

ESOI 2026 Heidelberg | Oral & Poster abstracts

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ESOI 2026 Heidelberg | Oral Abstracts

Scientific Session 1: Therapy Monitoring

Friday, October 30, 2026 | 14:40-15:40 CET | Auditorium

Definition of MRI complete response in multiple myeloma focal lesions– a lesion-based comparison with 18F-FDG PET/CT from the GMMG-HD7 imaging sub-study

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Purpose

When using whole-body MRI (wb-MRI) for therapy response assessment in multiple myeloma, different patterns of focal lesions (FL) after therapy are observed. However, it remains unclear which of these represent persistent active disease. The purpose of this study was to identify post-treatment imaging characteristics of FLs in wb-MRI which discriminate active disease from residual inactive findings and thereby derive an improved definition for complete response in wb-MRI (MRI-CR).

Materials and Methods

This analysis was part of the imaging substudy of a prospective, IRB-approved trial. Participants were recruited between October 23rd, 2018, and September 22nd, 2020, for the ongoing main trial, and participants who underwent both serial wb-MRI and ¹⁸F-FDG PET/CT at baseline and after induction therapy were included in the current subproject. Imaging characteristics of FLs after induction therapy were investigated by two board-certified radiologists, and compared to metabolic activity of the corresponding FLs in ¹⁸F-FDG PET/CT. After descriptive statistical analysis, cutoff-values were applied to stratify different patterns within the persisting FLs.

Results

Sixty-four participants (median age, 59 years [IQR, 53-65 years], 42 men) were included. Four MRI patterns of FLs after induction therapy were observed. Refractory FLs, defined by ADC-values ranging from $600 \times 10^{-6} \text{mm}^2/\text{s}$ to $1400 \times 10^{-6} \text{mm}^2/\text{s}$, showed metabolic activity in 32% (15 of 47 FLs) for reader 1 and in 28% (15 of 53 FLs) for reader 2. All FLs showing cystic transformation (ADC-values $>1400 \times 10^{-6} \text{mm}^2/\text{s}$), all residual lesions (ADC-values $<600 \times 10^{-6} \text{mm}^2/\text{s}$), and all FLs showing resolution in MRI, were metabolically inactive in ¹⁸F-FDG PET/CT in 100% of cases for both readers. Based hereon, it was proposed to classify patients showing only cystic transformation pattern, residual lesion pattern, and resolution pattern as MRI-CR, instead of classifying only patients with resolution of all FLs as MRI-CR. In comparison to the former definition, this reclassification led to an increase of patients reaching MRI-CR from 11% to 54% for reader 1 and from 11% to 46% for reader 2.

Conclusion

In addition to FLs showing resolution, two specific patterns of persisting FLs were identified which do not represent metabolically active disease, but inactive residual findings. Based on these results, we proposed an improved new definition of MRI-CR, allowing a substantial proportion of patients with persistent FLs in MRI to be reclassified as having MRI-CR.

CEUS with VEGFR2-targeted microbubbles for monitoring of early immunotherapy effects in a colorectal cancer model

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Purpose

To evaluate contrast-enhanced ultrasound (CEUS) with VEGFR2-targeted microbubbles for longitudinal monitoring of early treatment effects during combined anti-PD-L1/anti-CTLA-4 immunotherapy in a murine colorectal cancer model.

Materials and Methods

Murine colorectal cancer allografts (CT26) were established subcutaneously in 29 female Balb/c mice (therapy n = 15; control n = 14). Baseline CEUS with VEGFR2-targeted microbubbles was performed on day 7. The therapy group received intraperitoneal anti-PD-L1 and anti-CTLA-4 antibodies between days 7-15; controls received sham treatment. Follow-up CEUS was performed on days 14 and 21. Tumor perfusion (WiAUC) and VEGFR2 binding (SI_{8min} , SI_{10min}) were quantified, and immunohistochemistry assessed CD8, Ki-67, TUNEL, CD31, and VEGFR2.

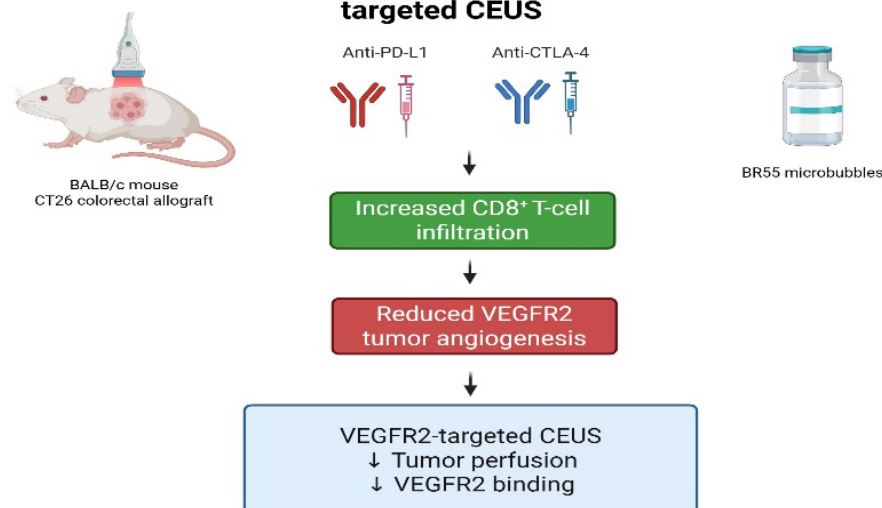
Results

At FU1, WiAUC was significantly lower in the therapy group compared with controls ($4,029 \pm 61$ vs $6,391 \pm 412$; $p < 0.001$), and remained significantly lower at FU2 ($1,028 \pm 27$ vs $2,049 \pm 39$; $p < 0.001$). VEGFR2-targeted microbubble binding was consistently lower under therapy. At FU1, SI_{8min} was 407 ± 11 vs 626 ± 13 and SI_{10min} was 409 ± 10 vs 634 ± 28 (both $p < 0.001$). At FU2, SI_{8min} was 106 ± 6 vs 207 ± 4 and SI_{10min} was 107 ± 5 vs 207 ± 4 (both $p < 0.001$). Immunohistochemistry confirmed higher apoptosis and tumor-infiltrating lymphocytes, and lower proliferation, microvascular density, and VEGFR2 expression in treated tumors (all $p < 0.05$).

Conclusion

CEUS with VEGFR2-targeted microbubbles enabled longitudinal monitoring of early immunotherapy effects, revealing lower tumor perfusion and VEGFR2 binding under combined immune checkpoint blockade.

Immunotherapy-induced vascular changes detected by VEGFR2-targeted CEUS



Dual checkpoint blockade links CD8-mediated antitumor immunity with reduced VEGFR2-associated tumor angiogenesis

Dual checkpoint blockade (anti-PD-L1/anti-CTLA-4) increases CD8⁺ T-cell infiltration and reduces VEGFR2-mediated tumor angiogenesis. VEGFR2-targeted CEUS reveals decreased tumor perfusion and receptor binding in the CT26 mouse model.

Hybrid SSTR-PET/CT criteria outperform RECIST 1.1 or SSTR-PET criteria alone in GEP-NET undergoing PRRT

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Purpose

RECIST 1.1 is the clinical standard for response evaluation in GEP-NET patients undergoing PRRT. However, the prognostic value of SSTR-PET/CT criteria remains unclear. The aim of this study was to evaluate whether SSTR-PET/CT response scores (MORE, nMORE, ZP, nZP and RECIN) provide superior response classification and prognostic stratification compared to CT-based RECIST 1.1.

Materials and Methods

In this retrospective single-center study, 154 patients with metastatic GEP-NET treated with [¹⁷⁷Lu]Lu-DOTATATE and undergoing SSTR-PET/CT at baseline and at two follow-up time points (FU1: intermediate follow-up after 2 cycles, FU2: after completion of 4 cycles PRRT) were included. Response assessment was performed according to RECIST 1.1 and the SSTR-PET/CT criteria MORE/(normalized) nMORE (SUVmax-based), ZP/nZP (SUVmean- and HU-based) and RECIN (CT- and SUVpeak-based). All scores were classified into CR, PR, SD and PD. Associations with overall survival (OS) were evaluated using Kaplan–Meier analysis, Cox regression and model performance metrics (including C-index and AIC).

Results

MORE, nMORE, ZP and nZP classified significantly more patients as PD than RECIST 1.1 at FU2 (18.1%, 23.9%, 25.4% and 28.3%, respectively; $p < 0.01$). For PR, all evaluated criteria, including RECIN, assigned significantly more patients to PR than RECIST 1.1 at both FU1 and FU2 ($p < 0.001$). While at FU1 none of the evaluated criteria showed a significant OS difference between PR, SD and PD ($p > 0.05$), at FU2 patients classified as PD by RECIST 1.1, ZP, nZP and RECIN demonstrated significantly shorter OS than those with SD or PR ($p < 0.05$). At FU2, ZP and nZP showed the strongest prognostic value for OS among all criteria (ZP: HR 3.06, $p < 0.001$; AIC 450.9; C-index 0.64; nZP: HR 2.52, $p < 0.001$; AIC 452.5; C-index 0.65), outperforming RECIST 1.1 and RECIN (both C-index 0.58; AIC 456.4). Patients classified as PD by nZP but PR/SD by RECIST 1.1 at FU2 demonstrated significantly shorter OS than concordant PR/SD (median OS 45.3 vs. 61.7 months; $p = 0.019$).

Conclusion

ZP and nZP emerge as especially promising PET-based criteria for response assessment in GEP-NET patients at therapy completion after PRRT, as they effectively stratified OS.

Superior Overall Survival Prediction with RECIST 1.1 Compared to Choi and Volumetric Response Criteria in PRRT-Treated GEP-NET

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Purpose

Despite recognized limitations, clinical guidelines recommend unidimensional RECIST 1.1 for response assessment in GEP-NET treated with PRRT, whereas neither functional (Choi) nor volumetric criteria have an established role. This study aims to compare unidimensional response criteria with multidisciplinary tumor board (MDT) assessment and overall survival (OS) prediction in patients with GEP-NET undergoing PRRT, and to evaluate the potential added value of volumetric response assessment.

Materials and Methods

This retrospective single-center study (2012–2023) included 138 patients with advanced GEP-NET who received four PRRT cycles and underwent baseline and follow-up SSTR-PET/CT. Response after four cycles (FU1) and at the subsequent follow-up (FU2) was assessed using RECIST 1.1, Choi, and volumetric criteria derived from RECIST 1.1, and compared with MDT assessment. Category distributions were evaluated with McNemar's test. Agreement with MDT was quantified using Cohen's κ and percentage agreement. OS discrimination was assessed using Cox regression models with hazard ratios (HR), Akaike information criterion (AIC), and Harrell's concordance index (C-index). Kaplan-Meier and log-rank tests further evaluated OS.

Results

Choi and volumetric criteria identified significantly more patients as progressive disease (PD) than MDT at both FU1 ($p = 0.013$; $p < 0.01$) and FU2 ($p = 0.043$; $p < 0.01$), whereas RECIST 1.1 did not ($p > 0.25$). Patients classified as PD by Choi but as stable disease (SD) by RECIST 1.1 had OS similar to those with SD by both methods (FU1 $p = 0.52$; FU2 $p = 0.69$). RECIST 1.1 showed the highest agreement with MDT (FU1 $\kappa = 0.83$, 97.8%; FU2 $\kappa = 0.67$, 91.2%), followed by Choi, while volumetric RECIST showed only moderate concordance. All three criteria were prognostic for OS; RECIST 1.1 demonstrated the most favorable model performance (FU1 C-index = 0.553; AIC = 473).

Conclusion

RECIST 1.1 showed the highest concordance with MDT assessment and effectively stratified OS. Additional PD classifications by Choi or volumetric criteria did not correspond to shorter survival and offered no incremental prognostic value beyond RECIST 1.1.

Use of the MetroPancreas algorithm to reduce futile resections in patients with pancreatic ductal adenocarcinoma after neoadjuvant treatment

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Purpose

This study aims to test the MetroPancreas algorithm, a score for identifying patients with upfront resectable pancreatic ductal adenocarcinoma (PDAC) at increased risk of death or recurrence within 6 months, in a cohort of patients who underwent neoadjuvant therapy (NAT) before resection.

Materials and Methods

This is a retrospective study on a prospectively-maintained registry (PAD-R registry, n1101CESC). We reviewed all patients resected for PDAC after NAT at the Pancreas Institute of Verona, Italy, between 2014 and 2021, including those with baseline and post-treatment CT available for review, tumor markers in the electronic medical records, and follow-up/survival data. The online MetroPancreas calculator was used to assess the following explanatory variables: CA19-9-adjusted-to-size criteria, futility risk group, Personalized Futility Index (PFI). Univariate analysis and binary logistic regression analysis investigated the association of explanatory variables with outcome variable of early recurrence/death (<6 months after surgery).

Results

132 patients (62 M, 70 F, mean age 64.72 ± 8.93 years) were included, with 28 deaths (21.2%; Overall Survival 28.71 ± 16.21 months). PFI decreased from a baseline of 19.22 ± 8.86 to 14.67 ± 8.40 after NAT ($p < 0.001$, Wilcoxon matched-pairs test), and the proportion of high-risk cases decreased from 34.1% to 15.9%. In univariate analysis, death/recurrence were associated with baseline tumor size > 29.50 mm, ASA > 2 , and PFI, which were considered as explanatory variables in regression analysis. Tumor size > 29.50 mm (adjusted Odds Ratio [aOR] 2.773, 95%CI 1.036-7.423), baseline PFI > 19.75 (aOR 4.583, 95%CI 1.146-18.316) and post-NAT PFI > 10.75 (aOR 6.663, 95%CI 1.585-28.011) were predictive of death/recurrence.

Conclusion

Although devised for upfront-resectable PDAC, this preliminary experience shows that MetroPancreas could be a valid tool to preoperatively identify PDAC patients treated with NAT at high risk of early recurrence or death.

MRI Evaluation of the Local Response of Pancreatic Ductal Adenocarcinoma Before and After Neoadjuvant NALIRIFOX Therapy

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Purpose

Pancreatic ductal adenocarcinoma (PDAC) is an aggressive cancer with an estimated 5% of 5-years survival, and only 15-20% of tumors are classified as upfront resectable at diagnosis. In recent years, neoadjuvant therapy has become increasingly important for treating patients with borderline resectable or locally advanced disease. However, restaging after treatment is still challenging because CT cannot reliably distinguish residual tumor tissue from therapy-induced fibrotic scar tissue. This study aims to evaluate the role of multiparametric MRI in assessing PDAC response to neoadjuvant therapy.

Materials and Methods

A retrospective single-center study was conducted on patients enrolled in the phase III nITRO trial and treated with the NALIRIFOX regimen at the Oncology Unit of the Policlinico G.B. Rossi (AOUI Verona). All patients underwent CT and MRI before and after treatment. The MRI examinations included T2-weighted images, diffusion-weighted imaging (DWI, b800), apparent diffusion coefficient (ADC) maps, and dynamic contrast-enhanced sequences. Two readers evaluated morphological and functional changes in the tumor, including: presence of metastatic disease, tumor size in mm, main pancreatic duct (MPD) dilatation in mm, signal intensity on DWI b800 sequences, ADC map, T1-, T2-weighted, and dynamic contrast-enhanced sequences.

Results

30 patients (18 M, 12 F, mean age 60.6 years) were included. The statistical analysis showed significant pre- and post-treatment changes in ADC values and signal intensity during the arterial, venous and delayed contrast-enhanced phases, suggesting the development of fibrotic scar tissue within the tumor microenvironment as a response to therapy: post-treatment tumors showed a significant increase in signal intensity in contrast-enhanced sequences during the arterial, venous and delayed phases, and a significant decrease in ADC values, with a prevalence of severe restricted diffusion before treatment (16/27, 59.3% grade 3) which resolved after neoadjuvant therapy (14/30, 46.7% grade 1). It was also observed a significant decrease in tumor dimension, from $27,57 \pm 8,41$ mm before treatment to $20,07 \pm 9,63$ mm after treatment. No statistically significant correlation was found between MRI parameters and Tumor Regression Grade (TRG) in 21 patients who underwent surgical resection.

Conclusion

Multiparametric MRI appears to be a promising imaging technique for the evaluation of PDAC response to neoadjuvant therapy, providing additional and complementary information compared to conventional imaging.

Automating oncological response evaluation with a promptable tumor-tracking foundation model

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Purpose

To test whether a promptable tumor-tracking foundation model can reproduce radiologist RECIST 1.1 response assessment during cancer immunotherapy, and whether it stays reliable when prompted once and run autonomously across follow-up. We benchmarked LesionLocator, a zero-shot universal tumor segmentation and tracking model, for automated RECIST measurement and classification on real-world multicenter, multi-vendor CT and MRI.

Materials and Methods

We analyzed a subset of ANTICIPATE, a prospective pan-tumor immunotherapy study, including 88 patients in five cohorts (hepatocellular carcinoma, cutaneous melanoma, neuroendocrine carcinoma, uveal melanoma, mixed pan-cancer) with heterogeneous, multicenter imaging data, 276 follow-up timepoints and 662 target and new lesions. Predicted longest diameters were used to derive RECIST 1.1 response categories and compared to validated radiologist response assessments. Two prompting strategies were compared: automatic tracking, prompting only at baseline and propagating the prediction forward, and assisted tracking, with re-prompting at every timepoint from the reference annotations. Endpoints were RECIST agreement with Cohen's kappa, perclass recall, and absolute longest-diameter (LD) error among localized lesions.

Results

With automated tracking, LesionLocator reached 52% RECIST agreement with radiologist assessment with a kappa of 0.38 across tumor types. Performance was highest for solid CT metastases and poorest on MRI, where only 3% of lesions were correctly localized and RECIST agreement was 3%. Per-timepoint re-prompting improved performance substantially, increasing RECIST agreement to 66% and kappa to 0.52. Performance was strongly modality-dependent, with CT reaching 75% agreement with 92% of lesions correctly localized, versus 32% on MRI with 50% localized. Similar variation was observed across tumor entities, with highest agreement in cohorts dominated by solid, discrete metastases, such as melanoma 85% and pan-cancer 76%, and lower performance in entities with infiltrative or less well-contrasted lesions, such as hepatocellular carcinoma 45%.

Conclusion

A promptable tumor-tracking foundation model can reproduce radiologist RECIST assessment with promising accuracy on CT, particularly for solid, well-delineated metastases. Brief per-timepoint prompting substantially improves reliability and brings automated assessment closer to expert-clinical concordance. Further development is needed to improve performance on MRI and diffuse or infiltrative disease before fully automated RECIST assessment can be broadly deployed.

Opportunistic AI-Based Baseline Body Composition from Routine CT Predicts PFS in Pancreatic but Not small bowel Neuroendocrine Tumors Under Somatostatin Analogs

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Purpose

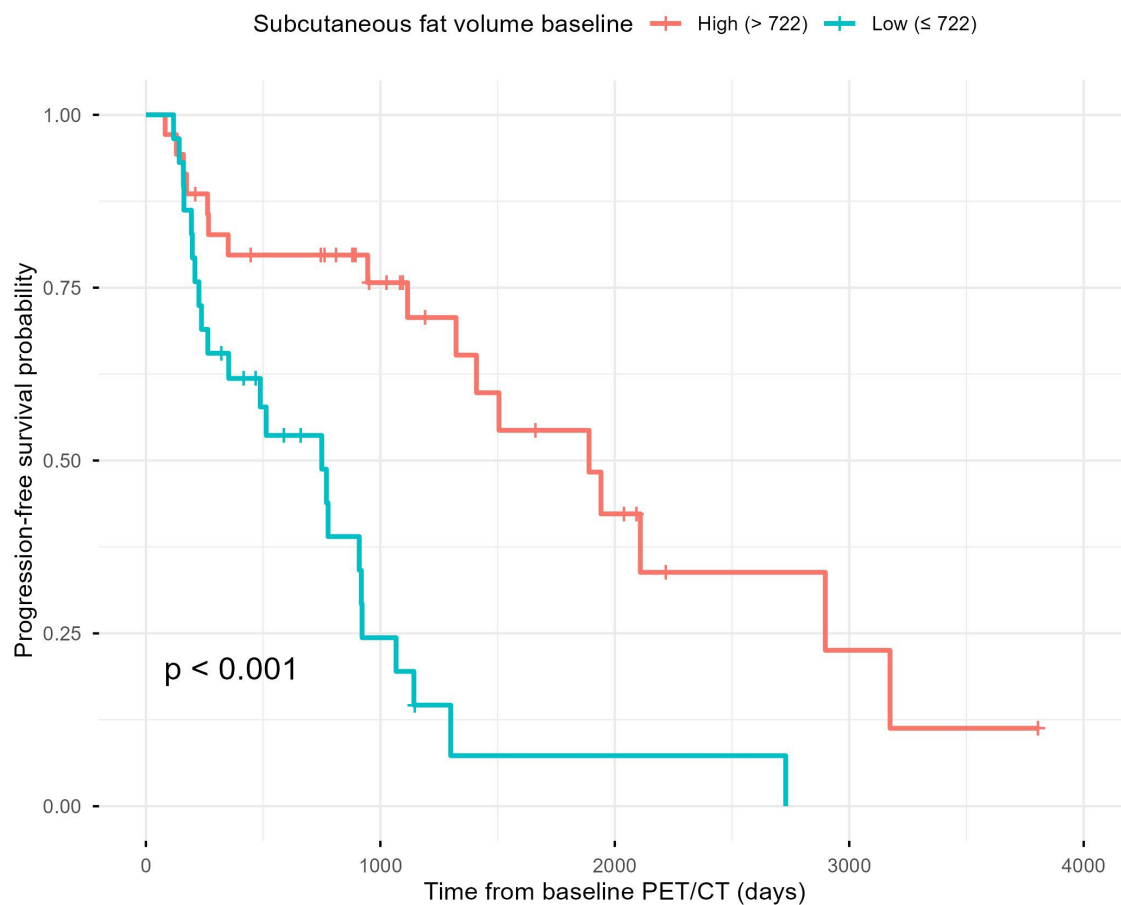
To evaluate whether opportunistic AI-based body composition analysis derived from routine CT enables clinical risk stratification by assessing its association with progression-free survival (PFS) in patients with neuroendocrine tumors (NET) treated with somatostatin analogs (SSA).

Materials and Methods

In this retrospective single-center study, 249 patients undergoing somatostatin analog therapy (65 with pancreatic neuroendocrine tumors (pNET) and 184 with small bowel neuroendocrine tumors (bNET)) were included. All patients underwent contrast-enhanced SSTR-PET/CT, with baseline defined as the examination performed prior to initiation of SSA. Body composition was extracted from routine clinical scans using MOOSE, an automated AI-based segmentation tool trained on large-scale datasets and validated against expert manual annotations, enabling fully automated opportunistic quantification of skeletal muscle, subcutaneous fat, and visceral fat. Derived parameters included volumetric measures, indices normalized to body surface area, and fat-to-muscle ratios. PFS was analyzed using Cox proportional hazards regression with adjustment for clinical confounders. Exploratory cut-offs were derived using maximally selected rank statistics and visualized by Kaplan-Meier analyses.

Results

PFS by Subcutaneous fat volume baseline



In the pNET cohort, 41 PFS events (63.1%) occurred. In adjusted Cox regression, higher visceral fat-to-subcutaneous fat ratio was associated with shorter PFS (HR 4.85, 95% CI 2.02-11.64, $p < 0.001$). Higher subcutaneous fat-to-muscle ratio was associated with longer PFS (HR 0.48, 95% CI 0.26-0.88, $p = 0.018$), as were higher subcutaneous fat volume (HR 0.999, 95% CI 0.998-1.000, $p = 0.016$) and skeletal muscle volume (HR 0.997, 95% CI 0.994-1.000, $p = 0.029$). Exploratory Kaplan-Meier analyses demonstrated significant PFS separation for all four parameters (all $p < 0.001$). In contrast, in the bNET cohort (111 PFS events [60.3%]), baseline body composition parameters were not associated with PFS in adjusted or unadjusted Cox models (all $p > 0.05$ after multiple testing correction).

Conclusion

Body composition analysis provides prognostic information for PFS in patients with pNET undergoing SSA, but not in bNET. These results highlight potential differences in prognostic relevance across NET subtypes. AI-based opportunistic body composition analysis from routine CT may provide additional prognostic information in patients with pNET undergoing SSA therapy and could support risk stratification pending further validation.

Dixon MRI Evaluation of Neoadjuvant Therapy–Related Hepatic Toxicity and Steatosis in Patients with Pancreatic Ductal Adenocarcinoma

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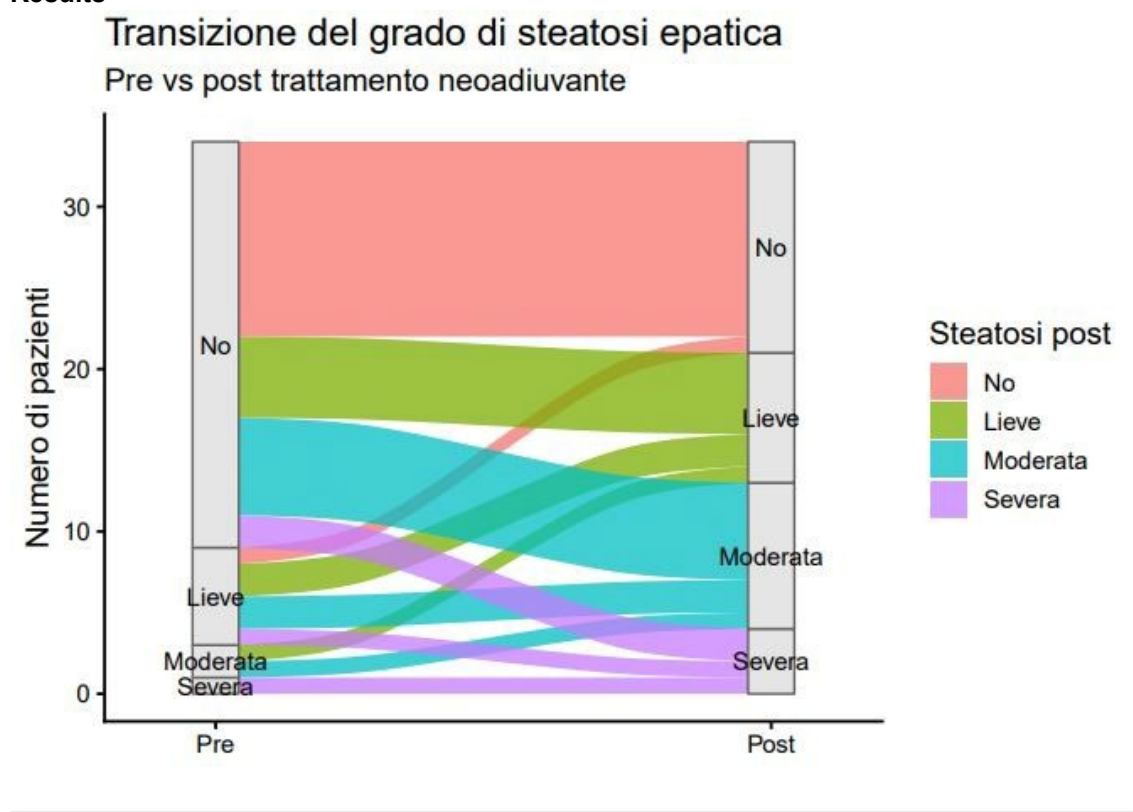
Purpose

Neoadjuvant therapy plays a pivotal role in the management of several solid malignancies, including pancreatic ductal adenocarcinoma (PDAC), but may induce hepatic changes that could affect subsequent surgery. This study evaluated neoadjuvant-related hepatic toxicity and changes in hepatic steatosis before and after therapy using Dixon magnetic resonance imaging (MRI), and explored their association with post-operative outcomes.

Materials and Methods

This retrospective study was conducted within an IRB-approved surgical registry (PAD-Registry, n1101CESC) and included patients with PDAC who underwent resection after neoadjuvant therapy. Pre- and post-treatment MRI examinations were required for inclusion. Hepatic toxicity was assessed in consensus by two radiologists, including hepatic steatosis, pseudocirrhosis, and sinusoidal obstruction syndrome (SOS). Steatosis was evaluated on Dixon MRI using a four-grade semi-quantitative scale (0 = absent, 1 = mild, 2 = moderate, 3 = severe). Paired pre- and post-treatment scores were compared using the Wilcoxon signed-rank test, with effect size (r). Changes in steatosis grade distribution were evaluated using the Stuart–Maxwell test. Associations between hepatic toxicity and length of hospital stay (LOS) were assessed using Spearman's correlation, while associations with post-operative complications were evaluated using the Chi-square test.

Results



Alluvial Plot

Thirty-four patients were included. Before treatment, 25/34 patients (73.5%) showed no hepatic steatosis, decreasing to 13/34 (38.2%) after treatment. Overall, steatosis worsened in 16 patients (47.1%), remained unchanged in 16 (47.1%), and improved in 2 (5.9%). The median steatosis score increased from 0 (IQR 0.75) pre-treatment to 1 (IQR 2) post-treatment. The Wilcoxon signed-rank test demonstrated a significant increase in steatosis after neoadjuvant therapy ($V = 161$, $p = 0.00085$), with a large effect size ($r = 0.787$). The Stuart–Maxwell test confirmed a significant shift in steatosis grade distribution ($\chi^2 = 11.73$, $p = 0.0084$). No patients developed radiological signs of pseudocirrhosis or SOS. Moderate-to-severe steatosis was not associated with a higher rate of post-operative

complications ($p = 0.36$), including bile leaks, postoperative hemorrhage, or postoperative pancreatic fistula (POPF), nor with longer LOS ($p = 0.65$).

Conclusion

In patients with PDAC undergoing neoadjuvant therapy, the most common hepatic toxicity was a significant increase in hepatic steatosis. Although Dixon MRI demonstrated measurable worsening of liver fat accumulation after treatment, this change was not associated with adverse short-term post-operative outcomes. These findings support Dixon MRI as a useful non-invasive tool for monitoring treatment-related hepatic changes.

LI-RADS CT/MRI Radiation Treatment Response Assessment Version 2024: Performance and category redistribution compared to Treatment Response Assessment Version 2018.

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Purpose

LI-RADS CT/MRI Radiation Treatment Response Assessment (TRA) version 2024 (v2024) removes LT TR equivocal category, introduces LT TR Non progressing category and more narrowly defines the criteria for LR TR Viable. The purpose of this study was to evaluate performance & redistribution of categories of the LI-RADS CT/MRI Radiation TRA version 2024 (v2024) with that of the LI-RADS CT/MRI TRA version 2018 (v2018) in patients with hepatocellular carcinoma(HCC) treated by the trans arterial radioembolization (TARE) / Stereotactic body radiation therapy (SBRT).

Materials and Methods

This single centre retrospective study included 39 patients with HCC treated with TARE or SBRT from January 2021 to May 2026. Two experienced radiologists reviewed initial three month post treatment CT or MRI examinations and assigned an LI -RADS treatment response (LR TR) category using both v2024 and v2018 for each treated lesion. The radiologists also assessed available second post treatment CT or MRI examinations using v2024. The performance of the two TRA versions in predicting complete tumor necrosis were evaluated.

Results

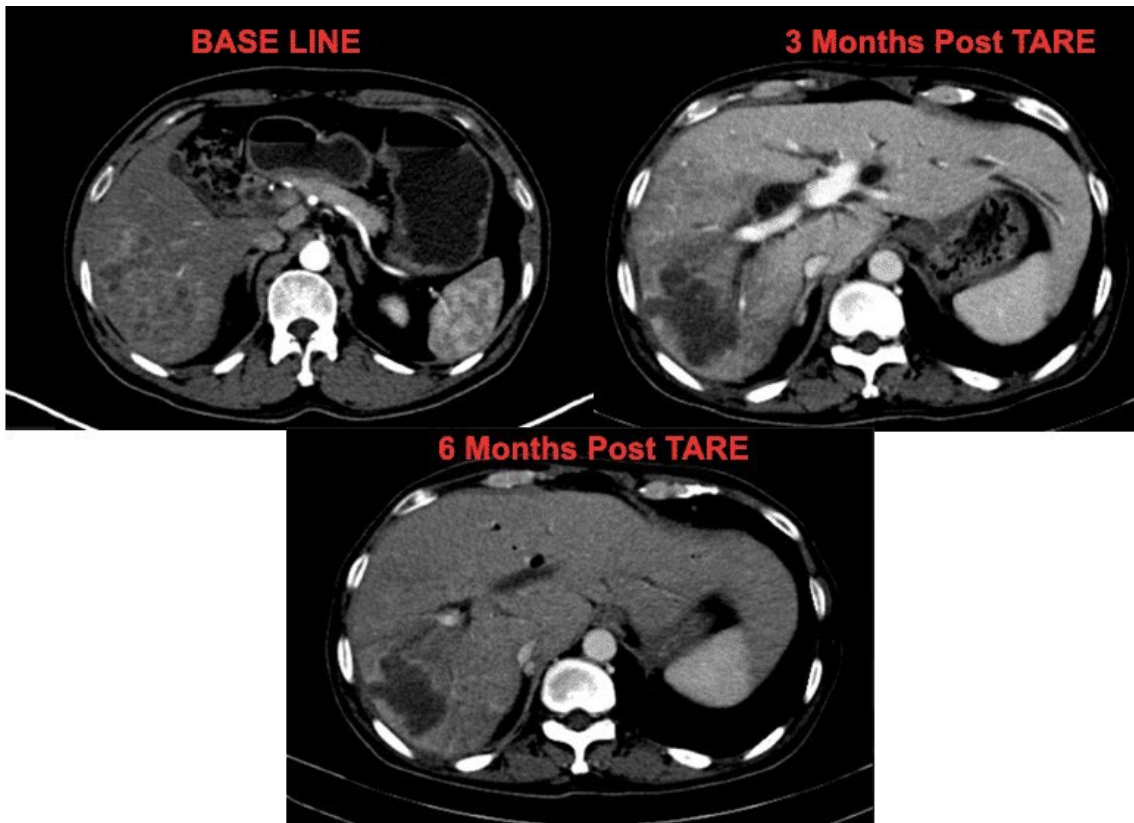
On first follow up, by using TRA v2018 distribution of categories were as follows: 9 lesions (23.1%) were LR TR Non viable, 30 lesions were LR TR Viable (76.9%). By using radiation TRA v2024, 9 lesions(23.1%) were LR TR Viable, 28 lesions(71.8%) were LR TR Non progressing and 2 lesions(5.1%) were LR TR Viable. Out of 30 lesions categorised LR TR Viable in v2018, 28 lesions were recategorized as LR TR Non progressing, while no change in category noted for LR TR Non viable lesions. Of 28 LR TR Non progressing lesions on second follow up, 4 cases(14.3%) transitioned to LR TR viable, 6 cases(21.4%) transitioned to LR TR nonviable and 18 cases(64.3%) remained in LR TR Non progressing. 2 cases of LR TR viable lesions become LR TR non progressing on second follow up.

Conclusion

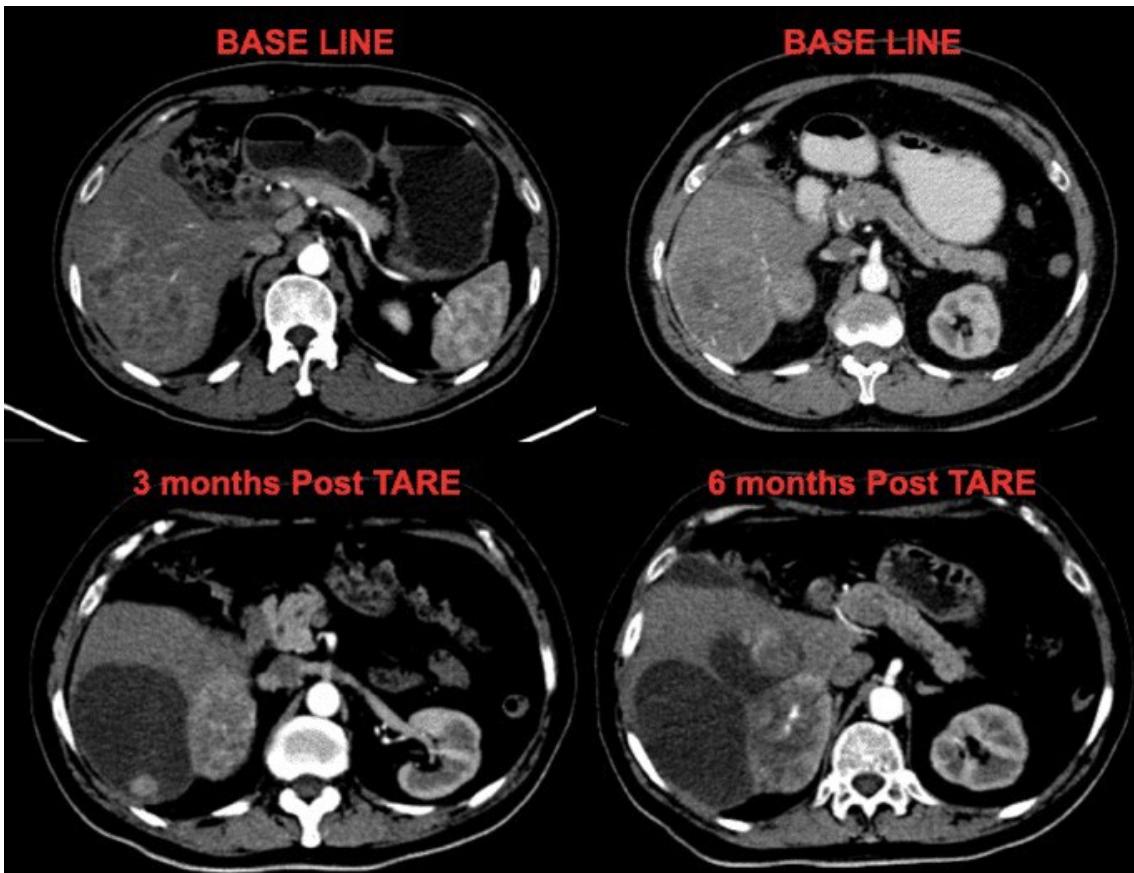
In the updated radiation TRA v2024 LR-TR Viable category was substantially less frequent than in v2018, as majority of lesions were recategorized to LR TR Non progressing. The diagnostic performance of radiation TRA v2024 in predicting the complete tumour necrosis of the Nonviable categories was comparable to that of TRA v2018.

CLINICAL RELEVANCE:

Updated radiation TRA version 2024 includes the characteristics of radiation-based therapy and the concept of change "over time" in assessing the treatment response. It refines early response assessment, provides prognostic utility, and informs further management strategies.



Base line image shows LR 5 lesion in right lobe of liver. On 3 months Post TARE follow up, lesion is LR TR Non progressing by v2024 (LR TR Viable by v2018). On 6 months post TARE follow up LR TR Non progressing lesion has become LR TR Non Viable lesion.



Baseline image shows multi-focal LR 5 Lesions. On 3 months Post TARE follow up, larger lesion shows LR TR Non Progressing category by v2024 (LR TR viable category by v2018). On 6 month follow up, LR TR Non progressing lesion has become LR TR Non viable.

Scientific Session 2: Diagnosis and Staging

Friday, October 30, 2026 | 14:40-15:40 CET | Room K1

Cross-sectional imaging of pancreatic squamous cell carcinoma: comparison with size-matched pancreatic ductal adenocarcinoma

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Purpose

To describe a series of pancreatic squamous cell carcinomas (PASC) at cross-sectional imaging and to compare them with size-matched pancreatic ductal adenocarcinomas (PDAC).

Materials and Methods

This retrospective study from an IRB-approved surgical registry (PAD-Registry, n1101CESC) included patients with histologically proven pancreatic squamous cell carcinoma and cross-sectional imaging available for review. Comparison was made with size-matched pancreatic ductal adenocarcinomas using Fisher's test and Wilcoxon test.

Results

Fifty-four of 75 patients with SCC included in the registry (24F, 30M, mean 63 years-old) had available imaging for review. PASC were located predominantly in the pancreatic head (55%) with a mean diameter of 30,3 mm (10-85 mm). PASC frequently demonstrated infiltrative margins (71%) with homogenous enhancement in 57%. Six PASC contained calcifications, 38 demonstrated vascular invasion, and 26 were associated with lymphadenopathies. MR was available in 18 patients: 94% lesions were hypointense on T1, and 72% were mildly hyperintense in T2sequences, 87,5% lesions showed restricted diffusion. PASC caused MPD dilatation less frequently than adenocarcinomas ($p=0.01$). No statistically significant difference was found in location, rate of macroscopic lymph nodal spread, vascular invasion, or calcifications. No difference in HU was observed between PASC and PDAC in any scan phase.

Conclusion

Pancreatic squamous carcinoma is a rare type of pancreatic carcinoma. While CT features do not allow a noninvasive differential diagnosis with ductal adenocarcinoma, PASC cause MPD dilatation less frequently than adenocarcinoma subtypes.

Diagnostic Accuracy Of Multiparametric MRI Breast In Differentiating Benign And Malignant Non Mass Enhancement Breast Lesions

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Purpose

ACR BI-RADS, defines Non-mass enhancement (NME) as a discrete enhancing area that is neither a mass nor a focus. NME seen on dynamic contrast enhanced breast MRI (DCE- MRI) can be either benign, high risk or malignant lesions. Purpose of this study was to evaluate the diagnostic accuracy of Multiparametric MRI in differentiating benign from malignant non mass enhancement lesions.

Materials and Methods

In this single center retrospective observational analysis, 62 patients who underwent MRI Breast between January 2021 to May 2026 were evaluated. Two experienced radiologists blinded to clinical history and histopathology outcome, independently evaluated each MRI examination. Non mass enhancement in each cases were categorized according to internal enhancement patterns (IEPs), pattern of distribution and Kinetic curve analysis. The reference standard was histopathology. Correlation between MRI characterization of NME and pathological outcome was done using appropriate statistical methods.

Results

62 patients (61 female and 1 male) with NME on dynamic contrast MRI was evaluated. Twenty one cases (34%) were histopathologically proven to be malignant and forty one cases were benign (66%). Dynamic contrast MRI showed 90.9% Sensitivity, 90.0% specificity, 83.3% positive predictive value, 94.7% negative predictive value for predicting malignant non mass enhancement. Inter-rater agreement was good ($k=0.78$). Segmental distribution was the most common NME pattern found in malignant lesions with a positive predictive value of 88.2%, followed by linear and regional distribution. As for enhancement pattern, among 21 malignant cases, 17 cases had heterogenous enhancement and 3 cases had clumped enhancement. In Kinetic curve analysis, type III washout curve seen in malignant lesions, type I persistent curve seen in benign lesions and type II plateau curve seen in both benign and malignant lesions. Restricted diffusion was seen in 81% malignant cases.

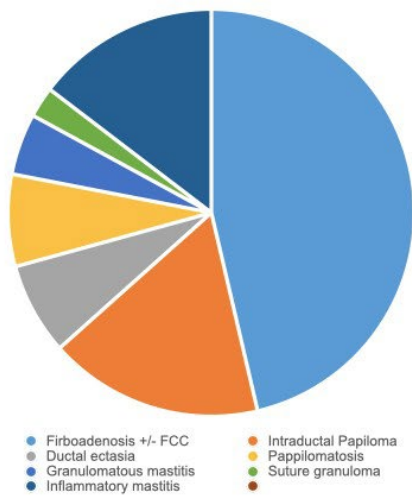
Conclusion

Multiparametric MRI Breast including dynamic contrast imaging and diffusion weighted imaging has high diagnostic accuracy in differentiating benign vs malignant non mass enhancements with high sensitivity and negative predictive value.

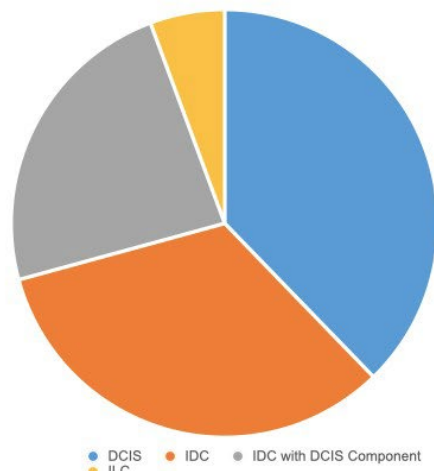
Clinical Relevance:

Non mass enhancement lesions in MRI Breast still remain a diagnostic challenge and careful characterization is crucial in predicting the malignant causes and reducing the unnecessary biopsies in benign conditions and ensure proper clinical management. In pre-operative setting non mass enhancement also determine the extent of peritumoral spread in presence of invasion.

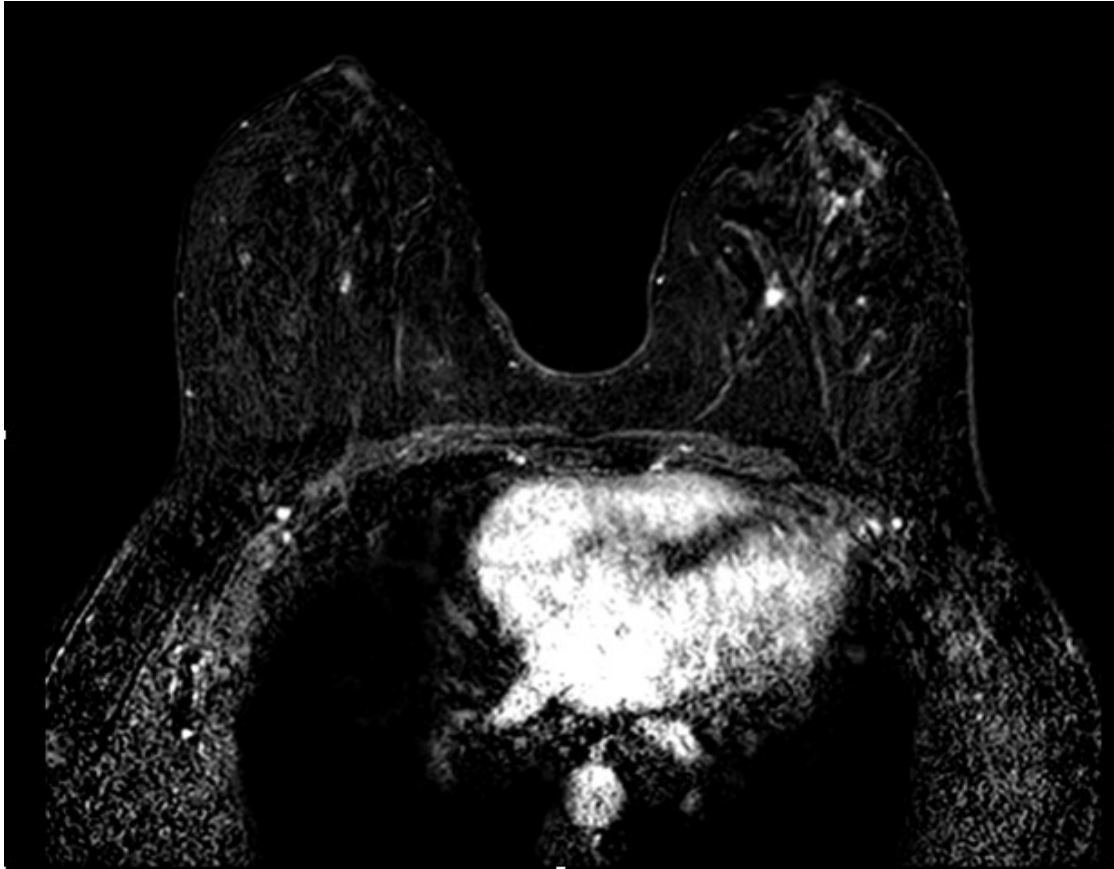
Distribution of Benign Non Mass Enhancement Lesion



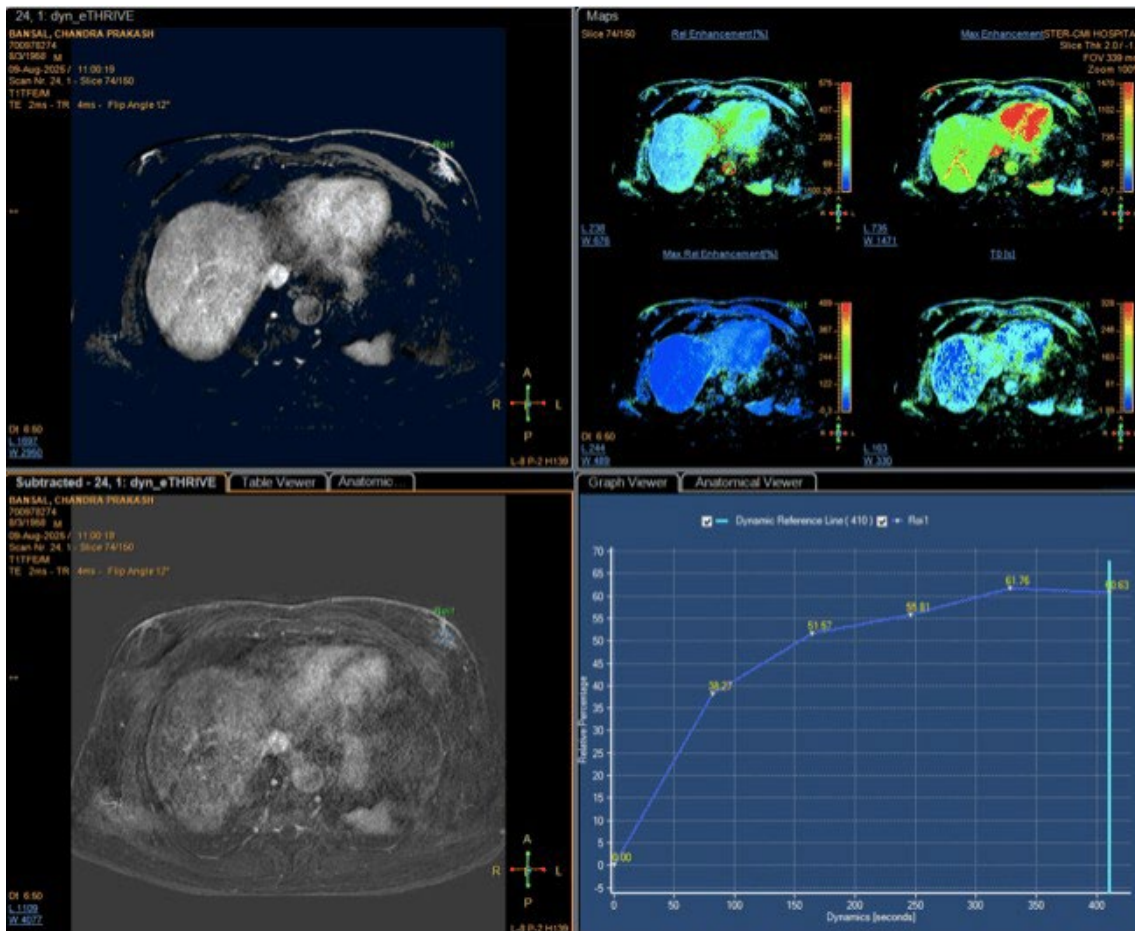
Distribution of Malignant Non Mass Enhancement Lesion



Histopathological distribution of Benign and Malignant Non mass enhancement breast lesions



Segmental Clumped Heterogeneous Non mass enhancement, HPE – IDC with DCIS component



Linear ductal homogenous non mass enhancement, HPE – Intraductal Pappiloma

Assessment of lymph node metastases by Node-RADS: a systematic review and meta-analysis on its diagnostic accuracy in the context of abdominal and pelvic malignancies

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Purpose

Our systematic review and meta-analysis aim to evaluate the diagnostic performance of Node Reporting and Data System 1.0 (Node-RADS) for identifying lymph node (LN) metastases, using histopathology as a reference standard, across a range of abdominal and pelvic malignancies.

Materials and Methods

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, and was registered via the International Prospective Register of Systematic Reviews (PROSPERO, CRD42025629704). PubMed, ScienceDirect and Cochrane Library databases were systematically searched until August 2025. We included studies analysing patients diagnosed with an abdominal or pelvic malignancy, who underwent contrast-enhanced CT or MRI for loco-regional work-up, with LN assessment by Node-RADS, associated with LN histopathological analysis. Study quality was assessed by modified Quality Assessment of Diagnostic Accuracy Studies (QUADAS-2) tool. Diagnostic performance was estimated by the random-effects model. Forest plots of pooled sensitivity and specificity were generated for two different Node-RADS thresholds.

Results

Twenty-four retrospective studies were included, comprising 13 using CT, 9 using MRI, and 2 using both CT and MRI. These studies covered a variety of malignancies: gynecologic (endometrial, ovarian, cervical), urologic (prostate, bladder, renal), and gastrointestinal cancers (colon, rectal, gastric, cholangiocarcinoma, periampullary). When applying a Node-RADS threshold of ≥ 3 to define malignant LN, the pooled sensitivity and specificity were 0.79 (95%CI, 0.7-0.86) and 0.83 (95%CI, 0.77-0.87), respectively. For a threshold of ≥ 4 , sensitivity decreased to 0.62 (95%CI, 0.53-0.7), while specificity improved to 0.94 (95%CI, 0.91-0.96). The hierarchical summary receiver operating characteristic (HSROC) analysis showed area under the curves (AUCs) of 0.88 (95%CI, 0.84-0.9) and 0.9 (95%CI, 0.84-0.94) for thresholds ≥ 3 and ≥ 4 , respectively.

Conclusion

Node-RADS score demonstrated a satisfactory diagnostic performance in assessing lymph node involvement across abdomino-pelvic malignancies, allowing a standardized analysis method that enhances reproducibility and supports clinical decision-making in oncologic staging.

Reproducibility of O-RADS MRI Dynamic Contrast-Enhanced Curve Assessment in Indeterminate Adnexal Masses

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Purpose

To evaluate the reproducibility of enhancement curve analysis according to O-RADS MRI criteria in indeterminate adnexal masses.

Materials and Methods

This retrospective observational study included 40 consecutive indeterminate adnexal lesions with a solid component that underwent pelvic MRI with dynamic contrast-enhanced (DCE) acquisition between March 2024 and January 2025. Two experienced gynecological radiologists (R1 and R2) independently placed regions of interest (ROIs) on the myometrium and solid tissue according to O-RADS MRI guidelines and repeated the analysis after one month. The four enhancement curves obtained for each lesion were independently and randomly reviewed by the same readers, who classified them into three risk categories (low, intermediate, high). Reproducibility was assessed using weighted Cohen's kappa, separately evaluating variability related to ROI placement and curve interpretation.

Results

Each radiologist evaluated 160 enhancement curves. A significant difference was observed in the distribution of risk scores between the two readers ($\chi^2(2)=46.0$; $p<0.001$). Overall interobserver agreement was moderate (weighted $\kappa=0.536$; agreement 66.2%). Variability related to ROI placement was limited, with high intraobserver agreement ($\kappa\approx 0.85$) and good ordinal consistency (Cronbach's $\alpha=0.687-0.759$), although extreme classification changes ($1\leftrightarrow 3$) occurred in approximately 10% of cases. In contrast, curve interpretation showed greater variability, with only moderate interobserver agreement ($\kappa\approx 0.35-0.68$) and significant systematic differences between readers ($p<0.001$).

Conclusion

DCE curve generation according to O-RADS MRI is highly reproducible, whereas interpretation of the enhancement curves represents the main source of observer variability. These findings support the need for more standardized interpretative criteria or decision-support tools to improve diagnostic reliability.

MRI–US Fusion-Guided Second-Look Ultrasound in Breast Imaging: A Prospective Study

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Purpose

To evaluate the diagnostic accuracy and procedural performance of second-look ultrasound with MRI–US image fusion after breast MRI, and to assess examination time and radiologists' subjective experience with this technique.

Materials and Methods

In this prospective, single-center study conducted between February 2024 and February 2026, consecutive patients underwent second-look ultrasound with MRI–US fusion imaging to characterize newly detected suspicious lesions on breast MRI or confirm previously identified lesions. Concordance between sonographically detected lesions and corresponding targets registered through fusion was analyzed relative to patient- and lesion-related covariates. MRI was obtained prone with a 1.5-T scanner; fusion-guided ultrasound was performed supine, with the ipsilateral arm abducted, using a dedicated platform equipped with an electromagnetic trackingbased Virtual Navigator system and Breast Nav MRI co-registration software. Total procedural time was recorded and stratified into a pre-examination (co-registration and target mapping) phase and an active scanning phase.

After each procedure, radiologists completed a questionnaire evaluating perceived confidence and usability. Significance was set at $p \leq 0.05$.

Results

Twenty-nine patients with 56 breast lesions (16 malignant, 28.6%; 40 benign, 71.4%) were enrolled. Of 43 lesions (76.8%) identified at fusion-guided ultrasound, 32 (74.4%) showed high spatial concordance with coregistered targets, while 11 (25.6%) showed low concordance. Target correspondence was achieved for all malignant lesions (16/16, 100%) versus 27/40 benign lesions (67.5%). Concordance correlated significantly with BMI, breast volume, and tissue density, and with MRI lesion diameter and presence of palpable abnormality. Mean total procedural time was 18.9 ± 5.8 minutes, with mean pre-examination time of 9.3 ± 3.4 minutes and mean scanning time of 9.6 ± 3.6 minutes. Univariate regression showed a significant progressive reduction in total and pre-examination time across the learning curve, while scanning duration remained stable. Operators reported intermediate-to-high confidence, correlating with high perceived usability.

Conclusion

MRI–US image fusion for second-look ultrasound after breast MRI showed robust performance in localizing and characterizing MRI-detected lesions, with progressively shorter procedural time and intermediate-to-high operator confidence.

Beyond Peritoneal Cancer Index: Incremental Value of Diffusion-Weighted MRI Over CT for Predicting Complete Cytoreduction

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Purpose

Accurate preoperative assessment of peritoneal tumour burden is essential for selecting patients with gastrointestinal peritoneal metastases for cytoreductive surgery (CRS) and hyperthermic intraperitoneal chemotherapy (HIPEC). This study compared the performance of diffusion-weighted magnetic resonance imaging (MRI) and contrast-enhanced computed tomography (CT) in estimating the Peritoneal Cancer Index (PCI), predicting completeness of cytoreduction, and correlating with operative findings.

Materials and Methods

In this prospective single-centre study, 5 consecutive patients with gastrointestinal malignancies undergoing CRS-HIPEC between May 2024 and April 2026 were included. All patients underwent contrast-enhanced CT and MRI with diffusion-weighted imaging within four weeks before surgery. Imaging PCI was independently assessed by two radiologists and compared with operative PCI, which served as the reference standard. Correlation analyses, Bland–Altman agreement, region-wise diagnostic performance, subgroup analyses, and prediction of complete cytoreduction (CC-0) were evaluated.

Results

The mean operative PCI was 10.9 ± 10.0 . Mean MRI-PCI and CT-PCI were 12.0 ± 9.9 and 10.2 ± 9.5 , respectively. MRI and CT demonstrated excellent correlation with operative PCI ($r = 0.893$ and $r = 0.892$, respectively; both $p < 0.001$). MRI showed a mild tendency to overestimate disease burden (bias $+1.05$), whereas CT mildly underestimated disease burden (bias -0.75). MRI demonstrated slightly higher overall sensitivity (98.0% vs. 96.1%) and diagnostic accuracy (90.9% vs. 89.1%). For prediction of complete cytoreduction using a PCI threshold ≤ 20 , MRI demonstrated higher specificity (53.3% vs. 33.3%) and overall accuracy (83.6% vs. 78.2%) than CT. MRI also demonstrated superior sensitivity in mucinous tumours and small bowel disease.

Conclusion

Both MRI and CT demonstrate excellent correlation with operative PCI in gastrointestinal peritoneal metastases. Diffusion-weighted MRI provides incremental clinical value through higher sensitivity, improved assessment of small bowel involvement, and superior prediction of complete cytoreduction, supporting its use as the preferred modality for preoperative CRS-HIPEC planning.

AI-Derived Zonal PSAD and Tumor-Derived MRI Parameters for the Prediction of Clinically Significant Prostate Cancer

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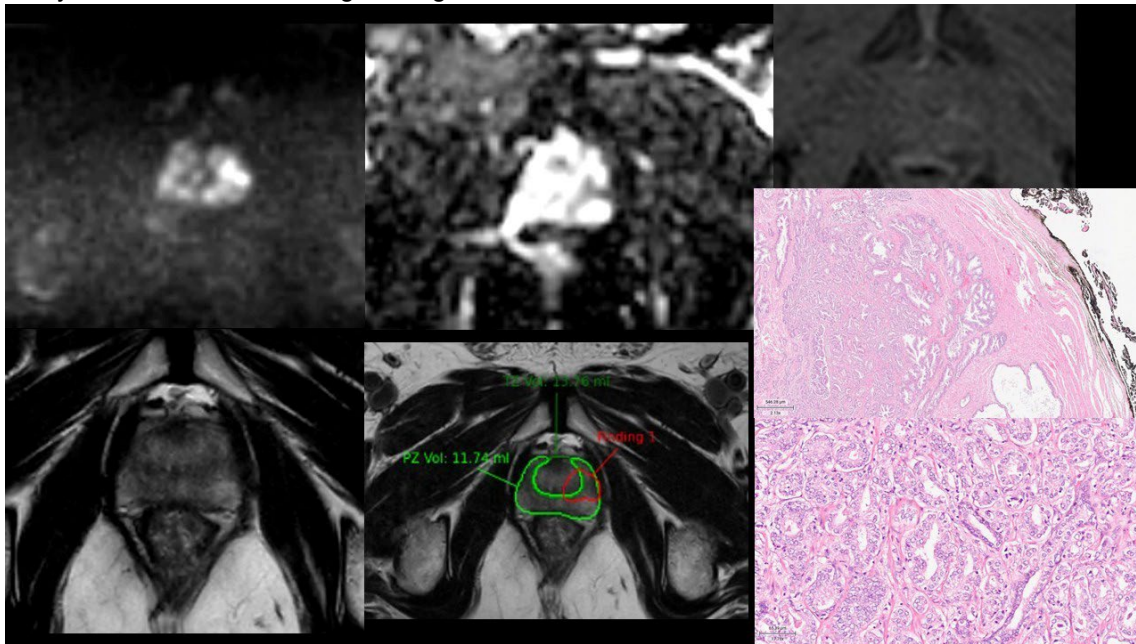
4. Zonguldak Bulent Ecevit University, Pathology, Zonguldak, Turkey

Purpose

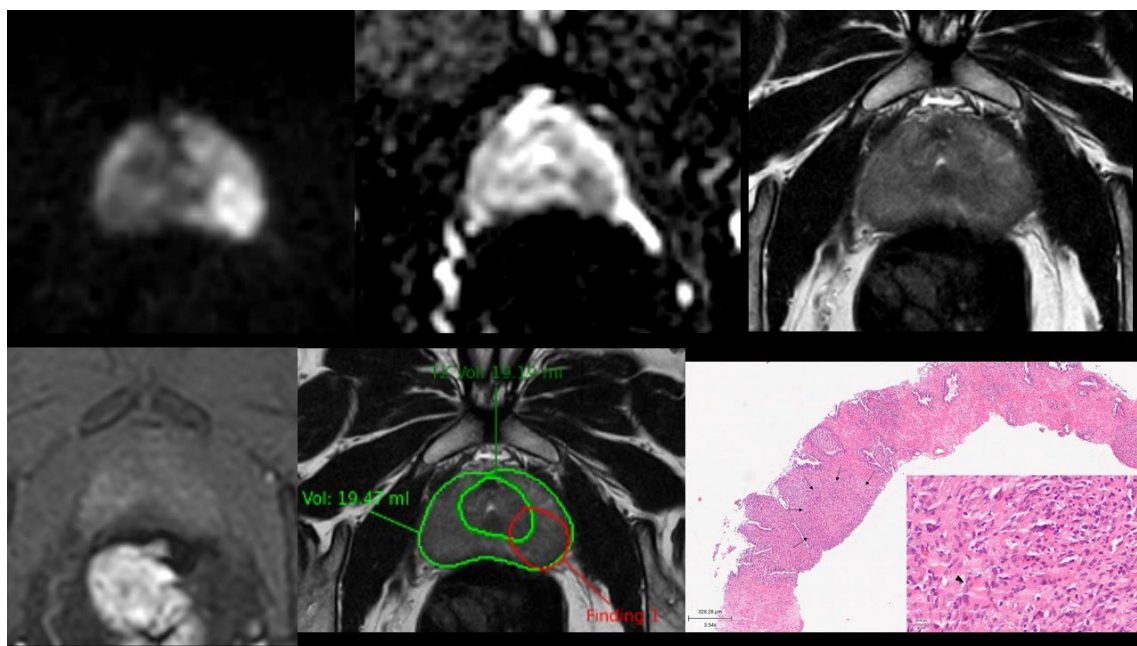
Although multiparametric prostate MRI (mpMRI) has become a cornerstone in prostate cancer diagnosis, its specificity remains limited, particularly in equivocal lesions. The aim is to investigate whether AI-derived zonespecific prostate-specific antigen density (PSAD) metrics combined with PI-RADS improve detection of clinically significant prostate cancer (csPCa) and reduce unnecessary biopsies.

Materials and Methods

In this retrospective single-center study, patients who underwent multiparametric MRI (mpMRI) and had histopathological confirmation were included. csPCa was defined as ISUP Grade Group ≥ 2 . Benign and clinically insignificant prostate cancer (ciPCa) cases were determined by TRUS-guided biopsy and clinical follow-up. PI-RADS v2.1 was assigned by an experienced radiologist blinded to pathology. AI-based MRI segmentation automatically generated whole-gland, peripheral-zone, and transition-zone volumes for calculation of wholegland (WgPSAD), peripheral-zone (PzPSAD), and transition-zone PSAD (TzPSAD). In MRI-visible lesions, lesion size, area, ADC, and tumor PSAD (TmPSAD) were recorded. Diagnostic performance was assessed using ROC analysis and multivariable logistic regression.



A 69-year-old patient who underwent radical prostatectomy. Serum PSA: 5.55 ng/mL; prostate volume: 24 mL; WgPSAD: 0.23 ng/mL/cc. MRI showed a PI-RADS 4 lesion. Histopathology demonstrated acinar adenocarcinoma, Grade Group 3 (Gleason 4+3=7), with focal extraprostatic extension and positive surgical margins.



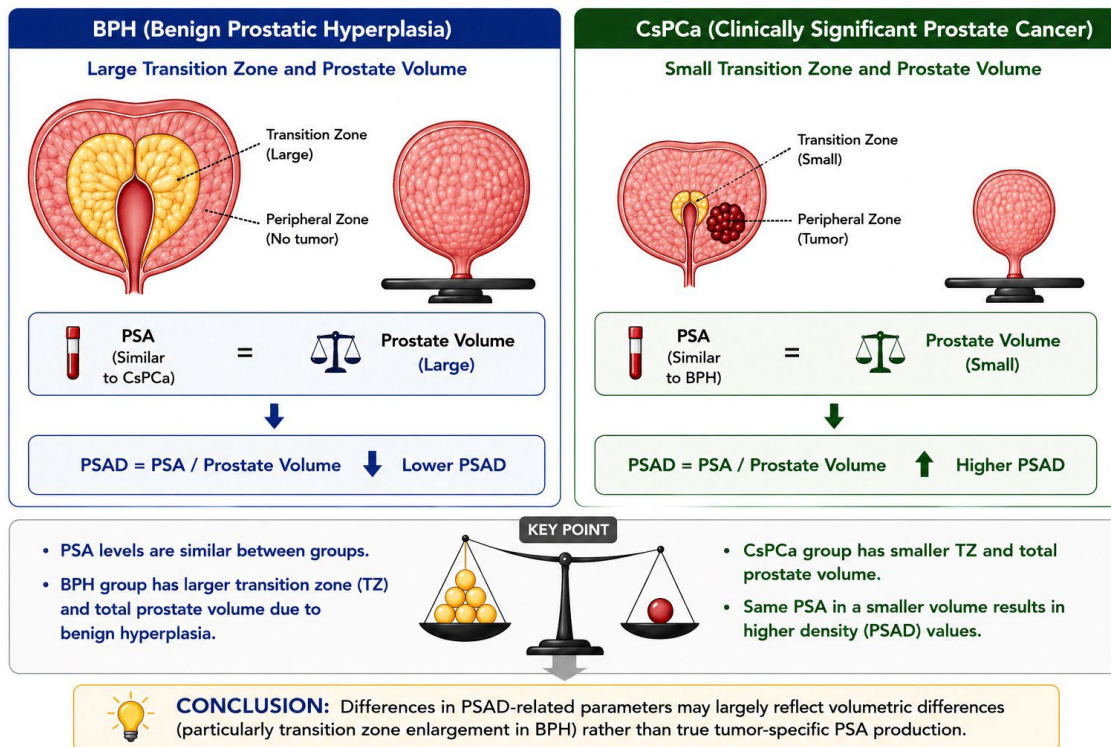
A 61-year-old patient. Serum PSA: 5.9 ng/mL; prostate volume: 38 mL; WgPSAD: 0.15 ng/mL/cc. MRI demonstrated a PIRADS 5 lesion. Prostate biopsy revealed granulomatous prostatitis. The inset shows a multinucleated giant cell (arrowhead) surrounded by epithelioid histiocytes (hematoxylin and eosin stain).

Results

Ninety-two patients (mean age 65.8 ± 6.0 years) were included, comprising 48 patients with benign prostatic hyperplasia (BPH), 20 with ciPCa, and 24 with csPCa. Among PSAD-derived parameters, TzP

MRI and clinical parameters	BPH (n=48, 52.2%)	ciPCa (n=20, 21.7%)	csPCa (n=24, 26.1%)	All PCa (n=44)	P value
Age	63.85 $\pm$ 6.92	67.05 $\pm$ 4.66	68.50 $\pm$ 3.77	67.84 $\pm$ 4.2	0.04*
Pz volume	17.6 $\pm$ 6	17.04 $\pm$ 6.3	13.9 $\pm$ 3.6	15.33 $\pm$ 5.2	0.027*
PSA	8.5 $\pm$ 5.83	9.98 $\pm$ 6.7	9.99 $\pm$ 8.07	9.98 $\pm$ 7.4	0.569
Prostate volume	66.0 (41.3- 84.7)	43 (32.25- 8.75)	43 (29.25- 61.25)	43 (30- 59.75)	0.003*
WgPSAD	0.12 (0.08- 0.17)	0.12 (0.13 - 0.32)	0.16 (0.12 - 0.28)	0.16 (0.13- 0.28)	0.002*
Tzvolume	42.7 (23.43- 67.9)	23.7 (13.55- 32.17)	17.4 (11.95- 29.13)	19.85 (12.74- 31.38)	<0.001*
TzPSAD	0.18 (0.1- 0.3)	0.19 (0.21- 0.64)	0.45 (0.26- 0.55)	0.44 (0.21- 0.62)	<0.001*
PzPSAD	0.12 (0.08- 0.15)	0.16 (0.13- 0.3)	0.16 (0.12- 0.29)	0.16 (0.12- 0.29)	0.002*

Clinical and MRI parameters of the study patients. PSA is expressed as ng/mL; , PZ, Tz and prostate volumes are expressed as mL, $\times 10^{-5}$ mm²/s, tumor area in mm², WgPSAD, TzPSAD and PzPSAD in ng/mL/mL.



Modeling of patients with benign prostatic hyperplasia (BPH) and clinically significant prostate cancer (csPCa) based on the findings of the present study.

SAD demonstrated the highest diagnostic performance for differentiating csPCa from benign/ciPCa cases (AUC=0.717, sensitivity 70.8%, specificity 75.0%; $p=0.002$), outperforming WgPSAD (AUC=0.645) and PzPSAD (AUC=0.645). Patients with csPCa showed significantly higher TzPSAD values and lower transition-zone volumes than non-csPCa patients.

PI-RADS demonstrated superior diagnostic performance for csPCa detection, with an AUC of 0.873. Using a PIRADS threshold of ≥ 4 yielded 68.2% sensitivity and 95.8% specificity. In multivariable logistic regression analysis, PI-RADS ≥ 4 remained the only independent predictor of csPCa (OR 12.4, 95% CI 2.8–54.3, $p=0.004$), whereas WgPSAD, PzPSAD, TzPSAD, minimum ADC, and TmPSAD did not retain independent significance.

Conclusion

Zone-specific PSAD parameters, particularly TzPSAD, showed better diagnostic performance than conventional WgPSAD for identifying csPca. However, their incremental value was limited when combined with PI-RADS, which remained the strongest independent predictor of clinically significant disease.

Scan-related anxiety and correlation with image quality in whole-body MR-imaging in individuals with LiFraumeni syndrome

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2. German Cancer Research Center, Radiology, Heidelberg, Germany

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Purpose

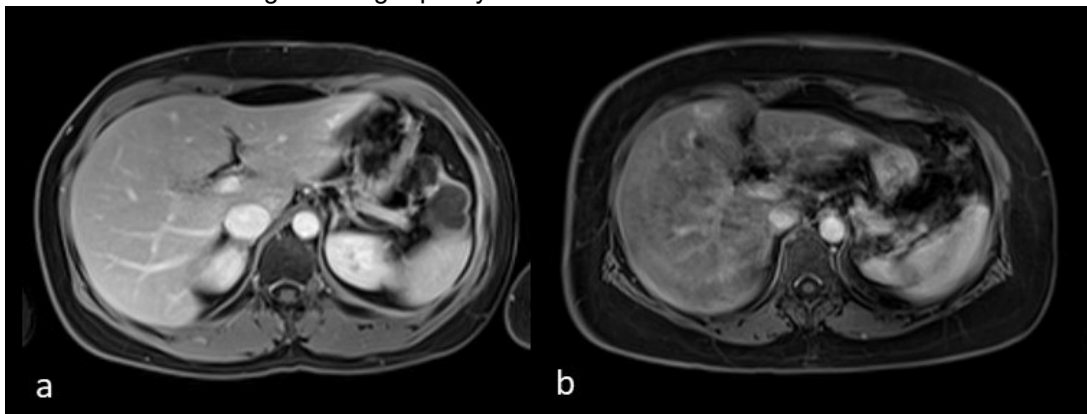
To evaluate anxiety during annual whole-body MRI (WB-MRI) surveillance in individuals with Li-Fraumeni syndrome (LFS) and to assess associations with clinical characteristics and image quality, particularly motion artefacts.

Materials and Methods

This prospective bicentric study was conducted within an ongoing WB-MRI surveillance study for individuals with confirmed LFS. Participants completed the validated 15-item Magnetic Resonance Imaging-Anxiety Questionnaire (MRI-AQ; score range 15-60) after their annual WB-MRI surveillance examinations. Associations between the initial MRI-AQ score and age, sex, and history of malignant disease were analysed by multivariable linear regression. Three radiologists independently rated overall image quality, contrast, sharpness, and motion artefacts using 5-point Likert scales, ranging from 1 (unacceptable/severe motion artefacts) to 5 (excellent/no motion artefacts). Correlations between MRI-AQ scores and image quality ratings were assessed using Spearman's rho.

Results

Overall, 114 MRI-AQ questionnaires from 86 participants were analysed, including 55 after the initial WB-MRI, 50 after the first annual follow-up, and 9 after the second annual follow-up. Mean Anxiety was low to moderate and did not change significantly with the number of prior exams with mean MRI-AQ scores after the initial examination, first follow-up, and second follow-up of 24.65, 24.80, and 25.56 respectively. Age, sex, and history of malignant disease were not significant predictors of the initial MRI-AQ score (all $p \geq 0.09$). Image quality was rated good to very good, with mean scores of 4.23 for overall image quality, 4.26 for contrast, 4.18 for sharpness, and 3.80 for motion artefacts. An example is shown in Figure 1. Anxiety did not correlate with overall image quality, contrast, sharpness, or motion artefacts (all $p \geq 0.41$). Examinations of participants with particularly high MRI-AQ scores nevertheless showed good image quality.



Representative examples of axial contrast-enhanced T1-weighted MR images of the upper abdomen with above-average (a) and below-average (b) image quality ratings. The images were obtained from two different female study participants aged 31 years (a) and 47 years (b).

Conclusion

Anxiety during annual WB-MRI surveillance in individuals with LFS was generally low to moderate and did not significantly vary over time. Anxiety was not associated with impaired image quality or increased motion artefacts, suggesting that WB-MRI remains technically feasible even in participants reporting higher anxiety levels. These findings support WB-MRI as a tolerable surveillance tool in this high-risk population.

A screening roadmap drawn without radiologists? *Concordance of IMACS myositis recommendations with population-based imaging guidelines*

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Purpose

The 2023 IMACS guideline is the first to standardise cancer screening in idiopathic inflammatory myopathies (IIM), prescribing imaging-intensive "basic" and "enhanced" panels; it was developed primarily within rheumatology and dermatology, without dedicated diagnostic/oncologic-imaging representation. From a radiology perspective, we aimed to benchmark its imaging-based recommendations against contemporary populationbased screening guidelines, to estimate the associated imaging burden, and to formally appraise its development quality via AGREE II.

Materials and Methods

This mixed-method study combined a cross-sectional comparison of guideline documents (not patient-level data) with a formal AGREE II quality appraisal. Each imaging-based IMACS screening recommendation was mapped to its targeted malignancy and benchmarked, item by item, against current population-based recommendations for lung, breast, colorectal, ovarian and gastric cancer; general-population (GPS) and high-risk (HPS) recommendations were retrieved from major societies/repositories (ESR/ESTI/EUSOBI/ESGAR, ACR, NCCN, ESGE, USPSTF; 2014-2026); between eligible guidelines, most recent versions were selected. Two reviewers (one rheumatologist and one radiologist) extracted modality, population, interval and stop rules. Imaging burden was estimated via EUCLID dose-length-product (DLP) reference values (scanner output, not effective dose).

Results

AGREE II appraisal indicated limited stakeholder involvement in guideline development. Of 24 documents identified, five guidelines met inclusion; no cancer type showed full concordance. Concordance was highest for gastric cancer (endoscopy as shared cornerstone) and lowest for ovarian cancer (IMACS includes pelvic CT, whereas guidelines advise against imaging-based screening). Recurrent divergences were: (1) multi-region CT, not supported for breast, ovarian or gastric screening; (2) chest radiography for lung, superseded by LDCT within defined high-risk programmes; (3) no MRI-based risk-stratification for high-risk breast screening. IMACS mandates CT as a screening layer, whereas evidence-based pathways use no CT for breast, gastric or ovarian screening and reserve it for selected colorectal cases; the enhanced panel's multi-region CT (DLP $\approx$ 1055–1929 mGy/cm) thus has no screening counterpart.

Conclusion

From an imaging perspective, several IMACS recommendations diverge from evidence-based population screening, chiefly through non-targeted, high-burden CT with limited screening sensitivity. We argue that oncologic-imaging societies should contribute to future IIM screening iterations, favouring organ-specific, validated modalities and reserving high-burden imaging for clinically justified scenarios, a debate we propose to open at ESOI.

Optimizing virtual non-calcium maps for Multiple Myeloma bone lesion detection: a quantitative and qualitative analysis of calcium suppression indices

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Purpose

Skeletal involvement in plasma cell disorders like Multiple Myeloma (MM) and its precursors, Monoclonal Gammopathy of Undetermined Significance (MGUS) and Smoldering Multiple Myeloma (SMM), can affect up to 80-90% of patients and requires accurate assessment of bone lesions[1].

This preliminary prospective study aimed to evaluate the diagnostic performance of virtual non-calcium (VNCa) maps derived from Dual-Layer computed-tomography CT (DLCT) for the detection of active MM bone lesions, comparing conventional and spectral CT using 8 calcium suppression (CaSupp) indices to identify optimal settings for lesion detection, diagnostic confidence, and visualization parameters.

Materials and Methods

21 patients with MM, SMM, or MGUS underwent whole-body low-dose (WBLD) DLCT. 25 active bone lesions, confirmed by FDG-PET, MRI, or follow-up WBLDCT[2][3][4][5], were analyzed. Examinations were performed using DLCT (Spectral CT 7500, Philips Healthcare), and both conventional CT images and spectral VNCa maps with 8 CaSupp indices (25-95) were evaluated.

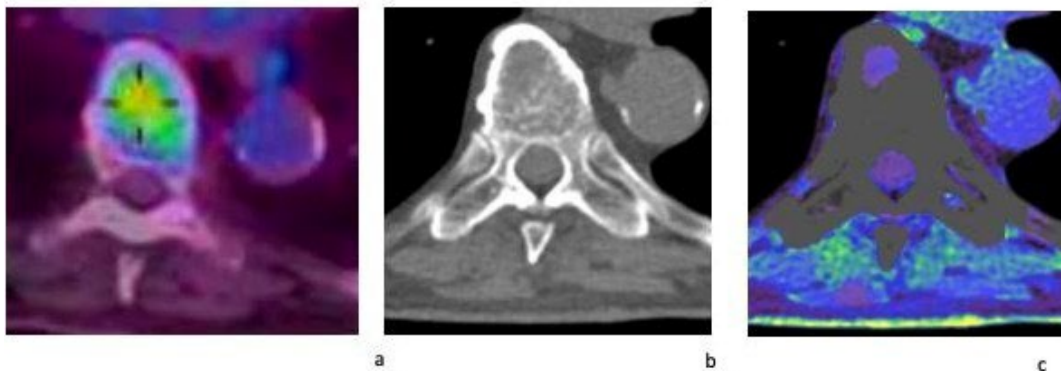
Quantitative analysis used regions of interest (ROIs) on lesions and healthy bone to measure mean attenuation (Hounsfield units)[6][7] and calculate relative contrast (CRel).

Diagnostic confidence was assessed on a 3-point scale by two radiologists in consensus, including lesion location analysis.

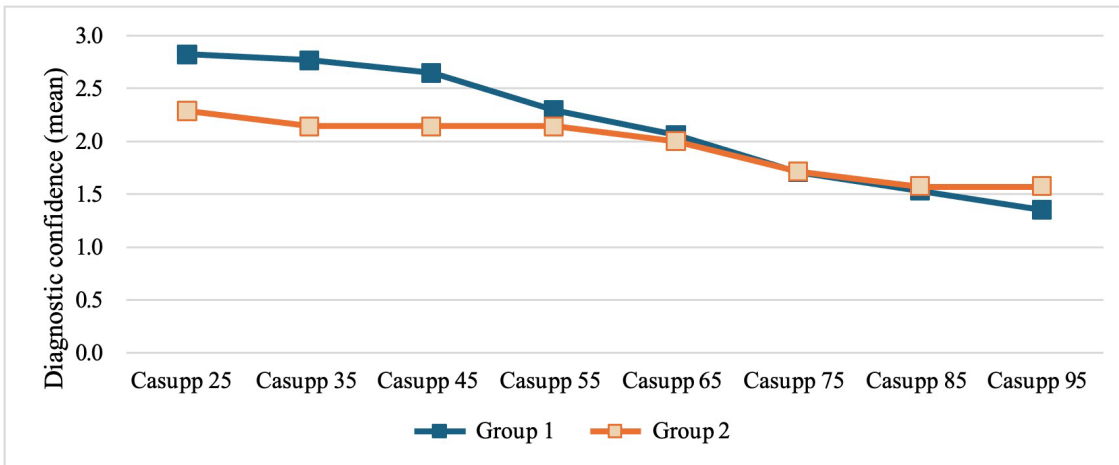
Optimal window level (WL) and width (WW) were derived for each CaSupp index, and correlation between CRel and diagnostic confidence was assessed using Pearson's coefficient.

Results

Spectral VNCa imaging detected 36% more active lesions than conventional CT, indicating higher diagnostic performance even without osteolysis.

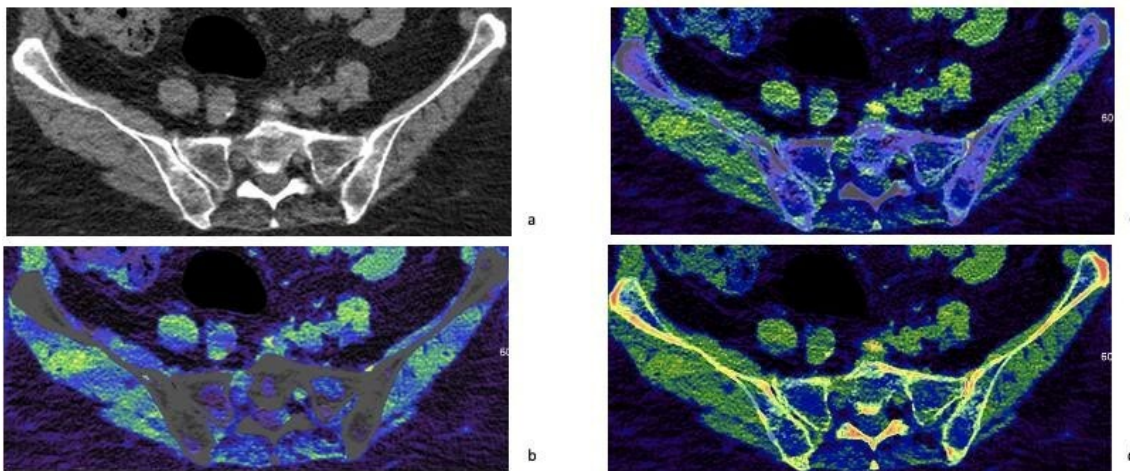


Active multiple myeloma (MM) lesion located in the anterior portion of the T8 vertebral body. (a) PET/CT demonstrating the site of metabolically active disease; (b) conventional CT showing no osteolytic lesions typical of MM; (c) VNCa map with the CaSupp25 index highlighting a focal abnormality corresponding to the PET finding. Quantitative analysis showed higher mean CRel with medium-high CaSupp indices (55-75), while diagnostic confidence was greater with medium-low indices (25-45), particularly in vertebral lesions.

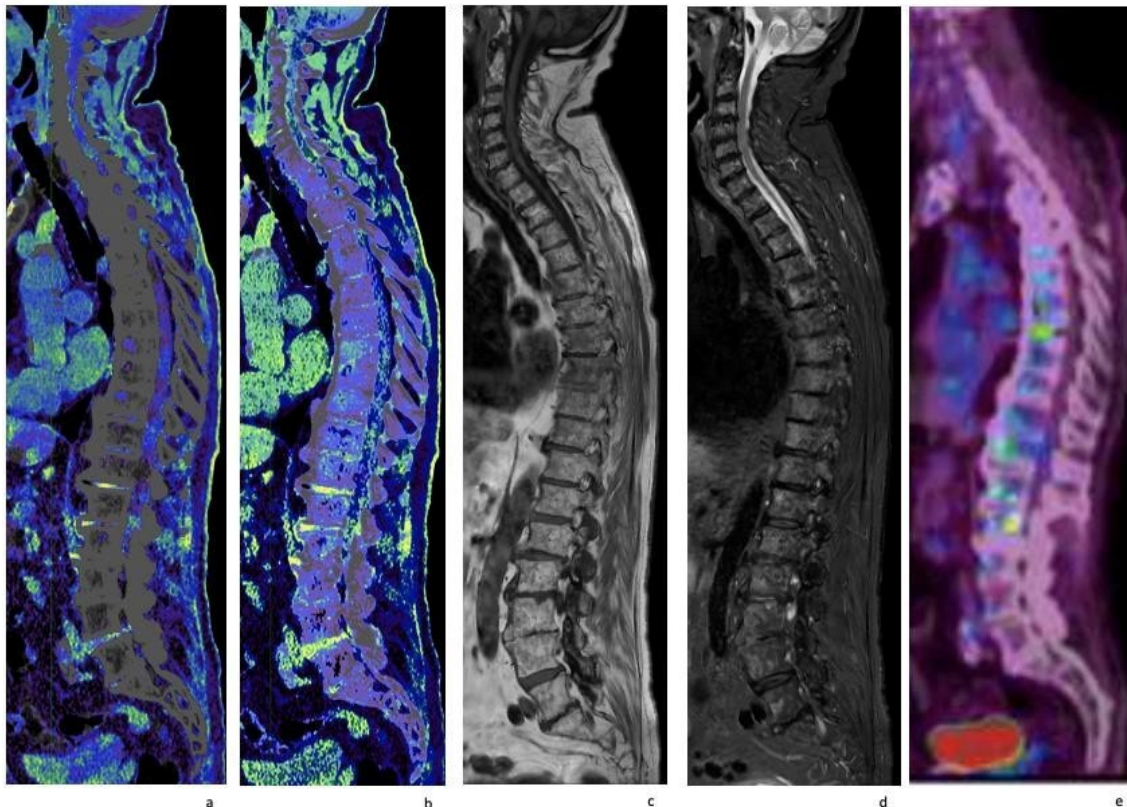


Group 1: lesions located in the spine; Group 2: lesions located in flat bones.

In flat bones, confidence was lower, likely due to difficulty distinguishing normal marrow from tumor infiltration.



Active lesion in the right sacrum evaluated using conventional CT and VNCA maps: (a) conventional CT; (b) CaSupp25; (c) CaSupp65; (d) CaSupp95.



Sagittal images of the whole spine comparing different imaging modalities: (a) VNCA CaSupp25 map; (b) VNCA CaSupp65 map; (c) T1-weighted MRI; (d) STIR MRI; (e) FDG PET/CT.

Pearson's analysis revealed a significant correlation between CRel and diagnostic confidence for medium-low CaSupp indices ($p < 0.05$). This discrepancy suggests that medium-low indices may enhance specificity and radiologist confidence, while medium-high indices increase sensitivity for diffuse infiltration. Lesion perception was also affected by visualization window settings, which required adjustment by CaSupp index.

Conclusion

Spectral VNCa imaging improves detection of active MM lesions compared with conventional CT and is a promising tool for diagnosis and management of MM. Diagnostic performance depends on calcium suppression settings, with a trade-off between contrast and diagnostic confidence, making optimization of reconstruction parameters essential for clinical use.

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Scientific Session 3: Advances in Oncological CT

Friday, October 30, 2026 | 14:40-15:40 CET | Room K2

Less is More: Dual-Energy CT and Contrast Reduction in Oncologic Follow-Up

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Purpose

Reducing iodinated contrast media (CM) in computed tomography is a clinical priority of particular relevance in oncologic patients undergoing repeated follow-up imaging, where cumulative CM exposure amplifies the risk of contrast-associated acute kidney injury (CA-AKI) alongside disease-related renal vulnerability. The global supply shortage of 2022 and growing economic and environmental concerns have further reinforced this need.

Dualenergy CT (DECT) enhances iodine conspicuity through low-keV virtual monoenergetic images (VMI), exploiting the iodine K-edge at 33.2 keV, potentially enabling dose reduction without compromising diagnostic quality. This study aims to define the minimum CM dose compatible with adequate image quality in an oncologic follow-up population and to validate VMI reconstructions as a routine clinical tool.

Materials and Methods

This retrospective study was conducted at the University Hospital of Siena. Phase 1 enrolled 300 oncologic patients in active follow-up who underwent total-body CT on two successive scanners (GE Discovery CT750 HD, SECT; GE Revolution Apex, DECT), with a mean 17% CM reduction in the second acquisition. Phase 2 analysed a subgroup of 45 patients drawn from the same cohort, who had undergone two consecutive DECT exams at substantially different doses (less than 0.5 gI/Kg vs 0.6 gI/Kg or above, lean body weight-based). Image quality was assessed via SNR, CNR, and Figure of Merit (FOM) on the hepatic portal phase, using non-parametric statistics (Wilcoxon, Friedman, Spearman).

Results

In Phase 1, DECT at 40 keV yielded significantly higher CNR and FOM than conventional SECT despite lower CM dose. SNR at 40 keV was comparable to 74 keV (Wilcoxon, $p > 0.05$), suggesting non-linear noise behaviour at low energies. In Phase 2, the correlation between dose variation and image quality did not reach statistical significance (Spearman rho 0.23, $p > 0.05$), and FOM values were higher in the low-dose group, with all metrics exceeding published reference thresholds.

Conclusion

In oncologic patients requiring long-term follow-up, DECT with 40 keV VMI reconstructions enables substantial CM dose reduction while preserving diagnostic image quality, supporting a reassessment of contrast protocols with direct implications for patient safety and treatment sustainability across repeated imaging sessions.

The Clinical Impact of PET/CT on Patient Selection for Stereotactic Body Radiotherapy: A Retrospective Cohort Study

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2. Imperial College Healthcare NHS Trust, London, United Kingdom

Purpose

Positron emission tomography-computed tomography (PET/CT) improves cancer staging and detection of metastatic disease and is increasingly used in selecting patients for stereotactic body radiotherapy (SBRT). [1] However, evidence for its impact on SBRT decision-making remains limited.

This study evaluates the influence of PET/CT on patient selection for SBRT by identifying sites of disease not detected on conventional modalities. These sites may be additional targets for SBRT or could preclude its use.

Materials and Methods

We performed a retrospective cohort study of patients referred for SBRT at a British teaching hospital (Imperial College London Healthcare NHS Trust) over a six-month period. All patients underwent a baseline PET/CT scan with at least one measurable target lesion (primary, oligometastatic or oligoprogressive). When available, PET/CT findings were compared with an alternate conventional imaging performed within two months prior (CT: 42.6%, MRI: 14.8%, No prior imaging: 42.6%). Demographic, primary tumour location, imaging, and treatment data were collected, including the impact of PET/CT on decision-making and the final choice of treatment.

Results

Of 54 eligible patients (29 male, 25 female; mean age = 67), PET/CT significantly influenced SBRT treatment selection in 38 (70.4%, $p=0.003$). PET/CT directly supported SBRT selection in 28 patients by identifying additional lesions or confirming disease progression. Malignancies of the lung and prostate were most likely to proceed to SBRT. PET/CT led to SBRT deselection in 10 patients where treatment was shifted to systemic therapies or surveillance predominantly because of high metastatic burden or patient unsuitability. The remaining 16 patients (29.6%) yielded no new PET/CT findings, exerting no impact on the treatment plan. Deselection or no impact on SBRT selection was more common in breast, colorectal, and renal cell carcinomas. 6 patients (11.1%) underwent [68 Ga]Ga-PSMA-11 PET/CT for prostate cancer, all of whom (100%) were selected for SBRT. The remaining 48 patients were evaluated using standard [18F]FDG PET/CT. The clinical utility of PET/CT remained consistent when stratified by metastasis timing (synchronous vs metachronous).

The observed lack of management impact in the renal cell carcinoma (RCC) cohort aligns with established literature highlighting the variable or often low [18F]FDG avidity of RCC leading to false-negative imaging. This emphasises the need to explore tumour-specific tracers.

Conclusion

This study demonstrates the substantial impact of PET/CT on selection of patients for SBRT. The greatest benefits were seen in lung and prostate cancers. Larger studies are needed to further investigate tumour-specific effects.

References

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Prognostic Value of CT-Derived Features for Five-Year Overall Survival in Locally Advanced Colon Cancer: A Multi-Reader Study

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2. Rijnstate hospital, Arnhem, Netherlands
3. Catharina Hospital, Eindhoven, Netherlands
4. Maastricht, Maastricht, Netherlands

Purpose

To evaluate whether CT-derived features are independently associated with five-year overall survival in patients with locally advanced colon cancer, and to assess the consistency and stability of CT findings across independent reader groups.

Materials and Methods

This retrospective study included patients with locally advanced colon cancer treated between 2011 and 2020 at two Dutch hospitals. CT scans were independently assessed by two groups of radiologists using a structured reporting template. Assessed features included T stage, tumour characteristics, bowel obstruction, extramural venous invasion (EMVI), tumour deposits, lymph node characteristics, and nodal station involvement. Five-year overall survival was the primary outcome. Cox proportional hazards models with backward variable selection were fitted separately per reader group, with EMVI as a stratification variable as it violated the proportional hazards assumption. A sensitivity analysis with 1000 iterations of random reassignment of reader observations was performed to assess the stability of variable selection.

Results

Reader group 1 included 912 patients with 221 deaths (24.2%), and reader group 2 included 945 patients with 228 deaths (24.1%). Model discrimination was similar (concordance statistic 0.679 and 0.693). Across both reader groups, bowel obstruction, older age, and male sex were independently associated with worse survival. In node-positive patients, each millimetre increase in lymph node size was associated with a 7–8% increase in mortality hazard ($p < 0.001$). Reader group 2 additionally identified tumour deposits (hazard ratio 1.83) and lymph node heterogeneity (hazard ratio 1.63). In sensitivity analysis, lymph node presence, lymph node size, age, and sex were retained in nearly all iterations. Bowel obstruction and paraaortic lymph node involvement showed high stability and tumour deposits and lymph node heterogeneity showed moderate stability.

Conclusion

Specific CT features were independently associated with five-year overall survival in locally advanced colon cancer. Lymph node size was the most consistent prognostic feature across reader groups, while bowel obstruction and paraaortic lymph node involvement also showed robust prognostic performance in sensitivity analyses. These findings suggest that reproducible CT-derived imaging features may contribute to preoperative prognostic assessment.

Integrating CT-Derived Anthropometric Biomarkers into the MetroPancreas Score for Predicting Futility in Upfront PDAC Surgery

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Purpose

Upfront resection is the only potentially curative treatment for pancreatic ductal adenocarcinoma (PDAC); however, it may be futile (i.e. recurrence or death within 6 months after surgery) in a relevant proportion of patients. The MetroPancreas score was created to provide a preoperative estimate of futility risk in these patients. The aim of this study is to assess whether the addition of preoperative CT-derived anthropometric variables improves the score's predictive ability for futility in patients undergoing upfront surgery for PDAC.

Materials and Methods

This is a retrospective study on a prospectively maintained registry (PAD-R registry, n1101CESC). We included patients who underwent upfront surgery for PDAC at the Pancreatic Surgery Unit of the Policlinico G.B. Rossi (AOUI Verona) between October 2013 and December 2020 for whom preoperative CT imaging was available for review. Futility was defined as recurrence or death within 6 months. The base model included BMI, ASA score, preoperative CA19-9, and radiological largest tumour size. We performed manual measurement of the selected CT-derived anthropometric variables, including pancreas-to-fascia distance, pancreas-to-skin distance, posterorenal fat thickness, paraspinal and psoas muscle measurements on both sides. Logistic regression models were built to compare the base score with an extended model, and performance was evaluated using AUC, Brier score, and internal bootstrap validation.

Results

158 patients were included, of which 87 were males and 71 females. Mean and median age were, respectively, 67 and 69 years old, with the youngest patient being 30 and the eldest 86 years old. Futility occurred in 19% of patients. The base model showed an apparent AUC of 0.67. Among the CT-derived anthropometric variables, mean left psoas density was the most informative marker and, when added to the base model, increased the apparent AUC to 0.70 and improved the Brier score from 0.141 to 0.136. After optimism correction, the AUC increased from 0.553 for the base model to 0.565 for the extended model, suggesting a modest but consistent incremental predictive value. Lower left psoas density was inversely associated with futility.

Conclusion

CT-derived anthropometric biomarkers may provide incremental prognostic information beyond the MetroPancreas score in upfront PDAC surgery, although the overall improvement in predictive performance was modest in this cohort. Left psoas mean density appears to be the most promising candidate marker and warrants external validation.

CT-Based Radiomics Machine Learning Model to Predict Response to Lu-177 DOTATATE in Advanced Gastroenteropancreatic Neuroendocrine Tumors: A Single-Center Retrospective Study

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2. Sapienza University of Rome, Sant'Andrea University Hospital, Gastroenterology Unit, Department of Medical-Surgical Sciences and Translational Medicine, Rome, Italy

Purpose

Lu-177 DOTATATE represents a cornerstone treatment for advanced gastroenteropancreatic neuroendocrine tumors (GEP-NETs). However, robust imaging biomarkers capable of predicting response to peptide receptor radionuclide therapy (PRRT) are still lacking. This study aimed to develop a CT-based radiomics machine learning model to predict disease progression in GEP-NET patients treated with PRRT.

Materials and Methods

This single-center retrospective study included 43 patients with advanced GEP-NETs and liver metastases treated with Lu-177 DOTATATE at the ENETS Center of Excellence of Sant'Andrea University Hospital in Rome. Contrast-enhanced CT scans acquired before therapy and during follow-up were analyzed. Clinical variables included progression-free survival, overall survival, tumor grade, Ki-67 index, and survival status. Patients were classified as progressive (n = 15) or non-progressive (n = 28), with no significant differences in demographic characteristics. Whole-liver segmentation was performed on arterial-phase CT images, and radiomic features were extracted in accordance with IBSI guidelines. Five supervised machine learning classifiers were trained and tested for binary outcome prediction.

Results

Radiomics-based machine learning models demonstrated a consistent ability to discriminate patients based on their response to PRRT, indicating that hepatic CT radiomic signatures capture biologically relevant information associated with treatment resistance. The K-Nearest Neighbors classifier outperformed all other models, achieving a ROC-AUC of 87% and an accuracy of 85%. The model showed high sensitivity (80%) and a positive predictive value of 87%, enabling the effective identification of patients at high risk of disease progression following PRRT. The F1-score reached 76%, highlighting a robust classification performance despite the limited cohort size. Overall, the performance metrics and calibration analysis support the potential clinical utility of the proposed radiomics approach.

Conclusion

These findings provide preliminary yet compelling evidence that CT-based hepatic radiomics, combined with machine learning, can identify advanced GEP-NET patients at a higher risk of progression after PRRT. This approach could represent a promising non-invasive imaging biomarker for patient stratification and treatment personalization, and warrants validation in larger, multicenter cohorts.

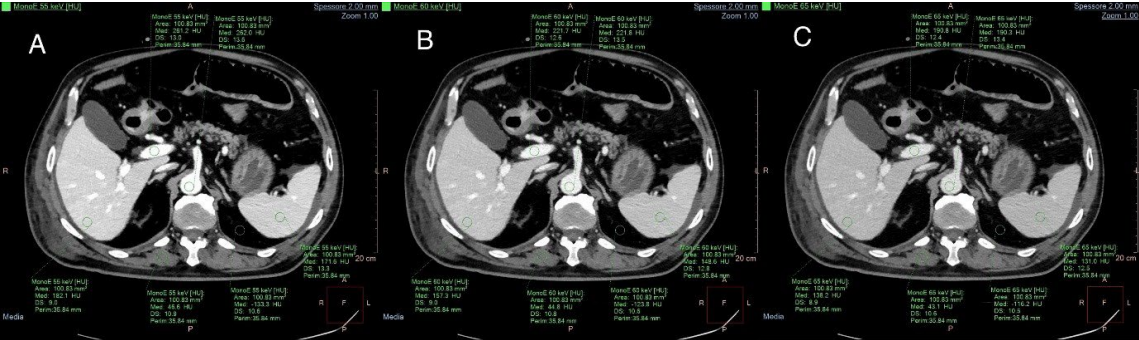
Second-Generation Dual-Layer Spectral CT: Impact of Virtual Monoenergetic Imaging on Image Quality

G. B. Zamarra, F. Virgili, G. Tremamunno, T. Polidori, D. De Santis, A. Ciprani, F. Pacelli, M. Zerunian, D. Caruso, M. Francone
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Purpose

To determine which virtual monoenergetic image (VMI) energy level obtained with a dual-layer spectral CT (DLCT) system provides the optimal balance between objective and subjective image quality compared with conventional reconstruction in abdominal CT imaging.

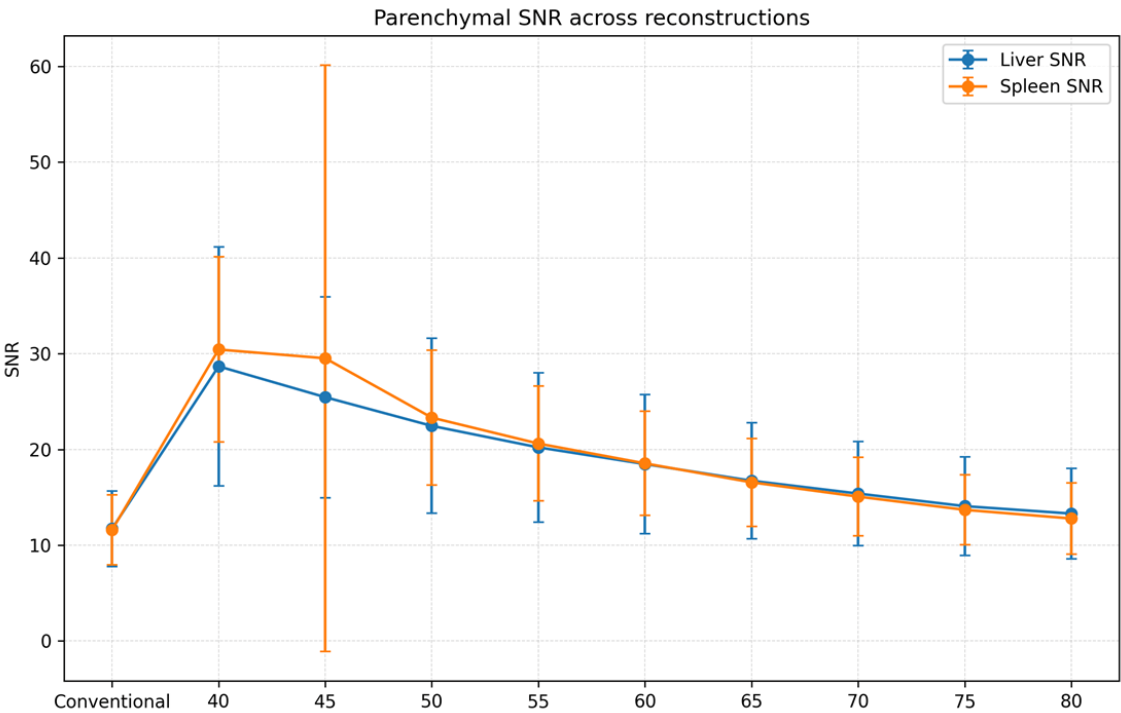
Materials and Methods



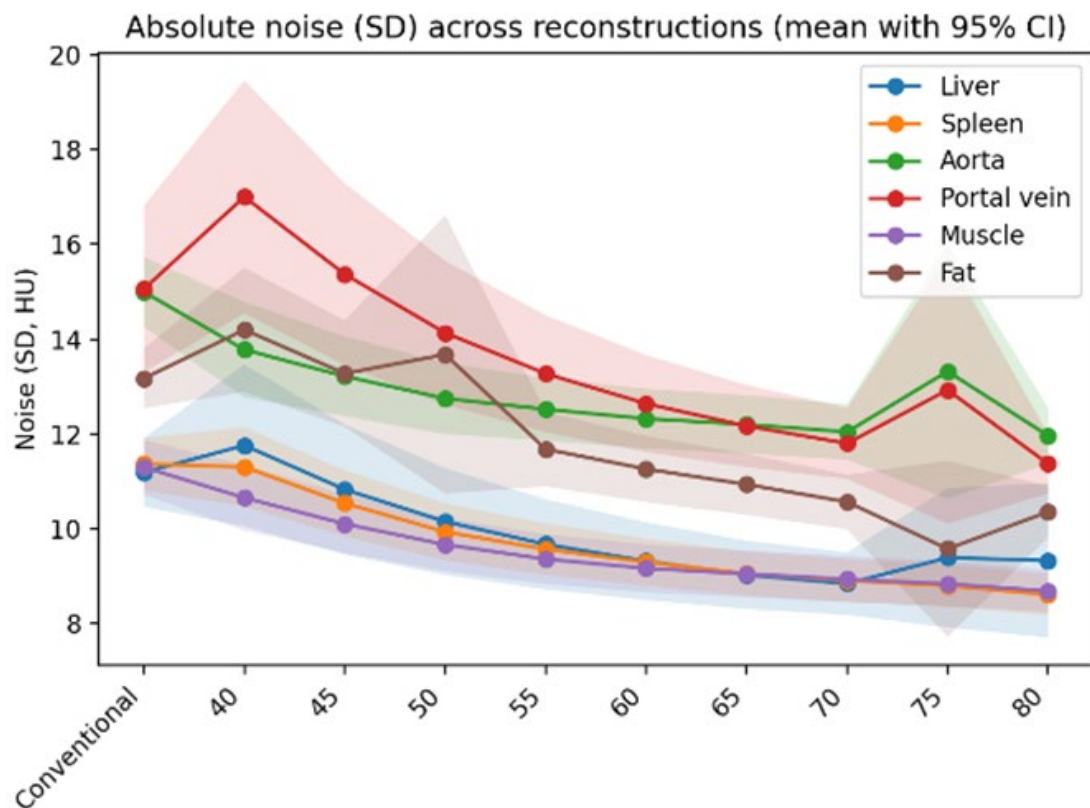
Example. Axial contrast-enhanced abdominal CT images acquired in the portal venous phase, with multiple circular ROIs, reconstructed as VMI at 40 keV (A), 45 keV (B), and 50 keV (C).

Consecutive patients undergoing clinically indicated contrast-enhanced abdominal CT between January and April 2025 were prospectively enrolled. All examinations were performed using a second-generation DLCT system with a dual-layer detector enabling simultaneous acquisition of high- and low-energy data without additional radiation exposure or protocol modification. VMIs were reconstructed at energy levels ranging from 40 to 80 keV in 5-keV increments. Quantitative analysis was performed by placing regions of interest in abdominal parenchymal organs, the aorta, portal vein, subcutaneous fat, and muscle. Objective image quality was assessed using signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR). Subjective image quality was independently evaluated by two experienced abdominal radiologists using a 5-point Likert scale assessing image sharpness, noise perception, contrast resolution, and overall diagnostic confidence. Inter-reader agreement was also assessed. Statistical analysis included the Friedman test for repeated measures and Wilcoxon signed-rank tests with Bonferroni correction for pairwise comparisons.

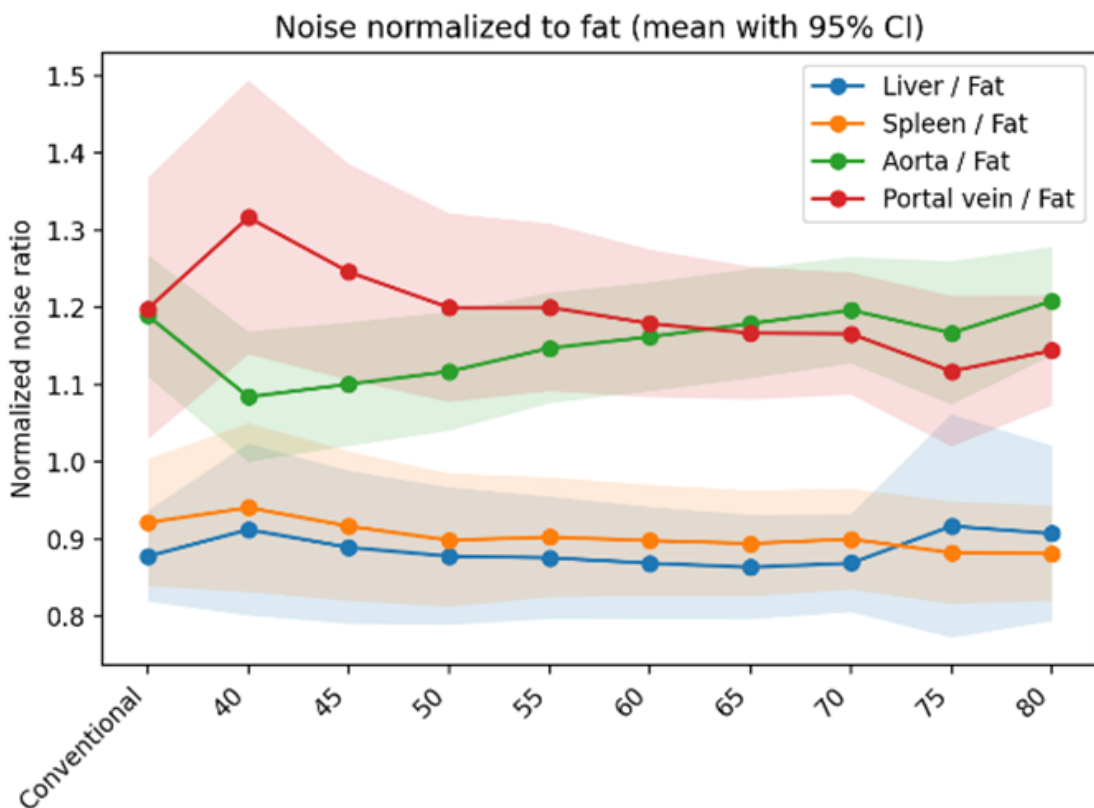
Results



Parenchymal SNR across reconstructions ($SNR = HU/SD$ within the same ROI). Error bars represent SD across patients.



Mean image noise (standard deviation of HU) across reconstructions (conventional and VMI 40–80 keV) for liver, spleen, aorta, portal vein, muscle, and fat. Shaded bands indicate 95% confidence intervals.



Mean normalized noise ratios (SD_{ROI}/SD_{fat}) across reconstructions (conventional and VMI 40–80 keV) for liver, spleen, aorta, and portal vein. Shaded bands indicate 95% confidence intervals.

Ninety-eight patients (50 males; mean age 66.1 ± 13.0 years; mean BMI 25.4 ± 5.2 kg/m²) were included. Compared with conventional reconstruction (noise: 13.0 ± 3.8), all VMI reconstructions from 45 to 80 keV demonstrated significantly reduced image noise (all $p < 0.0056$), whereas 40 keV showed comparable noise levels

(13.5 ± 5.4 ; $p = 0.55$). All VMI datasets exhibited significantly higher SNR and CNR compared with conventional images across all evaluated anatomical structures (all $p < 0.0056$). Subjective analysis demonstrated improved image quality for low-to-mid energy VMIs, with 45 and 50 keV achieving the highest diagnostic scores. The 50 keV reconstruction provided the best overall performance (4.0 [4.0–4.5] vs 3.0 [2.0– 3.0] for conventional imaging; $p = 0.002$), with higher diagnostic confidence and a better balance between contrast and noise.

Conclusion

DLCT enables robust and consistent generation of VMIs across a wide range of energy levels without workflow disruption or additional radiation exposure. Reconstruction at 50 keV provides the optimal compromise between noise reduction, contrast enhancement, and diagnostic confidence, outperforming conventional abdominal CT imaging.

Split-bolus CT with CNN-based denoising for low-dose oncologic imaging

Povshedna, O., Novikov, M.
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Purpose

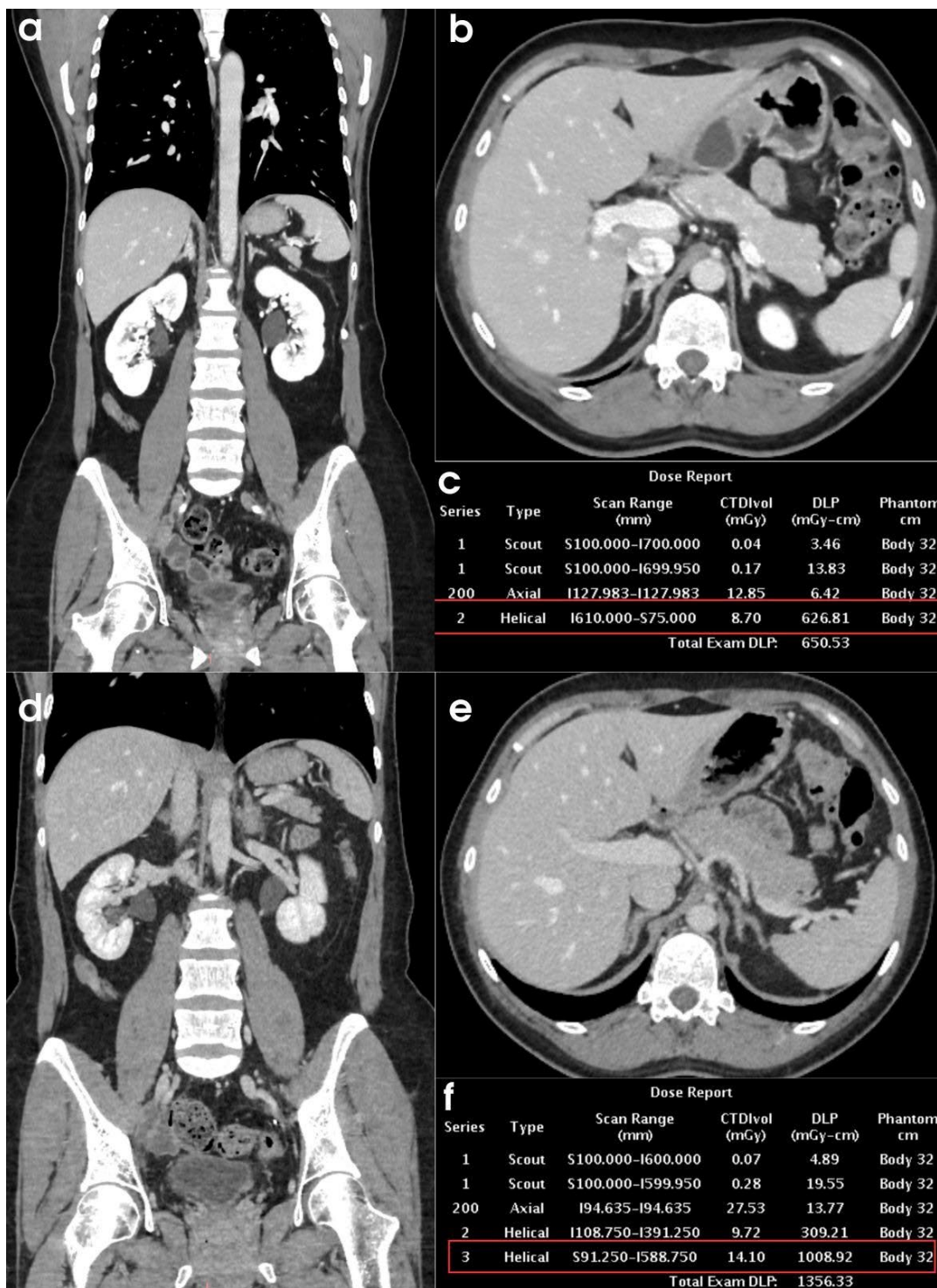
To demonstrate the practical implementation of a split-bolus CT protocol with CNN-based denoising in oncologic imaging, highlighting its advantages and limitations and identifying optimal clinical scenarios.

Materials and Methods

The protocol for chest, abdomen and pelvis combined LBM-based contrast dosing, low-kV acquisition (80/100 kV) and CNN-based denoising. Contrast injection, bolus tracking and scan delay were standardised to achieve simultaneous enhancement of the hepatic parenchyma (>110 HU), pancreatic parenchyma (> 120 HU), portal vein (>180 HU) and aorta (>180 HU). Images were retrospectively compared with conventional scans for radiation exposure (DLP, CTDIvol), enhancement in regions of interest and visual lesion conspicuity.

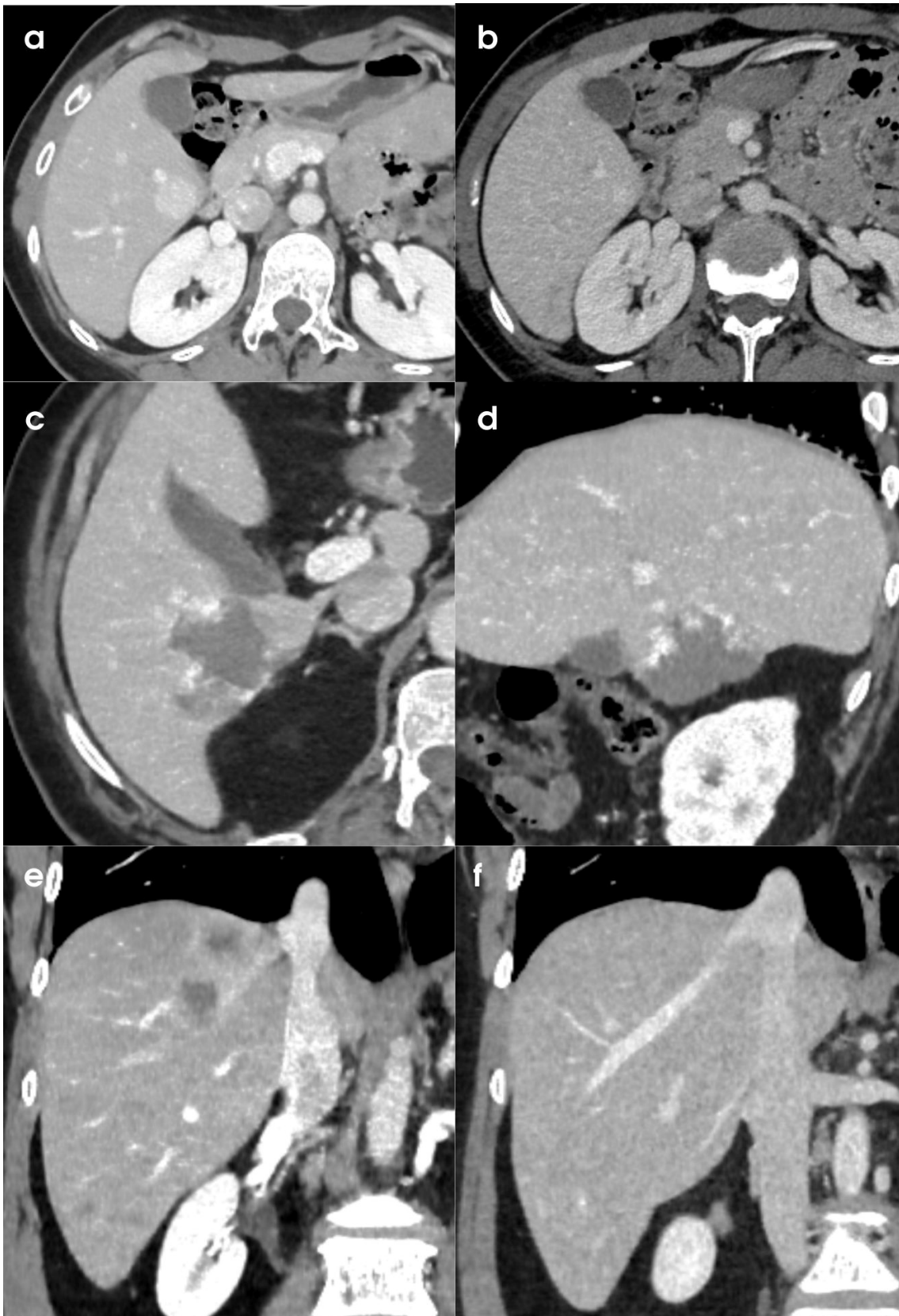
Results

The split-bolus, LBM-dosed protocol reduced radiation exposure by ~67,7% for the entire examination and by ~58,3% for the single CT acquisition compared with the conventional CT.

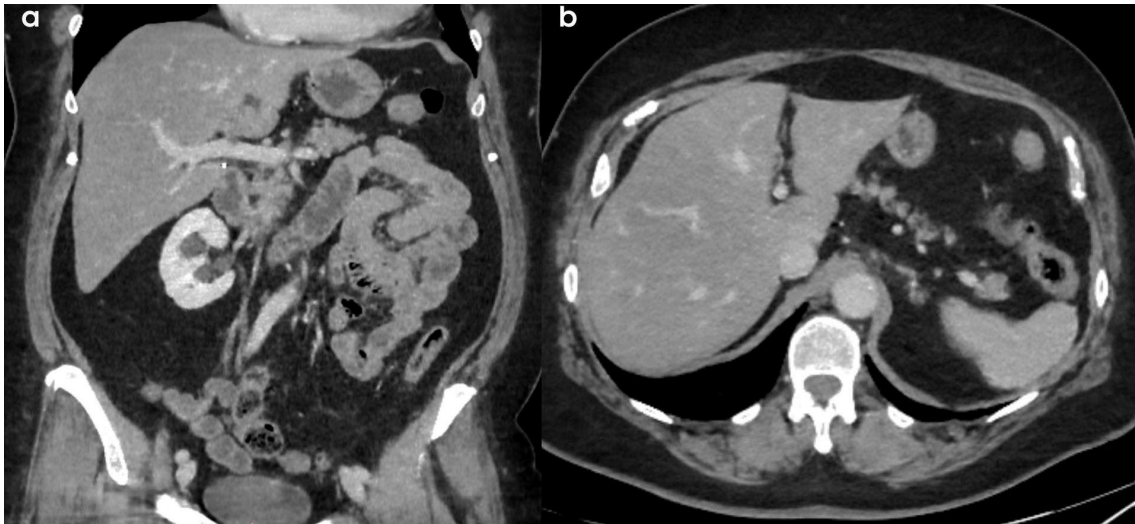


Comparison of a split-bolus CT protocol and a conventional portal venous phase in the same patient: a, b, c - Split-bolus CT, corresponding dose report demonstrating a DLP of 626,81 mGy.cm d, e, f - Conventional portal venous phase, corresponding dose report a DLP of 1008,92 mGy.cm

Lowering tube voltage increases iodine attenuation, potentially allowing a 27–30% reduction in contrast volume. To offset the added noise of low-dose acquisition, a CNN-based denoising algorithm preserved diagnostic quality and a favourable SNR (>13). These efficiencies also raise throughput and lower contrast demand, especially valuable in resource-constrained, high-volume settings.



Representative split-bolus CT images of focal liver lesions: a,b - focal nodular hyperplasia on split-bolus CT (a) and prior portal venous phase CT (b); c,d - typical hemangioma on split-bolus CT; e,f - hepatic metastases on follow-up split-bolus CT compared with previous conventional CT



Representative example of suboptimal split-bolus CT acquisition with inadequate contrast distribution - mean attenuation values demonstrate non-optimal enhancement pattern: aorta 127 HU, portal vein 137 HU, hepatic parenchyma - 62 HU

Conclusion

In oncologic surveillance, diagnostic value accrues across years of repeated imaging, where each protocol choice compounds over the full cycle of care. By reducing dose, contrast volume and the associated consumable and tube-maintenance costs at every timepoint, a split-bolus, LBM-adjusted, low-kV protocol with CNN-based denoising improves the ratio of diagnostic outcome to cumulative cost and risk, without sacrificing the lesion-detection performance these studies depend on. The gains are conditional: the protocol targets detection rather than characterisation and does not replace dedicated multiphase imaging where suboptimal enhancement would carry diagnostic cost. Positioned accordingly, it is a concrete, sustainable step toward more value per scan in long-term follow-up.

Could Contrast-Enhanced Ultrasound (CEUS) serve as a noninvasive diagnostic tool to distinguish degenerative thyroid nodules (DTN) from papillary thyroid carcinoma (PTC)? A preliminary study.

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Purpose

Degenerative thyroid nodules (DTN) may present diagnostic challenges when evaluated with conventional US, mimicking malignant features and potentially leading to unnecessary biopsies or surgery. The aim of this study was to evaluate whether CEUS can differentiate DTN from PTC.

Materials and Methods

A total of 45 patients with thyroid nodules corresponding to EU-TIRADS ≥ 4 were included in the study and divided into two groups: DTN and PTC. All patients underwent B-mode ultrasound, Colour Doppler (CD), strain elastography (SE), shear-wave elastography (SWE), CEUS, and FNA. Quantitative and qualitative analyses were performed, including post-processing using VueBox (Bracco, Italy). Measurements were obtained from three regions of interest: the nodule center, periphery and thyroid parenchyma. Average Contrast Signal Intensity (ACSI), Peak Enhancement (PE), Wash-in Rate (WiR), and Wash-out Rate (WoR) were analyzed, and time-intensity curves generated.

Results

Among 45 patients, 27 (60%) had DTN, 18 (40%) PTC. Mean nodule sizes were 10 mm and 9 mm, respectively. The area under the curve was 0,932 for ACSI (sensitivity 94%, specificity 81%), 0,936 for PE (sensitivity 94%, specificity 77%), 0,887 for WiR (sensitivity 94%, specificity 77%), and 0,848 for WoR (sensitivity 89%, specificity 73%) ($P < 0.001$). Using optimal cut-off values, ACSI, PE, and WiR all reached a sensitivity of 94%, while ACSI provided the highest specificity at 81%. The periphery-to-center peak intensity ratio was higher in DTN than in PTC group ($p = 0.001$). There was no statistically significant difference in the level of SE ratio ($p = 0.837$) and SWE ($p = 0.769$) between two groups.

Conclusion

Although no statistically significant difference was observed in SWE and SE between both groups, quantitative CEUS analysis improves diagnostic accuracy in differentiating DTN from PTC with high sensitivity and specificity.

AI-Derived Visceral Fat from Routine Baseline CT Scans Provides Independent and Incremental Prognostic Information Beyond Established Clinical Risk Factors in PDAC – Results from the Multicenter METAPAC Cohort

Herr, F.1, 2, Vornhölz, M.1, Steinbauer, J.1, Dascalescu, C.1, Oehrle, B.1, Burkard, T.1, Goni, E.1, Kamlage, B.1, Fahlbusch, T.3, Horn, J.3, May, M.4, Brunner, M.5, Mayer, P.6, Bayer, G.1, Regel, I.1, Schirren, M.1, D'Haese, J.1, Werner, J.1, Lerch, M.1, Ricke, J.1, Mahajan, U.1, Ingrisch, M.1, Shiyam Sundar, L. K.1, Mayerle, J.1, Grosu, S.1

LMU University Hospital Munich, Munich, Germany

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University Hospital Erlangen, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Department of Radiology, Erlangen, Germany

University Hospital Erlangen, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Department of General and Visceral Surgery, Erlangen, Germany

Heidelberg University Hospital, Department of Diagnostic and Interventional Radiology, Heidelberg, Germany

Purpose

To evaluate whether fully automated AI-derived body composition biomarkers obtained from routine clinical CT examinations provide independent and incremental prognostic information in patients with pancreatic ductal adenocarcinoma (PDAC) and to assess their potential for integration into clinical risk stratification workflows.

Materials and Methods

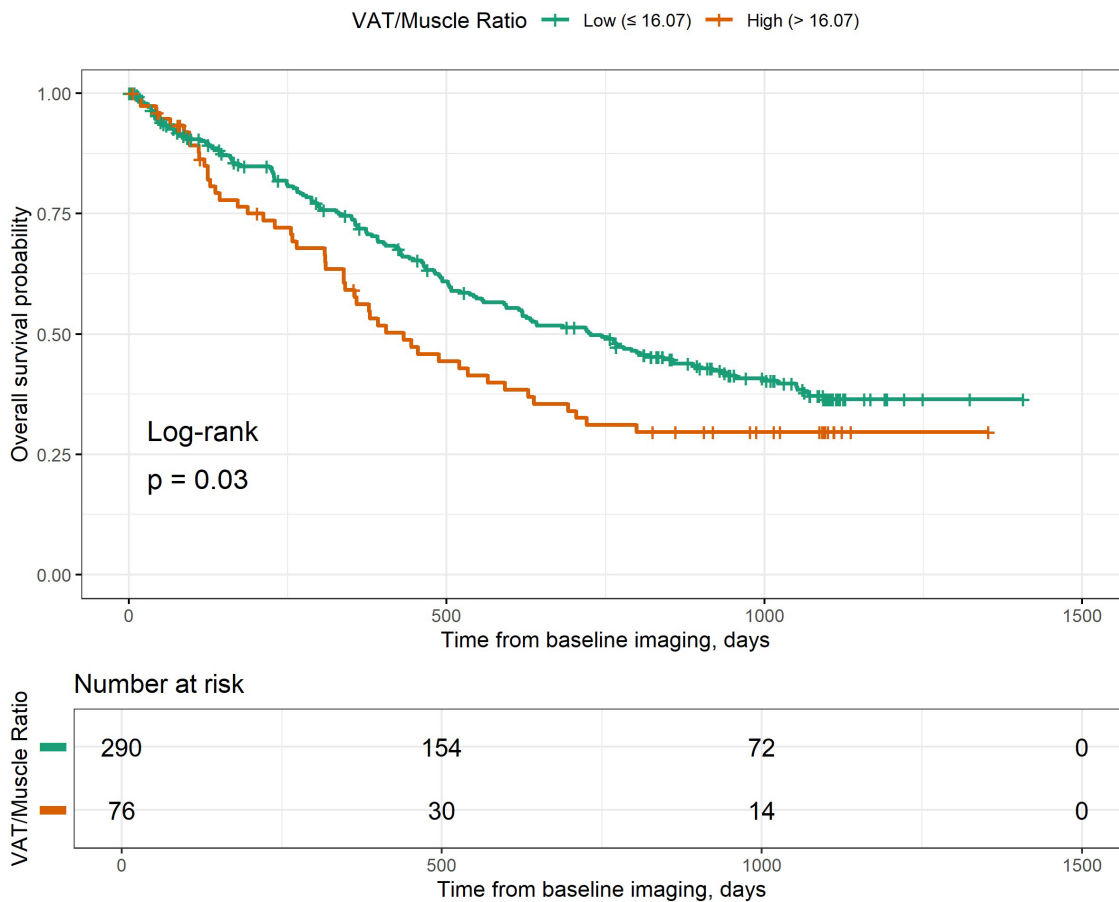
This retrospective analysis of the prospective multicenter METAPAC cohort included patients with PDAC from four tertiary referral centers. Baseline CT scans were analyzed using the externally validated AI framework MOOSE to derive body composition biomarkers. Associations with overall survival (OS) were assessed using multivariable Cox regression adjusted for age, sex, diabetes, albumin, CRP, CA19-9, surgical resection, and chemotherapy. False discovery rate correction, center-adjusted sensitivity analyses, and likelihood-ratio testing were performed.

Results

Among 379 patients with baseline CT imaging available, 218 deaths occurred during follow-up and median overall survival was 498 days. Of nine body composition parameters investigated, only visceral adiposity measures remained independently associated with OS after multivariable adjustment and FDR correction. Higher VF (HR 0.95, 95% CI 0.91–0.99), VFI (HR 0.92, 95% CI 0.87–0.98), and VF/M (HR 0.96, 95% CI 0.92–0.99) were associated with lower mortality risk (all FDR=0.041), whereas skeletal muscle and subcutaneous fat measures were not. Associations remained significant after adjustment for recruiting center. Kaplan–Meier analyses demonstrated improved survival for patients with higher VFI ($p=0.013$) and VF/M ($p=0.03$).

VAT/Muscle Ratio by Maxstat cutoff

Cutoff = 16.07



Addition of VF significantly improved the clinical prognostic model (likelihood-ratio test $\chi^2=6.53$, $p=0.011$) and reduced the Akaike information criterion (1368.6 vs. 1364.1), supporting incremental prognostic value beyond established clinical risk factors.

Conclusion

AI-derived visceral fat measures obtained opportunistically from routine clinical CT imaging provided independent and incremental prognostic information beyond established clinical and laboratory risk factors in patients with PDAC. Across a multicenter cohort from four tertiary referral centers, visceral fat volume, visceral fat index, and visceral fat-to-muscle ratio emerged as robust and reproducible imaging biomarkers. These findings demonstrate that AI-derived body composition assessment can be translated into clinically meaningful prognostic information, supporting the integration of opportunistic imaging biomarkers into routine oncologic care.

Scientific Session 4: AI, Miscellaneous

Friday, October 30, 2026 | 14:40-15:40 CET | Foyer

Prospective Evaluation of WB-DWI MRI for Detection of Hepatic and Extrahepatic Disease in Neuroendocrine Tumors: Comparison with SSTR-PET/CT

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2. LMU University Hospital Munich, Department of Radiology, Munich, Germany

3. Medizinische Klinik und Poliklinik IV, München, Germany

Purpose

To prospectively evaluate the patient-based detection of hepatic and extrahepatic tumor manifestations using whole-body diffusion-weighted MRI (WB-DWI-MRI) compared to somatostatin receptor PET/CT (SSTR-PET/CT) in patients with neuroendocrine tumors.

Materials and Methods

In this prospective study, 22 patients with well-differentiated neuroendocrine tumors (G1/G2) underwent time point-matched SSTR-PET/CT and WB-DWI-MRI. SSTR-PET/CT served as the comparative standard. SSTR-PET/CT and WB-DWI-MRI were each interpreted in consensus and blinded to the results of the other modality. Analyses included global patient-based detection, organ-matched site-specific agreement for primary tumor, liver, peritoneal, lymph node, lung, and bone metastases, and quantitative lesion-count comparison by organ system. Agreement metrics, Cohen's kappa, McNemar testing, and Wilcoxon signed-rank tests were applied.

Results

In total, 178 metastatic lesions were identified on PET/CT and 423 on WB-DWI-MRI, predominantly driven by higher hepatic lesion counts on MRI (104 vs. 340). Organ-matched site-specific analysis showed strongest agreement for peritoneal metastases ($\kappa = 1.00$), lymph node metastases ($\kappa = 0.91$), bone metastases ($\kappa = 0.77$), and liver metastases ($\kappa = 0.73$). Agreement was lower for lung metastases ($\kappa = 0.65$), reflecting low event numbers, and for primary tumor detection ($\kappa = 0.55$). WB-DWI-MRI showed lower patient-level detection for primary tumors, missing three small bowel primaries and one pancreatic tumor. Quantitative lesion analysis revealed significantly higher hepatic lesion counts on WB-DWI-MRI compared with PET/CT ($p = 0.002$). Lesion counts for bone, lung, and peritoneal metastases were largely comparable, while lymph node counts showed a trend toward higher detection on MRI ($p = 0.057$).

Conclusion

WB-DWI-MRI shows high agreement with SSTR-PET/CT for patient-level detection of extrahepatic tumor manifestations and organ-matched assessment of metastatic disease. While limitations exist in primary tumor detection, WB-DWI-MRI may serve as a complementary imaging modality in neuroendocrine tumor imaging. WB-DWI-MRI may serve as a complementary imaging modality for staging and follow-up, alongside established reference standards such as liver MRI and SSTR-PET/CT, particularly for the detection of extrahepatic metastasis. Its integration into clinical workflows may improve comprehensive disease assessment and support longitudinal patient management.

Optimized Threshold-Based Segmentation Approach for Response Assessment in [¹⁸F]SiTATE PET/CT Response Assessment in GEP-NET Under Somatostatin Analogs

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Purpose

To evaluate the impact of different threshold-based segmentation approaches on response assessment in [¹⁸F]SiTATE PET/CT in patients with gastroenteropancreatic neuroendocrine tumors (GEP-NET) undergoing somatostatin analogs (SSA).

Materials and Methods

In this retrospective single-center study, 61 patients with GEP-NET undergoing SSA who received baseline and follow-up (FU) [¹⁸F]SiTATE PET/CT were included. Lesions were segmented using five approaches: SMA (41% SUVmax), SMB (organ-adapted PET threshold), SMC (site-specific PET thresholds), and two hybrid PET/CT methods (SMD, SME) using CT-derived volumes with PET-based fallback. Quantitative parameters (SRETV, SUVmean) and relative changes (Δ SRETV, Δ SUVmean) were calculated. Segmentation-specific cutoffs were optimized using Cohen's kappa to classify responders (PR/SD) versus non-responders (PD), using multidisciplinary tumor board assessment as reference.

Results

A total of 2,354 lesions were analyzed. Lesion counts differed significantly ($p < 0.05$), lowest for SMB ($n = 1,874$) and highest for SMA and SMD ($n = 2,354$). Mean SRETV differed (122.3-188.6 cm³), whereas SUVmean did not (14.1-15.6). Across all methods, Δ SRETV-based models outperformed Δ SUVmean-only models (agreement 71.9-77.2%, $\kappa = 0.30$ -0.42 vs. 64.9-68.1%, $\kappa = 0.11$ -0.21; $p < 0.05$). Combining parameters did not improve performance (max $\kappa = 0.45$). SMD showed the most robust performance (agreement 77.2%, $\kappa = 0.42$).

Conclusion

Hybrid PET/CT-based segmentation demonstrated the most consistent performance for response assessment, though agreement remained moderate. Across all approaches, Δ SRETV consistently outperformed SUV-based metrics, while combining parameters provided no additional benefit, supporting the robustness of volumetric PET metrics. Volumetric PET-derived parameters may provide a more reliable basis for response assessment than SUV-based metrics in [¹⁸F]SiTATE PET/CT for GEP-NET under SSA. Hybrid PET/CT-guided segmentation offers a pragmatic framework for more consistent lesion delineation and may improve standardization and reproducibility in clinical practice.

Quantitative Magnetic Resonance Imaging for the Differentiation of Soft Tissue Tumors

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Purpose

Magnetic resonance imaging (MRI) with contrast enhancement is the primary imaging modality for the differentiation of soft tissue tumors. The aim of this study was to investigate the potential of multiparametric quantitative MRI to differentiate benign from malignant soft tissue tumors.

Materials and Methods

Between 10/2022 and 01/2026, patients with indeterminate soft tissue tumors were prospectively enrolled for multiparametric quantitative MRI prior to histopathological confirmation. All examinations were performed on a 3.0-T MRI system (Magnetom Prisma, Siemens Healthineers, Erlangen, Germany) and included chemical shift-encoded MRI, T1-/T2-mapping, and diffusion-weighted imaging (intravoxel incoherent motion [IVIM analysis]). Post-processing generated $R2^*$, proton density fat fraction (PDFF), T1 / T2 maps, and IVIM-derived parameters including diffusion coefficient (D), pseudo-diffusion coefficient (D^*), and perfusion fraction (f). Region-of-interest (ROI) measurements were performed on all datasets according to the biopsy target region. Mean values obtained by two independent readers were analyzed. Quantitative parameters were compared between benign and malignant tumors using the Mann-Whitney U test. A logistic regression model was developed to predict malignancy. Histopathological diagnosis served as the reference standard.

Results

Ninety-eight patients (46 women; mean age 56.7 $\pm$ 15.8 years) were examined, including 29 with malignant and 69 with benign tumors. Malignant tumors revealed significantly lower values for $R2^*$ (18.1 $\pm$ 30.6 s⁻¹ vs. 43.9 $\pm$ 31.8 s⁻¹; $p < 0.001$), PDFF (25.9 $\pm$ 35.7 % vs. 65.3 $\pm$ 39.9 %; $p < 0.001$), IVIM D (1219.7 $\pm$ 720.7 $\times 10^{-3}$ mm²/s vs. 617.4 $\pm$ 732.4 $\times 10^{-3}$ mm²/s; $p < 0.001$), and IVIM D^* (24.4 $\pm$ 44.2 $\times 10^{-3}$ mm²/s vs. 115.8 $\pm$ 183.1 $\times 10^{-3}$ mm²/s; $p < 0.001$) compared to benign tumors. In contrast, T1 relaxation times were significantly higher (1939.4 $\pm$ 1036.6 ms vs. 1033.6 $\pm$ 927.6 ms; $p < 0.001$). No significant differences were observed for IVIM f and T2 relaxation times ($p > 0.05$). Univariate logistic regression analyses identified $R2^*$, PDFF, IVIM D, D^* and T1 as predictors for malignancy ($p < 0.05$). Following elimination of correlated biomarkers by Rank (Spearman's $\rho > 0.5$) and backward elimination, $R2^*$ and IVIM D^* remained as independent variables in the multivariate model ($R2^*$ odds ratio=0.974; IVIM D^* odds ratio=0.991), yielding an AUC of 0.792.

Conclusion

By enabling non-invasive differentiation of soft tissue tumors, quantitative MRI - particularly through the independent predictive values of $R2^*$ and IVIM D^* - may facilitate accurate preoperative assessment of tumor malignancy in clinical practice.

Specialist or Generalist – Is Task-Specific nnU-Net better than Foundation Models for Bone Metastasis Segmentation on CT?

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Purpose

The presence of bone metastases has a serious impact on patient prognosis, quality of life and treatment planning. The radiologist, therefore, has the difficult perceptual task of detecting bone metastases, which can be subtle and easily overlooked. Owing to this, different artificial intelligence approaches have been put forth to aid detection. Foundation segmentation models show promising performance, but their reliability against a wellconfigured task-specific model and behaviour in previously unseen patients remain unclear. To test the reliability, we compared the performance of one task-specific and two foundation-models for automated contouring of bone metastases on CT images.

Materials and Methods

A retrospective single-institution CT imaging dataset of 88 patients was contoured by four readers under seniorradiologist supervision, yielding 2616 lesion masks: 28% lytic, 15% sclerotic, 57% mixed. For better overall performance, a single lesion class was assembled. Three models were trained under comparable conditions: task-specific self-configuring nnU-Net; and fine-tuned DINOv3 and prompt-free MedSAM foundation models. [Fig. 1] Agreement with expert contours was measured by Dice similarity coefficient (DSC) and normalised Hausdorff distance (NHD), first on an internal validation set and then on a patient-disjoint held-out cohort, reflecting real-world deployment on new patients.

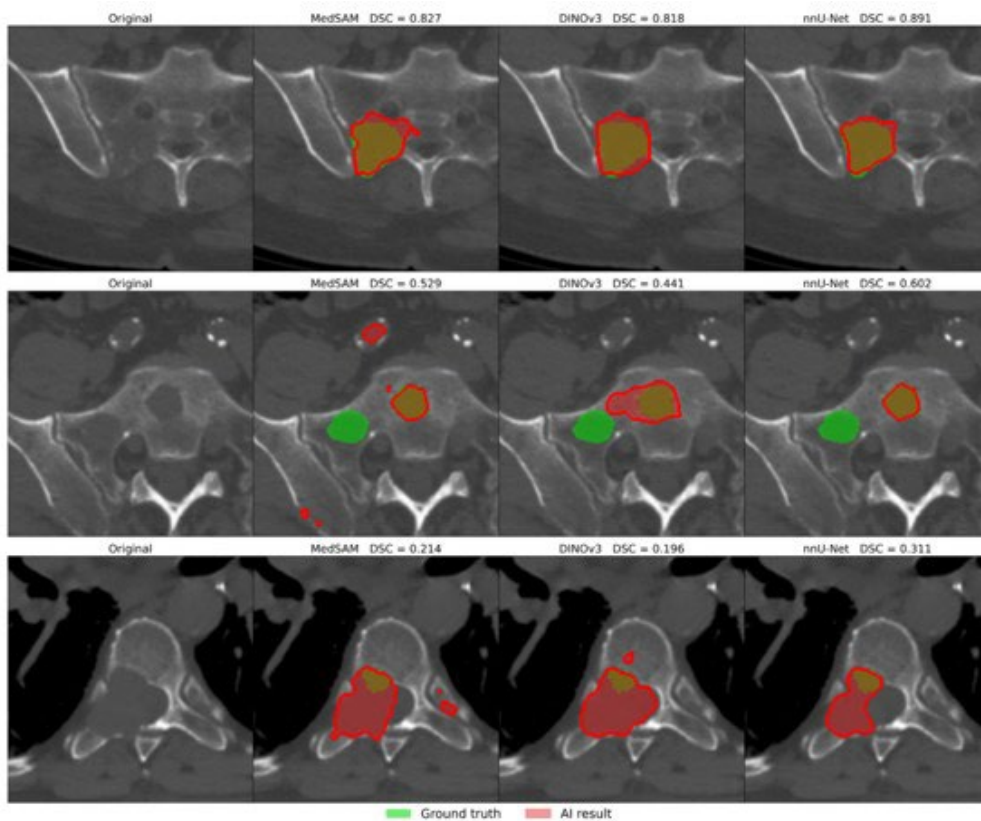


Default nnU-Net training metrics-Dice score and loss progression across epochs. Blue line: training loss (loss_tr); red line: validation loss (loss_val) (left y-axis). Green dotted line: pseudo-Dice per epoch; green solid line: pseudo-Dice moving average (right y-axis).

Results

On validation, nnU-Net and MedSAM performed comparably (Dice 0.700 vs. 0.697), while DINOv3 lagged (0.527); boundary agreement was best for nnU-Net and DINOv3 (NHD 0.042 each). In previously unseen patients, the task-specific nnU-Net model agreed most closely with the reader (DSC 0.685 [95% CI 0.661– 0.709]; NHD 0.047) when compared to MedSAM (0.628 [0.608, 0.649]; 0.101) and DINOv3 (0.448 [0.425, 0.471]; 0.102). It was also the most stable across patients, with minimal loss of agreement from the internal to the unseen cohort (DSC ~0.015) versus a larger loss for both foundation models (DSC ~0.07–0.08). [Fig. 2] The task-specific model gave

smooth contours, closely tracking lesion margins, whereas the foundation models tended to over-segment highly sclerotic lesions or miss small lytic defects and subtle cortical breaches— precisely the lesions most easily overlooked.



Qualitative examples of MedSAM, DINOv3, and nnU-Net segmentation predictions with respective Dice scores on axial CT slices are displayed side-by-side with the original images

Conclusion

A task-specific nnU-Net model reproduced expert bone metastasis contours most accurately and generalised best to previously unseen patients, outperforming both foundation models despite their large-scale pretraining. General-purpose foundation models are promising, but not yet dependable and require further domain-specific adaptation before autonomous use.

Sequential Forward Selection with radiomics features from susceptibility-weighted MRI for classification of adult-type diffuse glioma

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Purpose

Optimal MRI sequence combinations for glioma characterization remain undefined, resulting in excessive scan time and protocol heterogeneity. We aimed to identify task-specific, minimal sequence combinations for predicting key parameters such as IDH mutation status, MGMT promoter methylation, and WHO CNS grade using a data-driven radiomic modality selection framework, with specific analysis of the complementarity and redundancy of susceptibility-weighted imaging (SWI).

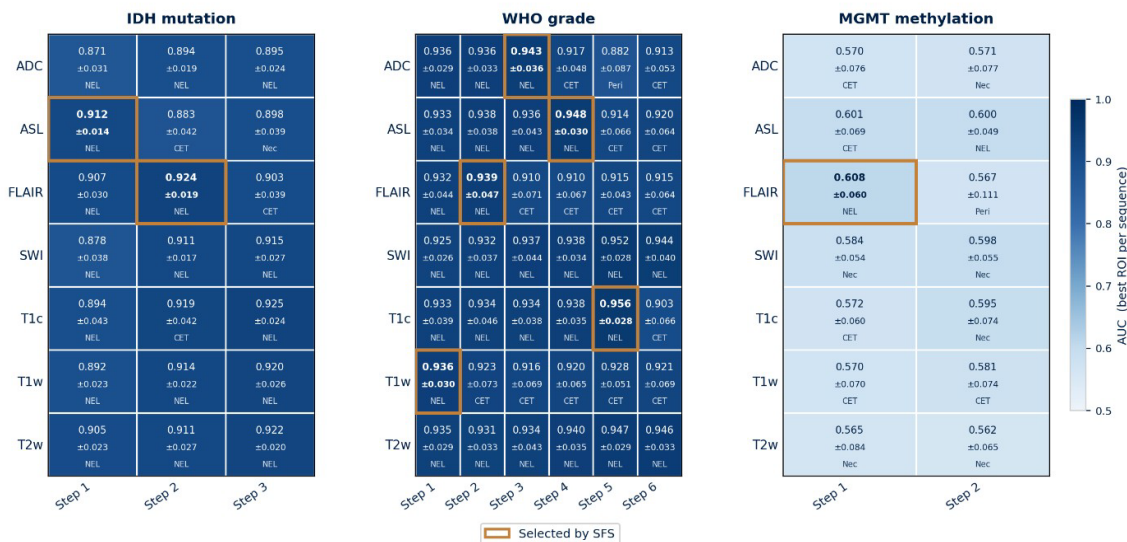
Materials and Methods

495 patients with histopathologically confirmed glioma from the publicly available UCSF Preoperative Diffuse Glioma MRI dataset (UCSF-PDGM) were analyzed. Radiomic features were extracted from seven MRI sequences (T1w, contrast-enhanced T1w, T2w, FLAIR, ADC, ASL, SWI) across four tumor sub-regions (contrast-enhancing tumor, necrotic core, non-enhancing lesion, 20 mm peritumoral margin around the tumor core (contrast-enhancing tumor and necrotic core)) using PyRadiomics, yielding up to 108 features per sequence-ROI pair. Sequential Forward Selection (SFS) identified optimal modality combinations for each target, evaluated via 5-fold outer x 3-fold inner nested cross-validation with ElasticNet feature selection and linear SVM / logistic regression classifiers. SWI feature redundancy relative to ASL and FLAIR was quantified via maximum absolute Pearson correlation across all pairwise feature combinations.

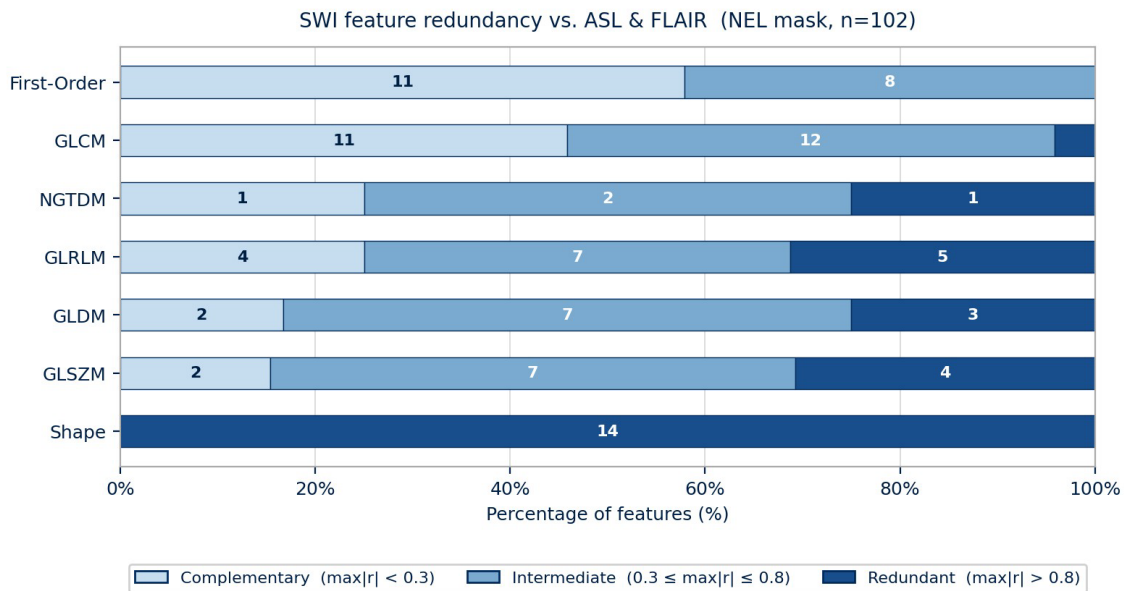
Results

SFS identified compact, task-specific modality sets. IDH mutation prediction achieved AUC 0.924 $\pm$ 0.019 using ASL and FLAIR from the non-enhancing lesion. WHO grade (4 vs. 2/3) reached AUC 0.956 $\pm$ 0.028 combining T1, FLAIR, ADC, ASL, and T1c. MGMT methylation remained challenging (AUC 0.608 $\pm$ 0.060) (

AUC $\pm$ SD per SFS step — best ROI per sequence



AUC of SFS selected sequence-features for the prediction of IDH mutation status, WHO grade and MGMT status). SWI redundancy analysis showed that 31/102 SWI features were complementary to both ASL and FLAIR ($\max|r| < 0.3$) and 28/102 were redundant ($\max|r| > 0.8$; 6 of 108 features excluded due to zero variance) (



SWI feature redundancy vs. ASL & FLAIR (NEL mask n=102)

). Despite this unique information content, adding SWI did not improve IDH or MGMT prediction performance.

Conclusion

Data-driven SFS identifies minimal, clinically interpretable radiomic feature sets tailored to specific glioma characterization tasks. SWI encodes imaging information not captured by perfusion or FLAIR, but this information does not contribute to molecular marker prediction in this cohort, suggesting its utility may lie in endpoints more closely linked to vascular tumor biology such as grade.

Comparison of the Diagnostic Performance of the Malignancy Score of Lung Nodules Calculated by the AI-based Software Optellum between CT Data Sets from Germany and France

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Purpose

The aim of this study was to perform a bicentric, binational analysis of the diagnostic performance of the deep learning-based AI software Optellum for malignancy prediction in pulmonary nodules (PN) using CT data sets from Thoraxklinik Heidelberg (TKHD) and Hôpital Cochin, Paris (HC).

Materials and Methods

A total of 281 incidental PN (5-15mm) from chest CT scans (slice thickness < 3mm) of 255 patients at HC and 835 nodules at TKHD were retrospectively analyzed. Malignancy probability was assessed with Optellum and confirmed as malignant by histopathology (CT-guided, bronchoscopic, surgical biopsy) or as benign by at least two-years of imaging follow-up. Malignant PN correctly identified by the AI were considered true positives. Metastases were excluded. Due to different prevalences of lung cancer in both cohorts (36.3% at TKHD vs. 82.6% at HC) a case matching was performed (sex, age $\pm$ 5y, nodule size, consistency, diagnosis and contrast administration).

Results

After case matching, 208 patients (105 female, 103 male) with 162 malignant and 46 benign PN (182 solid and 46 subsolid PN) were included. Mean age was similar (66.7 ± 8.5 y HC, 66.7 ± 8.6 y TKHD, difference 0.02y). No contrast agent was injected in 119 patients. PN size was comparable: 12.1 ± 2.8 mm at HC and 11.6 ± 2.4 mm at TKHD.

Conclusion

For the HC cohort AI achieved a diagnostic accuracy of AUC = 0.745 (sensitivity 82.1%, specificity 47.8%) and for TKHD cohort AUC = 0.764 (sensitivity 84.9%, specificity 59.2%), respectively, with no significant difference ($p = 0.85$). These findings indicate comparable diagnostic performance of the AI-based software across centers and countries.

Human-AI Interaction in Prostate MRI Interpretation in a cohort of 369 patients: Effect of reading style and reading personality in experienced radiologists

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Purpose

Biparametric prostate AI systems repeatedly showed equivalent performance to experienced radiologists, while the PI-CAI study demonstrated better AI performance compared to less experienced radiologists. We hypothesized a prostate AI system performs similar to experienced radiologists from different clinical environments. We performed side-by-side comparison and investigated human-AI interaction regarding radiologist performance. A survey assessed reader satisfaction with AI.

Materials and Methods

369 prostate MRI examinations were retrospectively assessed by three radiologists: R1) a radiology resident with 7 years of experience, R2) experienced private practice radiologist and R3) a senior expert academic radiologist. These independently performed PI-RADS reads of exams without AI, followed by review of AI results and submission of updated reports. After each case readers submitted a survey regarding subjective agreement with AI. Operating points at PI-RADS $\geq$ 3 and PIRADS $\geq$ 4 were compared.

Results

All readers' operating points were close to the AI-ROC curve, indicating no difference of AI performance, however they were dispersed along the curve, specifically between sensitive R1 and specific R2 and R3. Readers preferring specificity (R2, R3) demonstrated tendency to avoid PI-RADS 3 lesions and reduced sensitivity, with only minimal separation of operating points. R3 performed better than R2 as expected. R1 favored sensitivity, at reduced specificity, and tended to accept PI-RADS 3 results with operating point separation. R1/R2 were favorable toward AI. Case-wise reader agreement with AI increased confidence.

Conclusion

Although human readers exhibit only one operating point at a time, the spectrum of more sensitive vs. specific reading paradigms is well-elucidated in this study. AI performance and reader operating points validate each other by being close. Reader tendency to avoid PI-RADS 3 does not preserve sensitivity but primarily leads to collapse of the operating points onto each other. While all paradigms appear valid, results highlight that current prostate MRI and AI have remaining limitations, and that any specificity gain carries the cost of reduced sensitivity, and vice-versa. Maintaining a separation between operating points appears rather beneficial, supporting continued use of the PI-RADS 3 category even by experienced radiologists. PI-RADS 3 avoidance merely appears to mask indecision, precluding stratification of such lesions by other means such as PSA-density.

Natural evolution of cystic neuroendocrine tumors of pancreas

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Purpose

To evaluate a population of resected or followed-up cystic pNETs to determine their natural evolution.

Materials and Methods

This is a retrospective bicentric observational study including resected and followed-up cystic pNETs diagnosed with FNA/pathology or by 68Ga-DOTATOC-PET-CT. Cross-sectional imaging was reviewed for each patient at diagnosis and at most recent imaging (99 MRI; 6 CT). Patients were divided in two subgroups: resected and followed-up. Cox regression, Kaplan-Meier curves and restricted mean survival analysis were used for analysis.

Results

We included 99 patients (56 F, 43 M, mean age 60 yrs) with 104 cystic pNETs, 93 lesions diagnosed by FNA/histology and 11 by 68Ga-DOTATOC-PET-CT. 81 lesions had a Ki-67% score at pathology, ranging between 1%-8% (71 G1; 10 G2). No lesion showed macroscopic lymphatic or metastatic diffusion at baseline. 55 lesions were resected (mean diameter 29,9 mm): 17 T1, 26 T2, 12 T3. 51 patients had pre-operative follow-up longer than 6 months (median 46 months). 3 lesions with initial diameter >40 mm (44, 52, 70 mm), had peripancreatic nodal spread (all T3N1M0; 2 G1, 1 G2). 3 lesions grew in size during follow-up (mean time to growth 62,5 months). 49 lesions were only followed-up, 40 for >6 months (median 37,5 months). Mean lesion diameter was 18,2 mm. 13 lesions were >20 mm, 10/13 remained stable. 3 lesions grew in size after long follow-up (mean 65,2 months). T1 and T2 lesions didn't demonstrate advantage undergoing surgery. The same was demonstrated for T3 lesions, although the small number of lesions included rendered statistical analysis in this group less reliable.

Conclusion

In our series, cystic pNETs demonstrated an indolent nature. T1- and 2-lesions didn't demonstrate a significant advantage while undergoing surgery. For these, follow-up could be an alternative to resection

FocalLesionDetector: AI-based automated focal lesion quantification from whole-body MRI in multiple myeloma patients

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18. Roswell Park Comprehensive Cancer Center, Department of Medicine, Buffalo, United States

Purpose

The number of focal lesions (FL) from whole-body MRI (wb-MRI) is a strong prognostic factor in patients with multiple myeloma. The purpose of this study was to develop and test FocalLesionDetector, a deep learning algorithm for automated detection of FLs from wb-MRI, with the intended use to automatically quantify the focal tumor load in multiple myeloma patients.

Materials and Methods

This retrospective study included wb-MRIs acquired between May 2008 and July 2024. The training set comprised wb-MRIs from center 1; the independent internal test set comprised wb-MRIs acquired within one prospective trial at center 1; and the external multicenter test set comprised wb-MRIs acquired within two prospective trials at centers 2-10. Automated bone marrow segmentation was used to generate masked coronal T1-weighted wb-MRI images, which served as input for an nnDetection-based lesion detection pipeline. The AI-detected number of FLs was correlated with the radiologists manually obtained MY-RADS Focal Scores using Spearman's rho.

Results

The training set included 3377 FLs from 327 patients (mean age, 60 years ± 10 [SD], 192 men), and the internal and external multicentric test sets included 671 FLs from 36 patients (mean age 61 years ± 7 , 21 men) and 1451 FLs from 64 patients (mean age 58 years ± 10 , 38 men), respectively. The AI-detected number of FLs was significantly correlated with the MY-RADS Focal Score of Reader 1 on the overall test set ($r=0.82$ [0.74, 0.88], $p<0.001$), the internal test set ($r=0.86$ [0.72, 0.93], $p<0.001$) and the external multicentric test set ($r=0.81$ [0.69, 0.88], $p<0.001$). An interrater experiment on 31 patients as reference demonstrated a significant correlation between both radiologists ($r=0.74$ [0.51, 0.86], $p<0.001$).

Conclusion

FocalLesionDetector enabled automated, objective quantification of focal tumor load in multiple myeloma patients which was significantly correlated to manual focal tumor load assessment by experienced radiologists, as demonstrated in 100 whole-body MRIs from 10 centers.

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Cystic neuroendocrine tumors of the pancreas: imaging features from a large multicenter series.

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Purpose

To describe a series of cystic pNETs to determine specific imaging features in a large cohort of patients that might improve radiologic diagnostic accuracy of these rare lesions.

Materials and Methods

This is a retrospective multicenter observational study (5 centers/4 countries) that included cystic pNETs diagnosed with FNA/pathology or by 68GaDOTATOC-PET-CT. Cross-sectional imaging was reviewed for each patient (145 MRIs, 11 contrast-enhanced CTs, 1 non-contrast CT).

Results

We included 157 patients (85 F, 72 M, mean age 57,5 yrs) with 166 cystic pNETs (9 had multiple lesions), 143 diagnosed with FNA/pathology and 23 by positivity at DOTATOC-PET-CT. ki-67 was most commonly low, ranging from 1% to 19% (G1:103; G2: 21; G3: 0). Ki-67% was not available/indeterminate for 42 lesions. 131 lesions were completely cystic, while 35 were mostly cystic (with the cystic component exceeding 50% of lesion's size). Lesions were located predominantly in the body-tail (125/166) with mean diameter of 24 mm (5-90 mm) and mean wall thickness of 3.3 mm. 130 patients had only the cystic pNET, while 36 had also other lesions (18 IPMN, 14 solid/cystic pNETs, 4 nonspecified cysts). Cyst fluid was predominantly hyperintense on T2 (139/166) and hypointense on T1 (152/166); 5% of the lesions had fluid-fluid levels. 66 lesions showed restricted diffusion. 5 lesions had enhancing mural nodules. MPD was dilated in 13 patients, in 12/13 due to the cystic lesion. 162/166 showed enhancement, mostly constant (96). 14 lesions had wall calcifications. No lesions had macroscopic lymphatic or metastatic spread at diagnosis.

Conclusion

Cystic pNETs usually present as cystic body-tail lesions with mild thickened walls and continuous enhancement. The absence of extra-pancreatic spread at diagnosis suggests an indolent behavior.

Diagnostic Superiority & Utility of ¹⁸(F) FDG-PET-CT Imaging In Initial Staging, Restaging and Evaluation of Response to Therapy of Urinary Bladder Cancer.

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Purpose

(1) To evaluate the diagnostic value of F-18 FDG PET/CT in detecting primary & recurrent carcinoma urinary bladder & its metastasis.

(2) To assess the treatment efficacy, by capturing biological information like; SUVmax, TLG, MTV (response evaluation) in the carcinoma urinary bladder.

Materials and Methods

This research study of the carcinoma of urinary bladder, include search of primary tumour, its metastasis response to therapy with 18(F) FDG-PET-CT and follow-up during and after chemotherapy & immunotherapy. A intravenously dose of 9-10 mCi 18(F)FDG was administered after 6 hours & imaging was performed. Biomedical para-meters; SUVmax, TLG, MTV noted, followed by reporting.

Results

Patients were operated, Trans Urethral Radical Bladder (TURBT) with ileal conduit and histo-pathologically examination was done in all patients. TURBT usually the first treatment for non-muscle invasive bladder cancer followed by 18(F)FDG-PET-CT imaging for disease characterization, chemo-radiotherapy & immunotherapy response evaluation. Total patients investigated with 18(F) FDG- PET-CT were 43. Male were 38/43 (88.37%) & 05/43 (11.12%) female. 01/43 (2.3 %) patient was survived 11yrs disease free (H/O Surgery in 2014 followed by radiotherapy & chemotherapy. Residual disease was noted in 04/43pts (09.3%), partial response was seen in 01/43 (02.3%), recurrence in 02/43pts (04.6%), lung metastasis in 2/43 (04.6%), lymph nodes 03/43pt (06.9%) & brain metastasis in 03 / 43 (06.9%).

Conclusion

[¹⁸F]FDG PET/CT imaging & analysis in cancer urinary bladder has demonstrated one of the most notable contributions in its ability to enhance diagnostic accuracy and tumour characterization. It is very sensitive & specific due to SUVmax, TLG, TTMV.

Divided Subtracted Inversion Recovery (dSIR) MRI for Brain Tumor imaging – a feasibility study

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Purpose

Glioblastoma is known for its diffuse brain colonization that involves the infiltration of apparently healthy brain tissue. On conventional MRI, contrast-enhancing tumor lesions (CET) are surrounded by non-enhancing lesions (NEL) which correspond to edema, reactive changes and/or microscopic tumor invasion. With current radiological methods, it is challenging to separate these entities within the NEL. Divided subtracted inversion recovery (dSIR) is a novel imaging technique that allows to increase T1-contrast by using two inversion recovery (IR) sequences. It is ideal to identify small changes in white matter (WM) such as gliosis. In this study, we aim to elucidate the potential role of dSIR to the neuro-oncological imaging in a cohort of patients with pre-treatment brain tumors.

Materials and Methods

We prospectively recruited 5 patients (mean age: 61.8 years, 4 females, 1 male) with newly diagnosed brain tumor for an MRI brain scan at 3 Tesla. The protocol included a T1-weighted (T1WI), T2-weighted (T2WI), fluid-inversion recovery (FLAIR) image and two additional IR sequences with inversion times of 420 and 580 ms. To obtain dSIR, both IR images were subtracted from each other and then divided by the sum of both IR images. We qualitatively compared the extent of NEL in various MRI sequences including T2WI, FLAIR, and dSIR images.

Results

dSIR images could be computed from each patient included in this analysis. Two example cases are shown in Figures 1 and 2

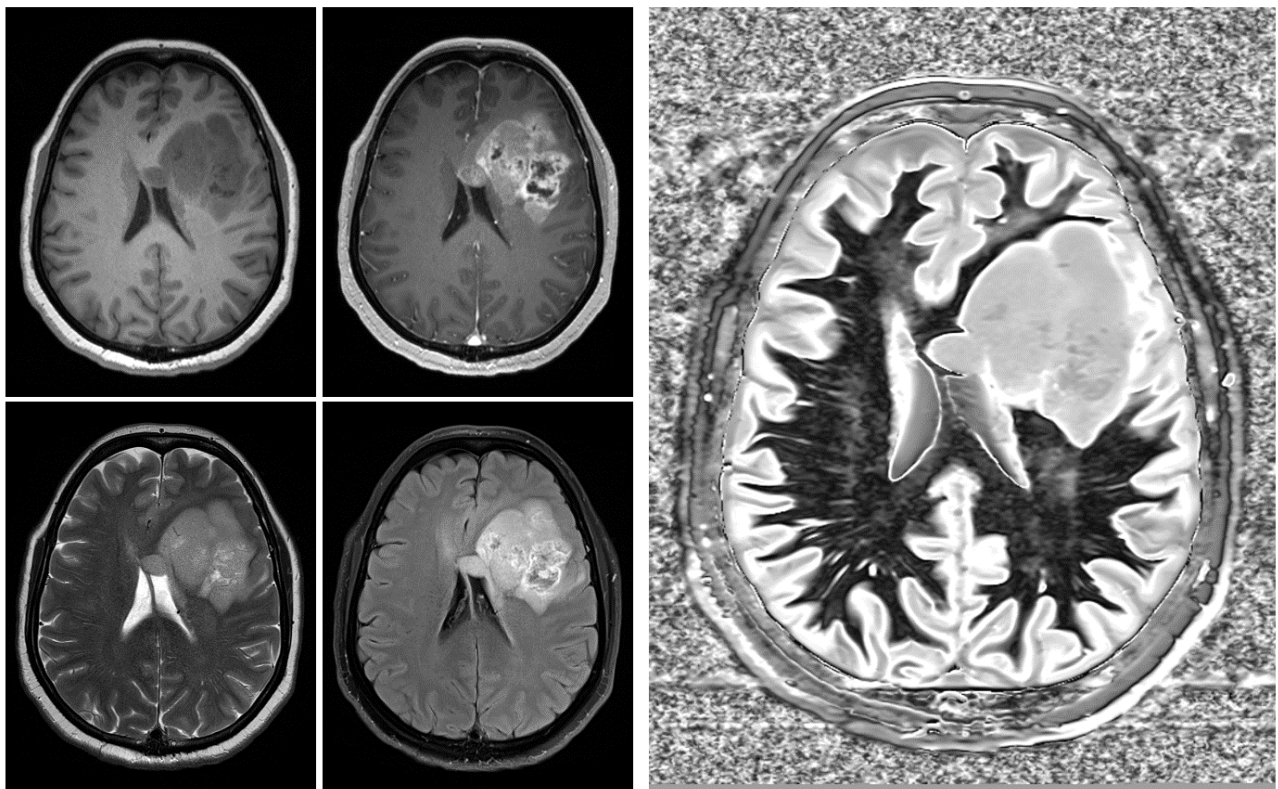


Figure 1: Example case of a patient with newly diagnosed brain tumor in the left frontal lobe.

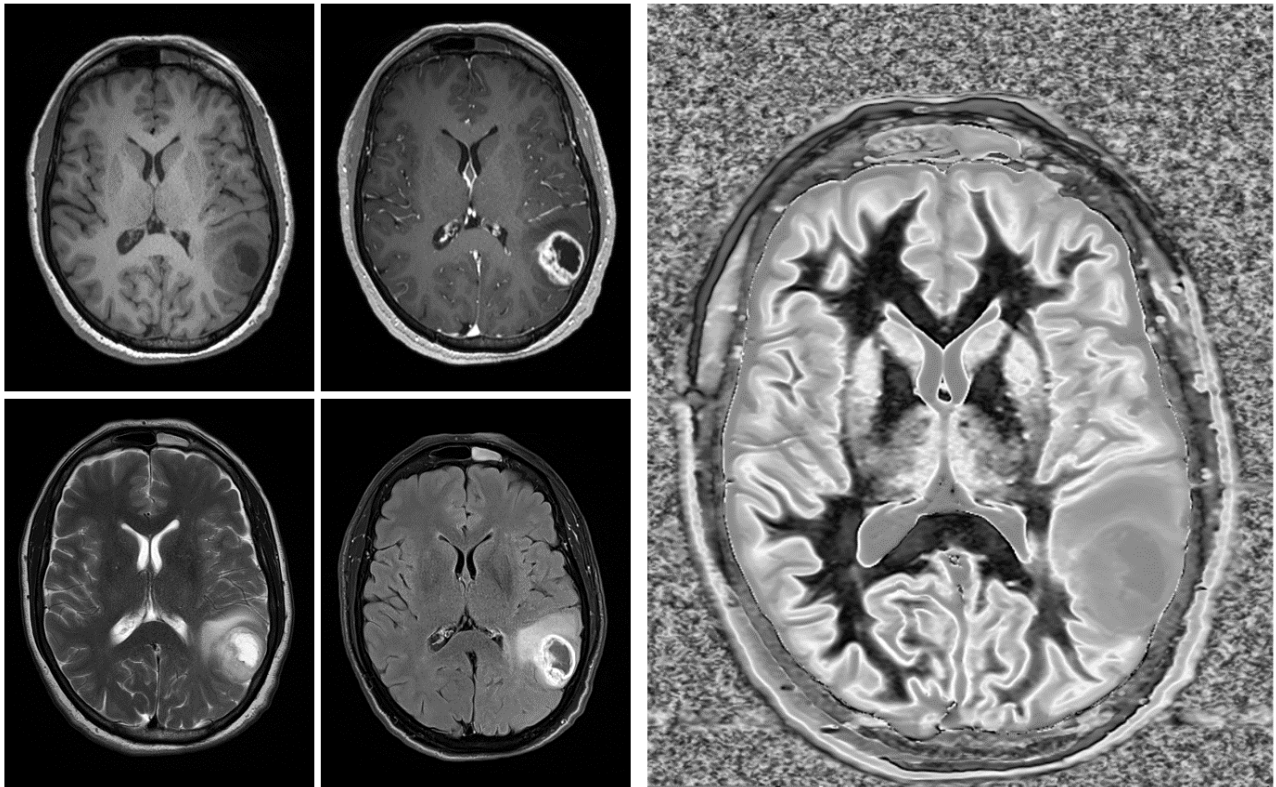


Figure 2: Example case of a patient with newly diagnosed brain tumor in the left parietal lobe.

. In dSIR, NEL presented with sharper margins compared to the NEL in T2WI and FLAIR in all 5 cases (Figure 1). The extent of NEL in dSIR was similar to that in other MRI sequences. Furthermore, dSIR allowed to identify more subtle changes in the white matter compared to conventional MRI sequences such as gliosis or perivascular spaces (Figure 1).

Conclusion

Compared to conventional MRI sequences, the dSIR sequences allowed for a clearer delineation of the NEL, which may pose an advantage for surgical and radiation therapy planning. In addition, dSIR revealed stronger signal heterogeneities within the white matter region and identified a larger number of perivascular spaces. Since the dSIR sequences are easy to implement into a conventional MRI protocol, the clinical relevance of these observations should be further elaborated in the context of treatment evaluations in larger cohorts.

Significance of Tissue Uptake Marker; 2-Deoxy-2-[¹⁸F] Fluoro-D-Glucose (Glucose Analogue) & Positron Imaging In the Pre-Operative Diagnosis & Evolution of Response to Treatment In Breast Cancer.

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Purpose

To examine correlations between the uptake of 2-deoxy-2-[¹⁸F]fluoro-D-glucose (FDG) by primary tumours/cancer and axillary lymph nodes, and clinical and biological tumour prognostic parameters (SUVmax, MTV, TLG, in patients with newly diagnosed breast cancer.

Materials and Methods

A dose of 9-10 mCi intravenously injected to the patient & after 1 hour patients were taken on the machine (PET-CT) for imaging /acquisition, followed by interpretation & reporting. The following tumour biomarker parameters were calculated and noted:

(1) **SUVmax**: The maximum standardized uptake value (SUVmax) is a key parameter in FDG PET imaging that measures the metabolic activity of the tumor.

(2) **Total lesion glycolysis** (TLG) is a measure of the glycolytic activity of the tumor.

(3) **Metabolic tumor volume** (MTV) is the volume of the tumor that is metabolically active. It is calculated as the product of SUVmean and the metabolic activity of the tumor. MTV is used to assess the local and total tumor burden and can be a predictor of treatment response.

Results

Radical mastectomy is the main treatment along with hormonal, chemotherapy.

A total of 72-patients (age ranges; from 35-70 years.) were examined with ¹⁸(F)FDG-PET-CT. Standard uptake value (SUVmax) 10-56 were seen in moderately to intense FDG of heterogeneously enhancing lesion at primary/metastatic & sites of recurrence. Approximate Total Lesion Glycolysis (TLG): 408.74, Mean Tumour Volume (MTV): 55.29 cm³. Local and distant metastases were observed in 28/70 (37.33%) patients. There was complete response to chemo-immunotherapy was seen in the 24/70 (34.28%) cases. After a single pulse of chemotherapy, ¹⁸(F)FDG-PET was able to predict complete pathological response with a sensitivity of 90% and a specificity of 74%.

Conclusion

¹⁸(F)-FDG-PET/CT imaging offers high sensitivity and specificity in the diagnosis of **cancer breast**. It is recognized as gold standard for response evaluation.

Anatomical Site-Specific Patterns of New Metastasis Development in Stage IV Melanoma During Immune Checkpoint Inhibitor Treatment

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Purpose

While metastatic spread during immune checkpoint inhibitor (ICI) treatment in melanoma may vary by anatomical location, the extent to which baseline disease distribution predicts the emergence of new lesions elsewhere remains poorly understood. This study examined whether the anatomical pattern of metastases seen on baseline imaging is associated with the subsequent appearance of new lesions in other regions during ICI treatment.

Materials and Methods

This retrospective, single-institution cohort study included patients with stage IV cutaneous melanoma undergoing first- or second-line ICI therapy. Contrast-enhanced CT scans of the chest and abdomen/pelvis were assessed longitudinally. The primary outcomes were emergence of new lesions during treatment, overall survival (OS), and progression-free survival (PFS). For each anatomical region involved at baseline, relative risk (RR) of developing new metastases in other regions was calculated. Statistical methods included Poisson regression, Cox proportional hazards models, Kaplan-Meier survival analysis, and two-sided Fisher's exact tests, with Benjamini-Hochberg correction applied for multiple comparisons.

Results

The final cohort comprised 126 patients with baseline imaging plus two subsequent follow-up scans, yielding 1,463 lesions for analysis. Lung metastases were most common at baseline (57.9%, 73/126), followed by lymph node (53.2%, 67/126) and liver involvement (48.4%, 61/126). New metastatic lesions developed in 37 patients (29.4%) over the course of follow-up. After correction for multiple testing, only baseline liver involvement remained significantly associated with an increased likelihood of new lesion development (RR 2.22; 95% CI, 1.23–4.02; $p = 0.0064$; $p\text{FDR} = 0.045$). No specific Couinaud liver segment showed a predisposition toward metastatic seeding (all $p > 0.05$). In multivariable analysis, baseline hepatic metastases were independently linked to worse OS (adjusted HR 2.22; 95% CI, 1.24–3.96; $p = 0.007$) and worse PFS (adjusted HR 1.91; 95% CI, 1.11–3.28; $p = 0.019$).

Conclusion

Liver involvement at baseline appears to be an independent predictor of subsequent metastatic progression in patients with stage IV melanoma receiving ICI therapy, and is associated with worse survival outcomes.

Pancreatic squamous cell carcinoma after neoadjuvant treatment: CT findings and rad-path correlation

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Purpose

To describe a series of neo-adjuvated pancreatic squamous cell carcinomas to determine the correlation between specific imaging features and pathology.

Materials and Methods

This retrospective study from an IRB-approved surgical registry (PAD-Registry, n1101CESC) included patients with pancreatic squamous cell carcinoma which underwent resection after neo-adjuvant therapy. Patients were included if they underwent pre-operative CT within one-month of resection. When available, pre-chemotherapy CTs were also reviewed. Agreement of size measurement between CT and anatomic-pathology was evaluated with Intra-class correlation (ICC) and Bland Altman test. Differences in size measurement before and after therapy were evaluated with t-test for paired data, after demonstration of normal distribution with Shapiro Wilk test. Statistical associations were calculated with Fisher's exact test.

Results

25 patients (8 F, 17 M, mean age 59 yrs) were included.

After treatment, mean radiological size was $28,35 \pm 8,92$ mm and mean anatomy-pathological gross size was $27,99 \pm 12,44$ mm. Bland-Altman test revealed a mean difference between measurements of 0,35 mm (CI -3,95; 4,65); ICC revealed an absolute agreement of 0.66 (averaged of 0.80), indicating moderate to good correlation. Mean post-treatment lesion density in the arterial phase was $58,9 \pm 15,9$ HU and $67,5 \pm 15,9$ HU in the portal venous phase. In 12/25 patients, pre-treatment CT was available for review; mean lesions size was $34,4 \pm 11,0$ mm before therapy and $29,8 \pm 10,3$ mm after therapy ($p=0.037$). Reduction in size was not statistically significantly associated with R0 resections ($p=0.19$). After treatment, lesion density increased in the arterial phase in 7/12 (mean $18 \pm 8,4$ HU) and in the portal venous phase in 8/12 (mean $54,6 \pm 18,3$ HU). Changes in lesion density were not related to favourable TRG response ($p=1.000$).

Six patients were deemed resectable according to NCCN criteria; none of these had R1 margins. 19/25 were considered borderline resectable (BR), of which 6/19 achieved R0 resection. After neoadjuvant therapy, presence of BR disease was associated with R1 resections ($p=0.0032$).

Conclusion

After neoadjuvant therapy, lesions tended to increase in density, although this finding was not associated with positive TRG response. Residual BR disease was associated to R1 resections. Good concordance in size measurement between CT and pathology was found.

Toward abdominal RAFF MRI for therapy monitoring: simulation, phantom calibration and in-vivo parameter maps

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Purpose

Therapy monitoring in abdominal oncology requires imaging readouts that may reflect treatment-related tissue remodeling before lesion size changes. Rotating-frame MRI, including spin-lock and relaxation along a fictitious field (RAFF), is sensitive to low-frequency molecular motion, chemical exchange and macromolecular interactions. RAFF preparations are attractive for abdominal use because they can generate rotating-frame contrast with comparatively low radiofrequency energy deposition. This project establishes a translational abdominal RAFF MRI workflow linking pulse simulation, phantom calibration and in-vivo parameter mapping, with liver and pancreas as primary target regions.

Materials and Methods

The work follows an iterative simulation-phantom-in-vivo design. RAFF magnetization behavior is modeled using vector-based rotating-frame simulations to compare RAFF preparations (*Figure 1*). Phantom measurements provide a controlled calibration layer for signal behavior, parameter fitting and map generation. RAFF acquisitions use a research sequence provided by Shalom Michaeli and colleagues within an ongoing volunteer and patient workflow. Coronal upper-abdominal 2D multi-slice RAFF and complementary spin-lock data are processed using a slice-wise pipeline for image handling, registration support, ROI inspection and voxel-wise fitting. Motion correction is included as a practical step, while focus is RAFF parameter mapping for therapy monitoring.

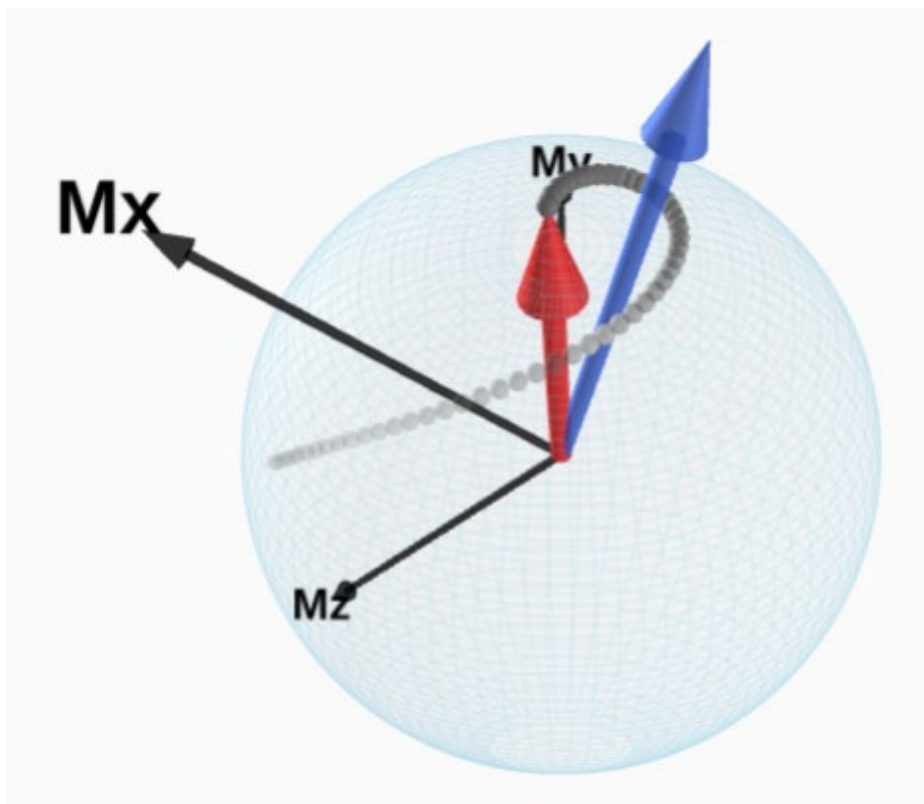


Figure 1: RAFF spin-lock simulation. The magnetization vector (red) evolves around the effective locking field (blue); the gray trace shows its recent trajectory.

Results

The workflow yields complementary simulation, phantom and in-vivo outputs. The simulation visualizes RAFF magnetization dynamics relative to the effective locking field and provides a physical framework for sequence-specific contrast behavior (*Figure 1*). Phantom measurements allow fitted signal curves and parameter maps under controlled conditions. In vivo, coronal 2D RAFF maps visualize upper-abdominal anatomy including liver and pancreas. The RAFF2 map demonstrates organ-resolved abdominal contrast with liver and pancreas identifiable in the color-coded parameter image (*Figure 2*). The corresponding RAFF4 map shows the same target region with a distinct visual contrast pattern (*Figure 3*). Differences between RAFF2 and RAFF4 are particularly apparent in the pancreas, supporting the concept that different RAFF preparations probe different rotating-frame contrast regimes.

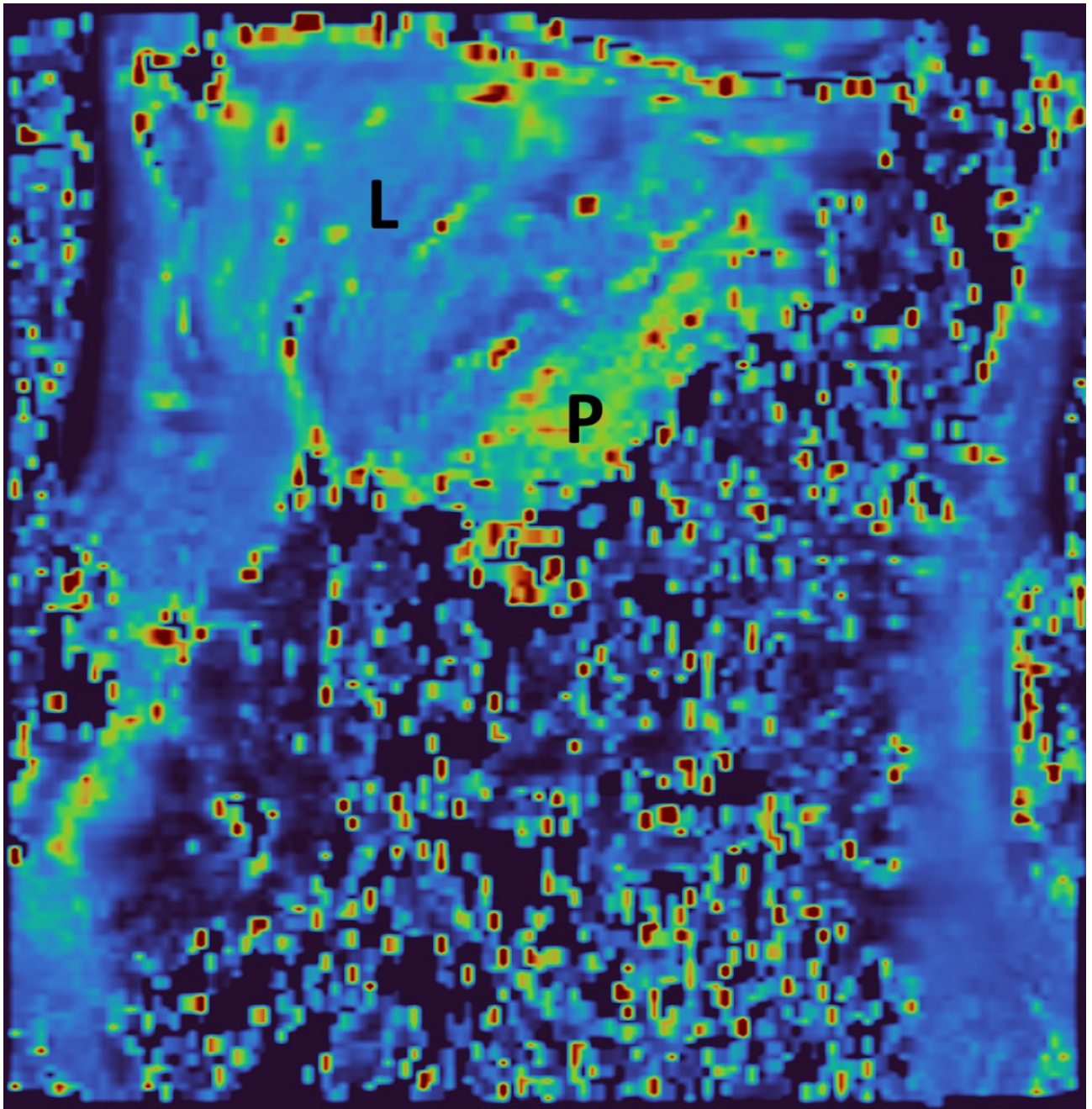


Figure 2: Coronal 2D RAFF2 map of the upper abdomen in a healthy volunteer. Liver (L) and pancreas (P) are labeled; RAFF2 values are displayed using a rainbow color scale.

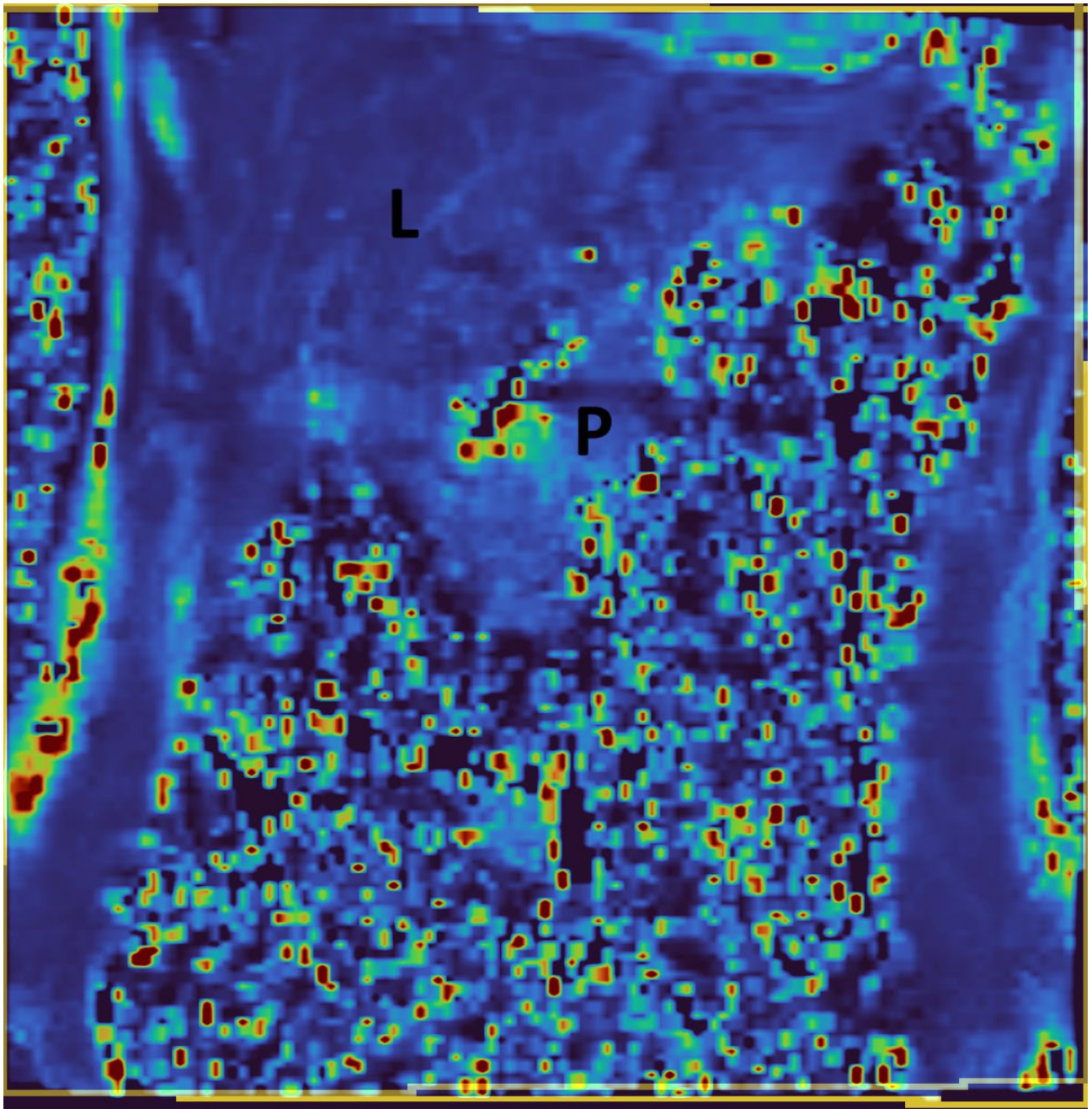


Figure 3: Coronal 2D RAFF4 map of the upper abdomen in a healthy volunteer. Liver (L) and pancreas (P) are labeled; RAFF4 values are displayed using a rainbow color scale.

Conclusion

Simulation, phantom calibration and in-vivo mapping are integrated to identify suitable spin-lock sequences/settings for abdominal tumor imaging. Low-SAR RAFF may offer complementary contrast for therapy monitoring.

Apparent Diffusion Coefficient (ADC) in Prostate Cancer as an Imaging Biomarker for Early Response to Androgen Deprivation Therapy (ADT)

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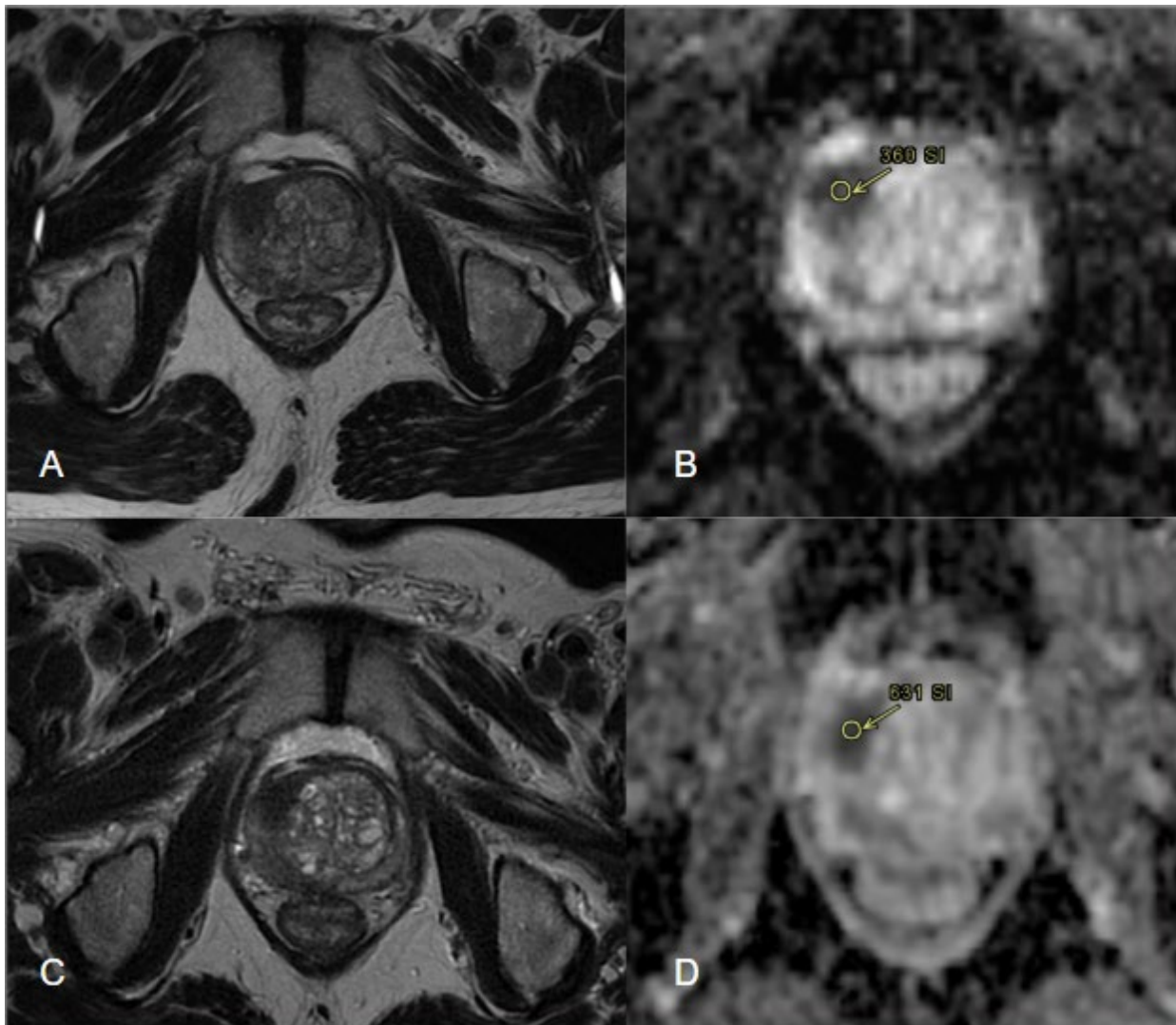
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Purpose

To investigate the clinical value of quantitative apparent diffusion coefficient (ADC) maps as an early imaging biomarker of therapeutic response in patients with prostate adenocarcinoma undergoing neoadjuvant androgen deprivation therapy (ADT) with quarterly Triptorelin at the dose of 11.25 mg prior to radiotherapy (RT).

Materials and Methods

This retrospective multicenter investigation enrolled 13 patients with histologically confirmed prostate cancer, selected for ADT and RT after multidisciplinary consensus. Imaging datasets were acquired at the Azienda Ospedaliera Universitaria "Luigi Vanvitelli" of Naples and centrally reviewed at the Azienda Ospedaliero-Universitaria Consorziale Policlinico di Bari Radiology Unit. All patients underwent multiparametric magnetic resonance imaging (MRI) of the prostate at diagnosis and after three months of ADT, before RT. Acquisitions were performed according to the Prostate Imaging Reporting and Data System (PI-RADS) v2.1 protocol. Regions of interest (ROIs) of 0.1 cm² were placed within the tumor lesion, contralateral prostate tissue, and bilaterally in the transition (TZ) and peripheral (PZ) zones. Changes in ADC, prostate-specific antigen (PSA), and tumor volume between baseline and follow-up MRI scans were evaluated using the t-test or Wilcoxon test after evaluation for normality with the Shapiro-Wilk test; their correlations were assessed using Pearson's or Spearman's correlation tests based on data distribution.

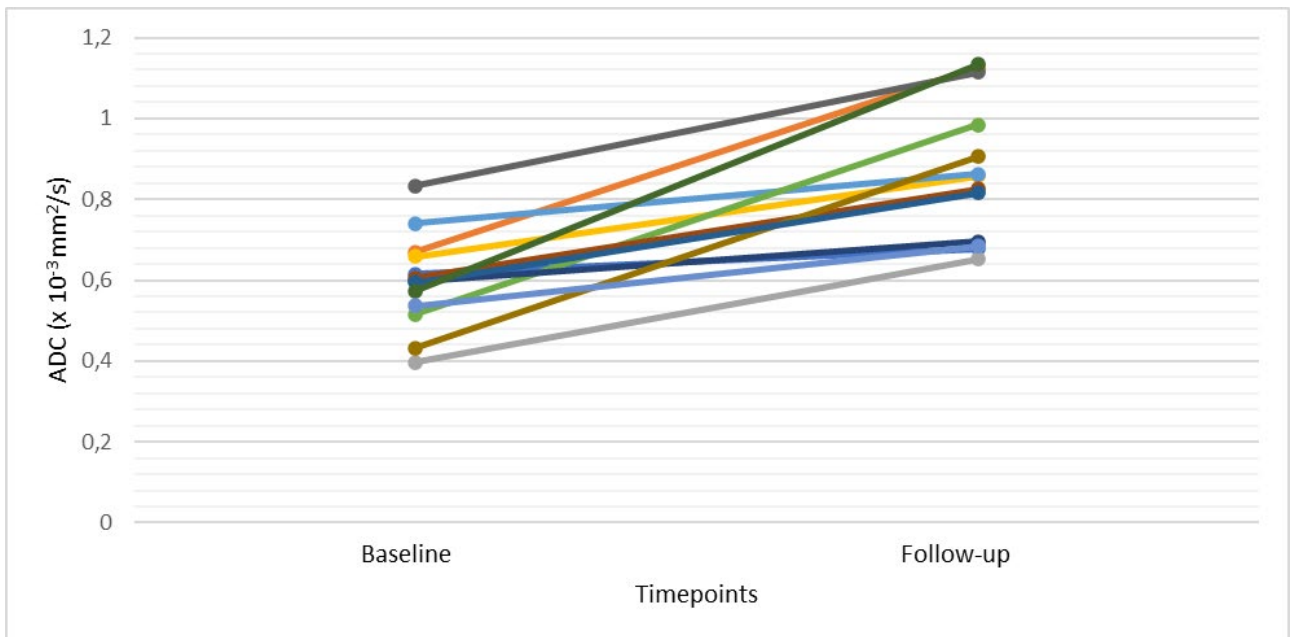


T2-weighted images (A, C) and ADC maps (B, D) of a patient with a PI-RADS 5 lesion. Images A and B show the lesion before treatment, while images C and D show the lesion after 3 months of ADT. Regions of interest (ROIs) were placed on ADC maps to calculate mean ADC values.

Results

Mean intralesional ADC values increased by $0.32 \times 10^{-3} \text{ mm}^2/\text{s}$ associated with a mean PSA decrease of 10.61 ng/mL and a mean tumor volume reduction of 1.48 cm³. A statistically significant difference was observed between pre- and post-treatment ADC values within the tumor lesion ($p < 0.001$), with no significant changes in contralateral tissue, TZ, or PZ. Correlation analyses revealed no statistically significant relations between parameter variations. Specifically, no significant association was found between ADC changes and PSA variations (Pearson $r = -0.102$; $p = 0.74$) or tumor volume alterations (Spearman $\rho = 0.313$; $p = 0.29$). Similarly, baseline PSA levels did not significantly correlate

with subsequent ADC changes (Spearman $\rho = 0.231$; $p = 0.44$).



Longitudinal changes in apparent diffusion coefficient (ADC) values from baseline to 3-month follow-up MRI after androgen deprivation therapy (ADT). Each line represents an individual patient ($n = 13$).

Conclusion

ADC variations observed within prostate adenocarcinoma after three months of ADT suggest the potential role of ADC as an early imaging biomarker of oncological response. ADC maps reflect treatment-related microstructural changes and may provide complementary information on therapeutic effects. Further studies in larger cohorts with extended follow-up periods are needed to confirm these findings and clarify their prognostic value.

Beyond Accuracy: Evaluating Trustworthiness of AI-Based Prostate Segmentation in the FAITH Project

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Purpose

The primary objective is the real-world clinical evaluation of a deep learning-based prostate gland segmentation model integrated into the radiology workflow, with particular emphasis on trustworthiness attributes including robustness, usability, transparency, and human oversight.

Materials and Methods

The evaluated AI software performs automated segmentation of the whole prostate gland, peripheral zone, and transition zone on T2-weighted MRI examinations. The clinical evaluation aims to reduce inter- and intra-observer variability, improve reproducibility, and support more efficient prostate cancer imaging workflows.

Trustworthiness assessment is conducted across seven domains: safety, security and resilience, bias mitigation, explainability and interpretability, accountability and transparency, privacy enhancement, and validity and reliability, according to the NIST AI Risk Management Framework and the European AI Act. The evaluation protocol includes quantitative segmentation analysis, radiologist trustworthiness questionnaires, and usability assessment.

Results

The evaluated AI system, with a Technology Readiness Level (TRL) 5, demonstrated high segmentation performance, achieving a Dice Similarity Coefficient (DSC) of 0.93 for whole-gland segmentation, 0.89 for the transition zone, and 0.83 for the peripheral zone using an nnU-Net architecture. A prospective collection of multiparametric MRI examinations is ongoing to assess the model's generalizability across different MRI vendors and field strengths (1.5 T and 3 T). End-user training activities were completed to ensure standardized interaction with the AI system, including image preparation, segmentation review, and trustworthiness assessment procedures. Clinical users, primarily radiologists, provide structured feedback regarding segmentation quality, usability, correctness, consistency, and overall trustworthiness through dedicated questionnaires integrated into the evaluation framework.

Conclusion

The FAITH framework extends the evaluation of AI-based prostate segmentation beyond conventional accuracy metrics by incorporating trustworthiness dimensions relevant to clinical practice. This approach may support safer, more transparent, and human-centered integration of AI tools into prostate MRI workflows.

Beyond Cancer Staging: Detection of Acute Emergency Conditions in Oncology Patients Using FDG-PET/CT: A Descriptive Cross-sectional Study

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Purpose

Oncology patients undergoing FDG-PET/CT are typically evaluated for cancer-related purposes, including tumor staging, restaging, and treatment response evaluation. The detection of incidental acute emergency conditions is an uncommon albeit critical finding, as timely intervention can significantly impact patient outcomes. By systematically reviewing such findings in the hybrid approach of PET/CT, this study aims to improve awareness among radiologists, nuclear medicine physicians, and clinicians to potentially reduce patient morbidity and improve clinical outcomes.

Materials and Methods

This descriptive cross-sectional study evaluated the prevalence, spectrum of disease and conditions, and clinical outcomes of incidental acute emergency findings in oncology patients undergoing FDG-PET/CT scan at St. Luke's Medical Center – Global City over a two-year review period from August 2023 to August 2025. All oncology patients who underwent both low dose and full dose FDG-PET/CT were assessed for the presence of acute emergency findings, including vascular, infectious, inflammatory, and other emergent conditions. Descriptive statistical analysis of the collected variables was done, including computation of frequencies, proportions, and summary statistics.

Results

Among 350 oncology patients (mean age 61.65 ± 14.25 years), vascular etiologies comprised the largest proportion of incidental acute emergency findings (40.97%), followed by other structural causes (34.96%), inflammatory (15.47%), and infectious (8.60%) etiologies. The most frequent specific diagnoses were venous thrombosis (14.29%) and pulmonary embolism (12.86%), followed by obstructive uropathy (9.14%) and acute/subacute cerebral infarction (4.00%). Vascular emergencies were particularly prominent in hepatocellular carcinoma, lung cancer, leukemia/lymphoma, and head and neck malignancies. Management within 48 hours varied by etiology: vascular causes were predominantly treated medically (55.04%), whereas structural and inflammatory etiologies more frequently required surgical or combined interventions. Infectious etiologies showed the highest proportion requiring combined medical and surgical management (42.86%).

Conclusion

Incidental acute emergency findings detected on FDG-PET/CT in oncology patients represent clinically significant events, with vascular etiologies being most common, followed by inflammatory, infectious, and other (structural) causes. Vascular emergencies were predominantly managed medically, whereas inflammatory and other (structural) etiologies were more likely to require surgical and/or combined treatment strategies. These findings reinforce the critical role of PET/CT in identifying life threatening but clinically silent conditions in vulnerable cancer patients.

Beyond Size Criteria: A Stepwise Approach to Nodal Staging in Head and Neck Cancer

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Learning Objectives

This poster aims to provide a practical step-by-step imaging approach for young radiologists, who don't possess the skill of experience to assess cervical lymph node spread in head and neck cancers according to the latest TNM staging system. This includes highlighting nodal level classification, imaging criteria for metastatic involvement, extranodal extension, and common staging pitfalls.

Background

Tumor stage at diagnosis is the number one predictor of survival for patients with head and neck tumors. The survival rate is almost double for patients without lymph node metastasis at diagnosis, as cervical lymph node metastasis is associated with higher risk of distant spread. Treatment is also decided based on initial classification and therefore requires accurate imaging assessment. Despite its clinical importance, nodal staging in head and neck malignancies remains challenging because it requires knowledge of cervical nodal anatomy, tumor-specific patterns of spread, and TNM-based staging criteria.

Imaging findings or Procedure details

Images of patients from our clinic were selected to showcase representative CT examinations from patients with histologically proven head and neck malignancies. These images highlight lymph node level classification, imaging criteria for nodal metastases, extranodal extension, nodal necrosis and advanced nodal disease. Imaging findings were correlated with the current AJCC/UICC TNM staging recommendations.

Conclusion

Accurate assessment of cervical lymph node involvement remains one of the most important prognostic factors in head and neck cancer. A structured TNM-oriented imaging approach improves diagnostic confidence, facilitates multidisciplinary communication, and enhances staging accuracy in daily radiological practice.

Biopsy-Guided Soft-Labels for Training Prostate Cancer Detection Models on Annotation-Sparse MRI Cohorts

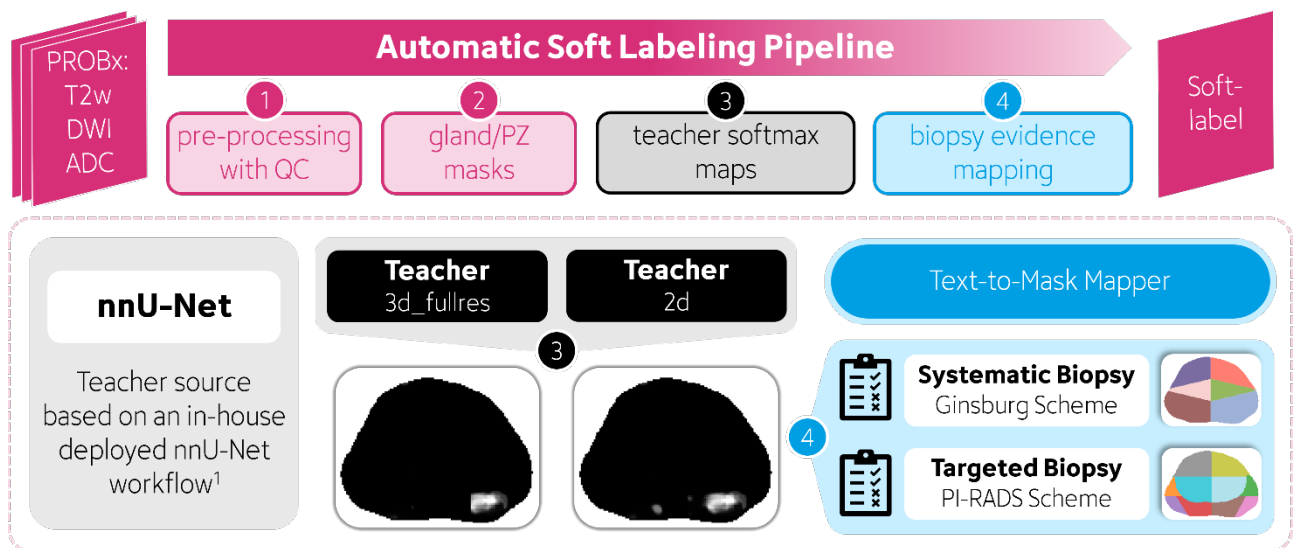
J. Yu^{1,2}, N. Netzer³, T. Kuder^{1,4}, M. Görtz^{5,6}, A. Stenzinger⁷, J. Huber^{6,8}, H.-P. Schlemmer³, M. Ladd^{1,4,8}, D. Bonekamp^{3,8,9}

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Purpose

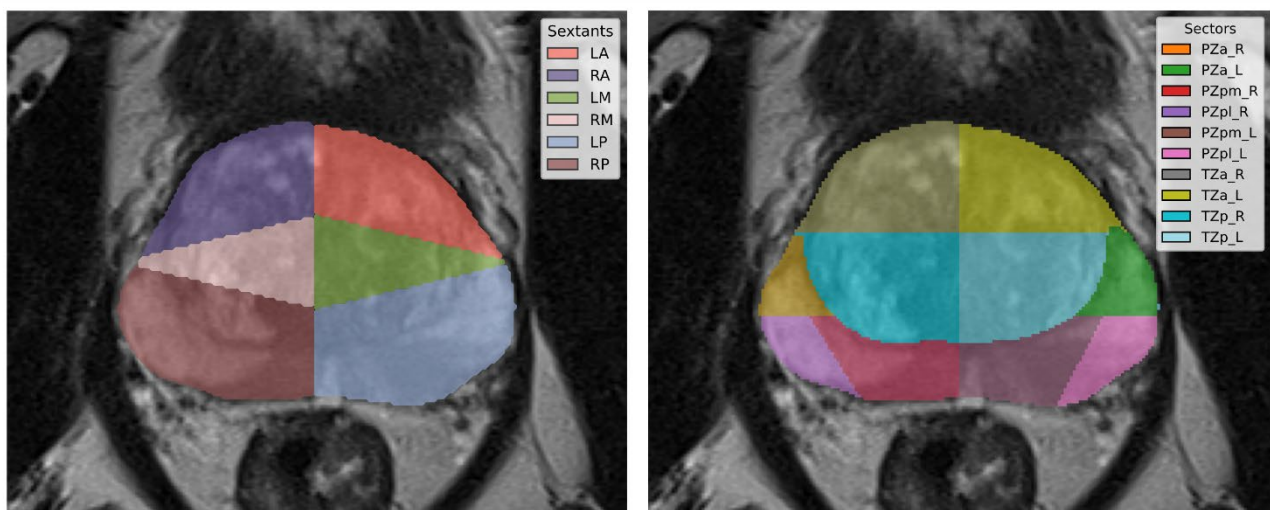
To evaluate whether routine systematic and targeted biopsy findings can guide soft-label generation to make unlabeled prostate MRI cohorts usable for cancer detection model training.

Materials and Methods



Overview of the automatic soft-labeling pipeline. Predictions from 2D and 3D full-resolution nnU-Net teacher models are averaged to form per-voxel softmax maps. Systematic and targeted biopsy reports provide sector-level spatial support for generating biopsy-informed soft labels.

In the retrospective PROBx bpMRI cohort without radiologist lesion delineations, averaged 2D/3D nnU-Net lesion-teacher predictions generated voxelwise softmax maps as candidate lesion maps^{1,2}. Systematic and targeted biopsy findings were mapped to prostate sectors and fused with these teacher candidates^{3,4}. Biopsy-informed soft-labels retained candidates with compatible biopsy-sector support and removed unsupported components before export. A paired teacher-only approach used the same retained cohort and teacher candidates but omitted biopsy filtering.



Example biopsy-scheme mapping on a mid-gland T2w slice. Left: Ginsburg sextants. Right: PI-RADS sectors. Both schemes are projected to create evidence masks for biopsy-informed soft labels; regions with Gleason score >6 encoded as positive evidence.

Soft-label utility was assessed through downstream student-model performance. Two 3D nnU-Net students were trained with identical settings (5-fold cross-validation) on 360 cases and evaluated on the same 275-case held-out test set. The averaged teacher predictions served as a teacher-reference benchmark. Metrics included raw maximum-softmax AUROC¹, lesion average precision (AP)⁵ at IoU 0.10/0.30, and five-fold

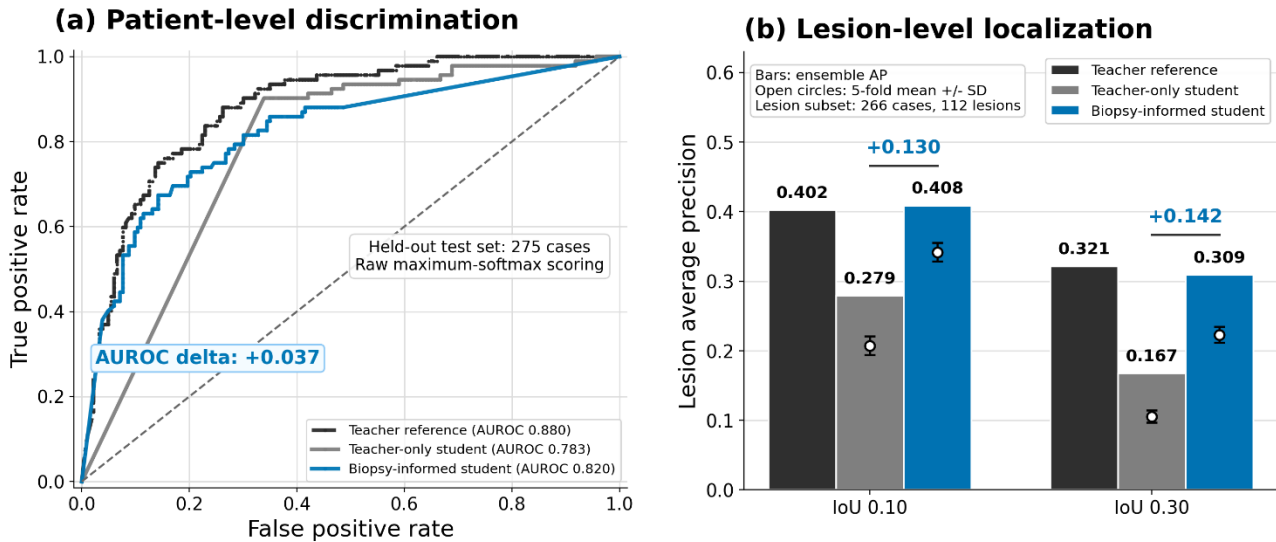
paired variability. Lesion metrics used the predefined 266-case lesion-evaluation subset; patient-level AUROC used all 275 cases.

Results

In ensemble evaluation, predictions from the five cross-validation student models were averaged to form a single test-set ensemble for each training strategy. Using this ensemble, biopsy-informed training improved lesion-level ranking relative to the paired teacher-only student. In the 266-case lesion-evaluation subset with 112 reference lesions, lesion AP increased from 0.279 to 0.408 at IoU 0.10 and from 0.167 to 0.309 at IoU 0.30. Five-fold analysis showed consistent AP gains: 0.342 ± 0.013 versus 0.207 ± 0.013 at IoU 0.10, and 0.223 ± 0.012 versus 0.105 ± 0.009 at IoU 0.30. These findings indicate improved lesion-level ranking performance with biopsy-informed soft-label training.

As a secondary patient-level reference, raw maximum-softmax AUROC increased from 0.783 to 0.820 across all 275 held-out cases, remaining below the teacher-reference AUROC of 0.880.

Model Performance Analysis on Hidden Test Dataset



(a) Patient-level empirical ROC curves from one raw maximum lesion-channel softmax score per case on the 275-case held-out test set; legend reports AUROC. (b) Lesion AP at IoU 0.10/0.30 in the 266-case lesion subset (112 lesions). Bars show ensemble AP; open circles show 5-fold mean $\pm$ SD.

Conclusion

Biopsy-informed soft-labels can convert routine biopsy-rich prostate MRI cohorts into model training data. Compared with teacher-only labels, they improved lesion AP but showed a more selective detection profile. Raw maximum-softmax AUROC was higher but should be considered a secondary reference metric because score saturation limits threshold interpretation. Threshold calibration and more comprehensive performance evaluation require further investigation.

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Differentiating pancreatic neuroendocrine tumors from mimickers on photon-counting detector CT with contrast-independent spectral signatures

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Purpose

To assess the diagnostic value of spectral parameters derived from photon-counting detector CT (PCD-CT) for distinguishing pancreatic neuroendocrine tumors (pNETs) from lesions with similar imaging characteristics. Particular emphasis was placed on both contrast-independent spectral biomarkers and multiphasic enhancement-derived metrics.

Materials and Methods

This retrospective study included patients with histologically confirmed pancreatic tumors, comprising pNETs and lesions considered imaging mimickers. Spectral reconstructions of PCD-CT examinations were analyzed including unenhanced, arterial, pancreatic, and venous phase scans. Mean attenuation values were measured within the lesion and adjacent pancreatic parenchyma. Tumor-to-pancreas attenuation ratios (T/P), high spectral ratio (HSR), spectral density index (SDI), and dynamic parameters describing enhancement patterns over all four phases were calculated. Diagnostic performance was assessed using receiver operating characteristic (ROC) analysis, Mann-Whitney U testing and Cliff's delta to estimate effect size.

Results

The complete four-phase cohort consisted of 13 pNETs and 13 mimicking lesions. Spectral parameters obtained during the venous phase demonstrated the strongest discriminatory performance. The venous T/P ratio at 190 keV achieved the best discrimination (AUC = 0.89, 95% CI: 0.73–1.00; accuracy = 88.5%), with a highly significant difference between groups ($p < 0.001$, effect size of $\delta = 0.78$). Venous T/P ratios at 70 keV and 40 keV also showed excellent performance, with AUCs of 0.86 and 0.83, respectively. Notably, spectral ratios measured on unenhanced scans remained highly discriminative, with unenhanced T/P at 70keV reaching an AUC of 0.81, suggesting that intrinsic tissue composition contributes to lesion differentiation independent of contrast administration. Compared with mimicking lesions, pNETs exhibited increased HSR (AUC = 0.82) and SDI (AUC = 0.80), consistent with a less pronounced high-energy spectral attenuation decline and greater relative spectral separation. In contrast, dynamic enhancement parameters provided limited additional diagnostic value.

Conclusion

PCD-CT identifies distinct spectral characteristics of pancreatic neuroendocrine tumors that facilitate their differentiation from imaging mimickers. High-keV tumor-to-pancreas spectral ratios, particularly in the venous phase, demonstrated strong discrimination performance, while unenhanced spectral features suggest the potential for contrast-independent tissue characterization. These findings support the role of PCD-CT as a promising non-invasive imaging biomarker for improving the diagnostic workup of pancreatic lesions.

Diffuse Bone Marrow Infiltration with Minimal CT Abnormalities as the Initial Imaging Manifestation of an Occult Malignancy

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Learning Objectives

To recognize that diffuse metastatic bone marrow infiltration may lack destructive CT findings, appreciate the importance of evaluating bone marrow in soft-tissue windows and correlating imaging findings with clinical presentation, and understand the complementary role of MRI in detecting diffuse marrow replacement.

Background

Diffuse metastatic bone marrow infiltration may not produce cortical destruction or focal osseous lesions on CT, making the diagnosis challenging when imaging findings are subtle or nonspecific. Careful evaluation of bone marrow attenuation, particularly in soft-tissue window settings, together with clinical–radiological correlation, may reveal subtle abnormalities that warrant further investigation. MRI plays a pivotal role in confirming diffuse marrow replacement and guiding the diagnostic work-up of occult malignancy.

[REF1]

[REF2]

Imaging findings or Procedure details

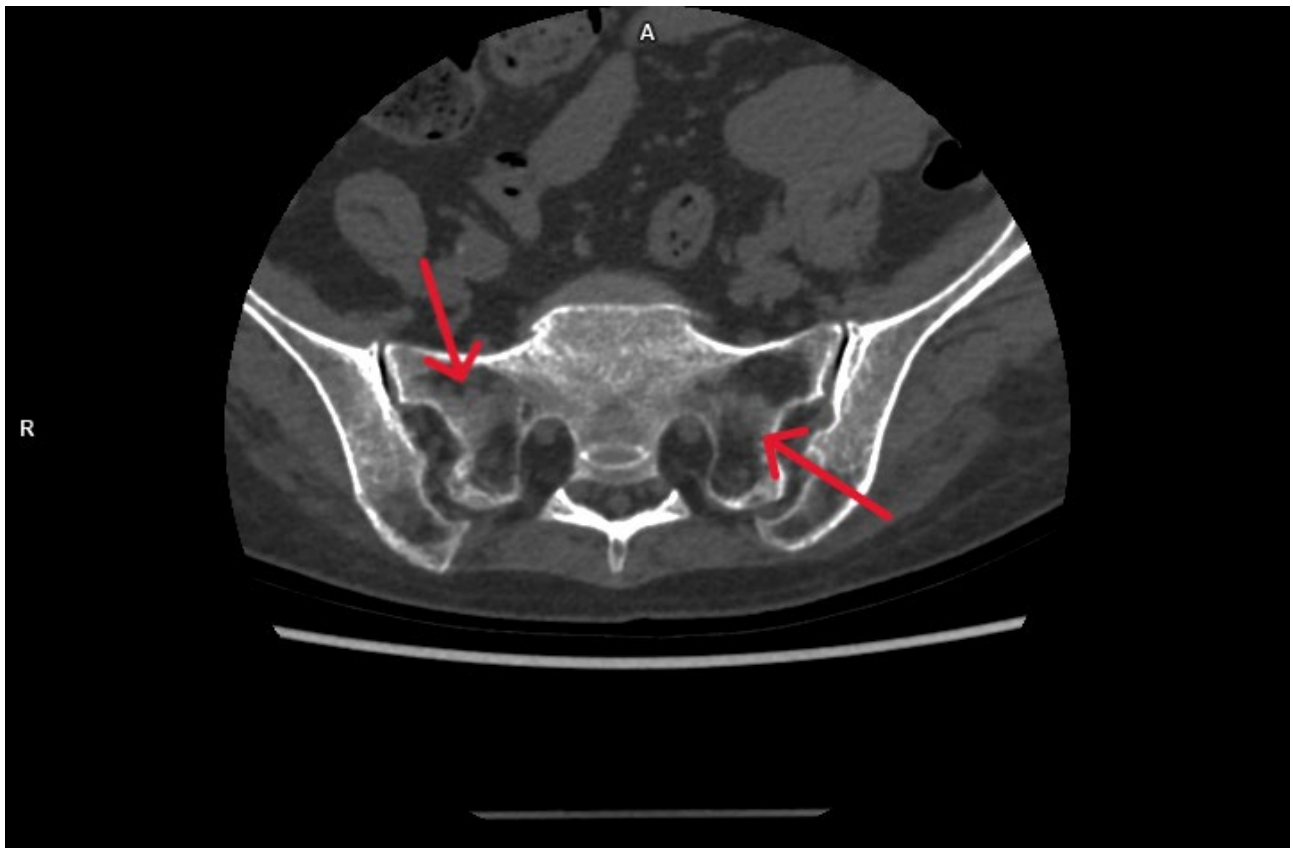
A 69-yr woman presented with a 2-week history of persistent low back pain partially relieved by NSAIDs.

Lumbar CT demonstrated mild multilevel degenerative changes without spinal canal stenosis or nerve root compression.



Initial lumbar CT (bone window) demonstrates only subtle marrow abnormalities with a small indeterminate lucent lesion in the T12 vertebral body and no destructive osseous lesions

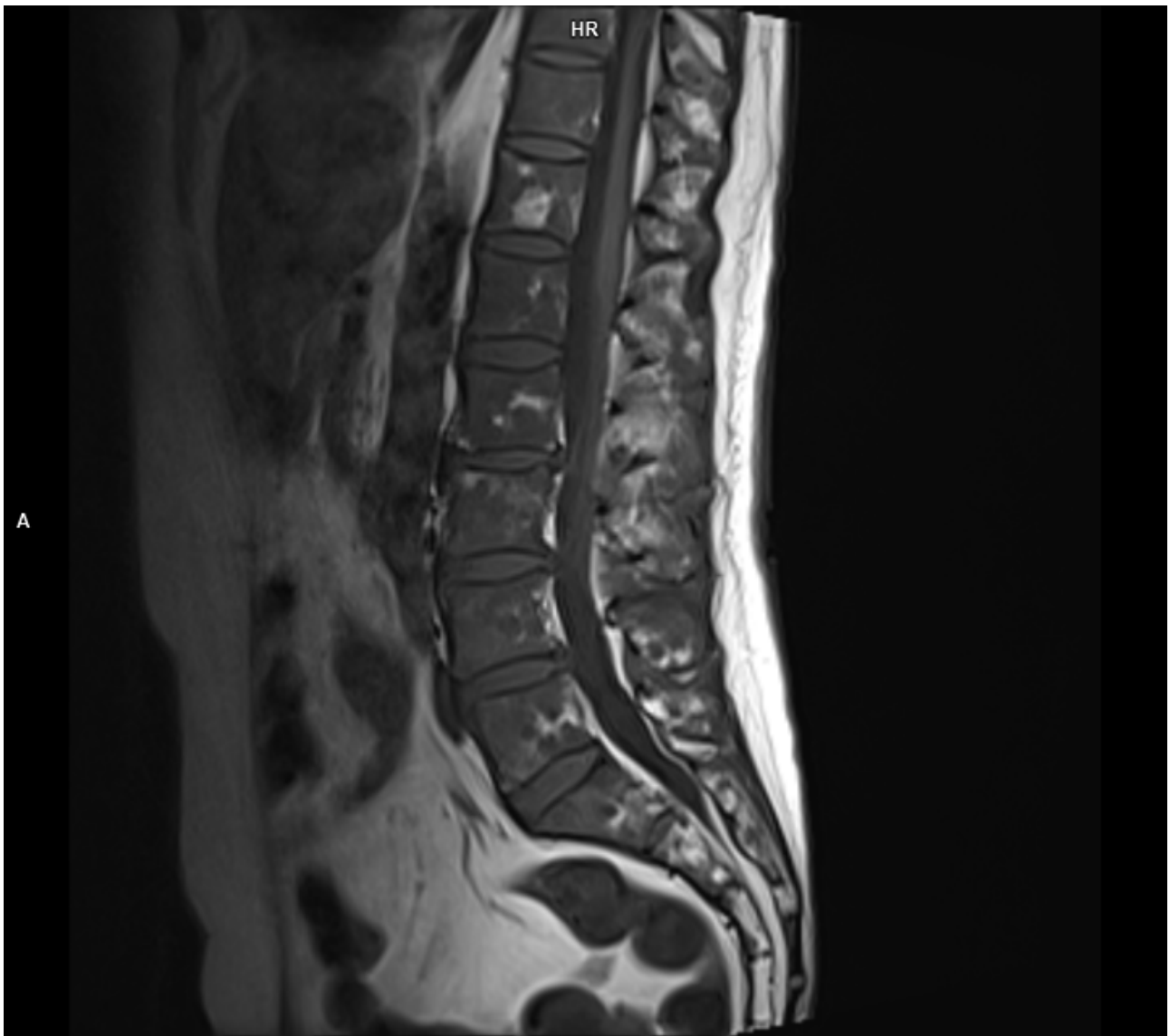
Careful assessment of the bone marrow, particularly in soft-tissue window settings, revealed a small indeterminate lucent lesion within the T12 vertebral body, initially considered most compatible with an atypical hemangioma, together with subtle heterogeneous bone marrow attenuation involving the sacrum and iliac bones.



Axial lumbar CT (soft-tissue window) demonstrates subtle heterogeneous bone marrow attenuation within the sacrum and iliac bones

No cortical destruction or definite focal osseous lesions were identified. As these imaging findings did not adequately explain the patient's symptoms and raised suspicion of diffuse bone marrow pathology, MRI was performed.

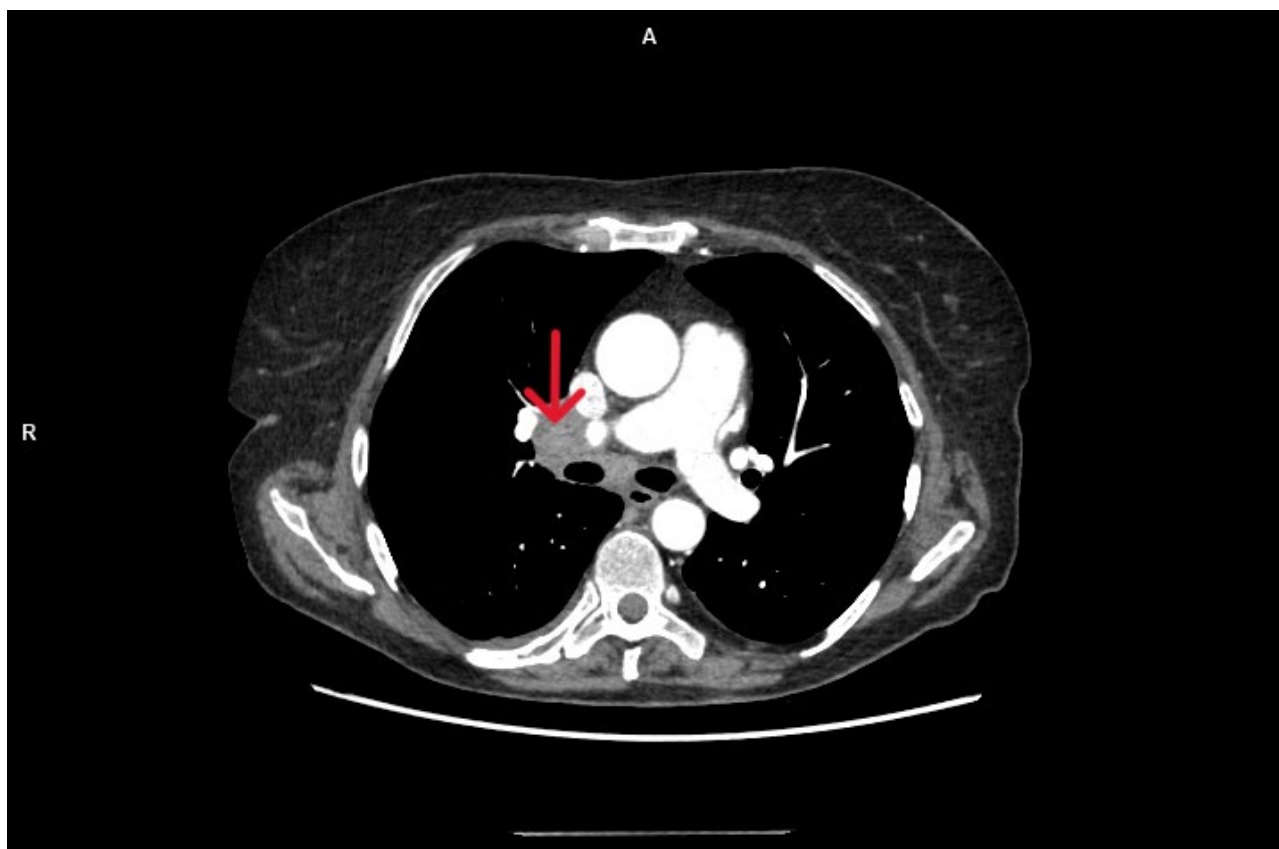
MRI demonstrated extensive diffuse marrow replacement involving multiple vertebral bodies, posterior elements and the sacrum.



Sagittal T1-weighted MRI demonstrates diffuse replacement of normal vertebral bone marrow by malignant marrow infiltration

The lesions showed diffusely low T1 signal intensity, mildly increased STIR signal, marked diffusion restriction, irregular contrast enhancement and absence of signal loss on opposed-phase imaging, consistent with diffuse malignant marrow infiltration. MRI also revealed innumerable additional marrow lesions that had not been appreciable on CT.

Subsequent contrast-enhanced CT of the chest, abdomen and pelvis demonstrated a centrally located right hilar pulmonary mass with mediastinal lymphadenopathy, highly suggestive of advanced primary pulmonary malignancy.



Contrast-enhanced CT subsequently demonstrated a centrally located right hilar mass with mediastinal lymphadenopathy, establishing the likely primary malignancy.

The patient was referred for oncological evaluation; however, her condition rapidly deteriorated, and she died from multiorgan failure before histopathological confirmation could be obtained.

Conclusion

When CT findings do not explain the clinical presentation, assessment of bone marrow in soft-tissue windows should prompt MRI. Diffuse marrow infiltration may occur without destructive bone lesions.

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Divided Subtracted Inversion Recovery (dSIR) MRI reveals more Perivascular Spaces in subcortical White Matter compared to T1-weighted MRI

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Purpose

Divided subtracted inversion recovery (dSIR) is a novel imaging technique that allows to increase T1-contrast by using two inversion recovery (IR) sequences. It is ideal to identify small changes in white matter (WM) such as enlarged perivascular spaces (PVS). Various neurological conditions including gliosis, neurodegenerative and neurovascular disorders have been shown to be associated with enlarged PVS. In this study, we aim to elucidate the potential role of dSIR to assess PVS.

Materials and Methods

We prospectively recruited 65 participants (mean age: 61.7 years, 26 females, 39 males) without any previously known pathological brain conditions for an MRI brain scan at 3 Tesla. The protocol combined a T1-weighted (T1wi) and two additional IR sequences with inversion times of 420 and 580 ms. To obtain dSIR, both IR images were subtracted from each other and then divided by the sum of both IR images. PVS were segmented automatically from T1wi using mcPVS-Net and manually from dSIR images. We performed Spearman correlations between the total volume of PVS in both sequences and age.

Results

dSIR images could be computed from every participants recruited in this study. An example case is presented in Figure 1. dSIR images revealed much more PVS especially in subcortical WM compared to T1wi (see Figure 3). In contrast, T1wi identified PVS predominantly in the basal ganglia. The volume of PVS from T1wi correlated with the volume of PVS in dSIR image ($r = 0.49$, $p < 0.0001$) and with age ($r = 0.52$, $p < 0.0001$) (see Figure 2). However, the volume of PVS in dSIR did not correlate with age ($p = 0.47$).

Example case (male, 58 years)

T1wi

dSIR

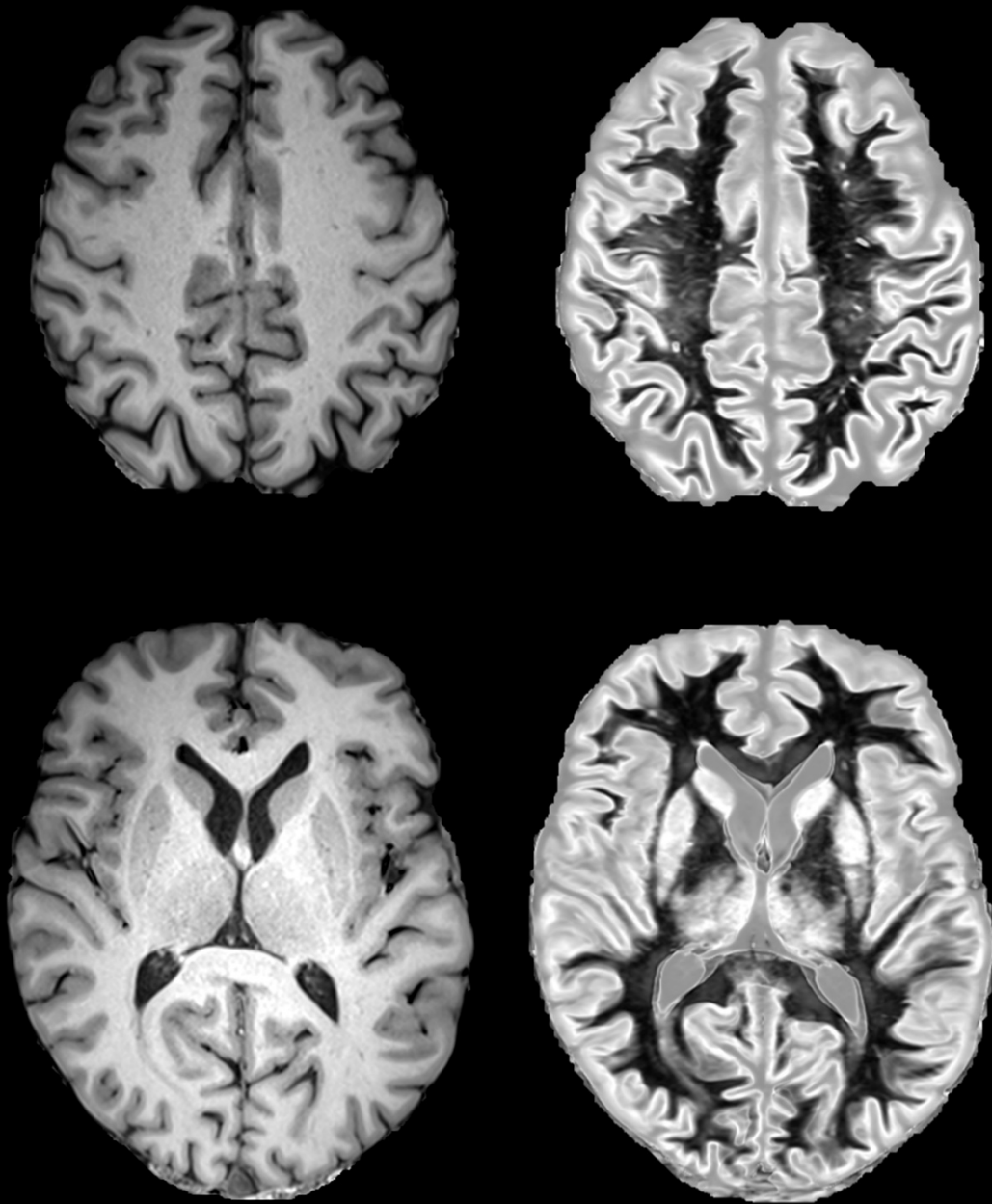
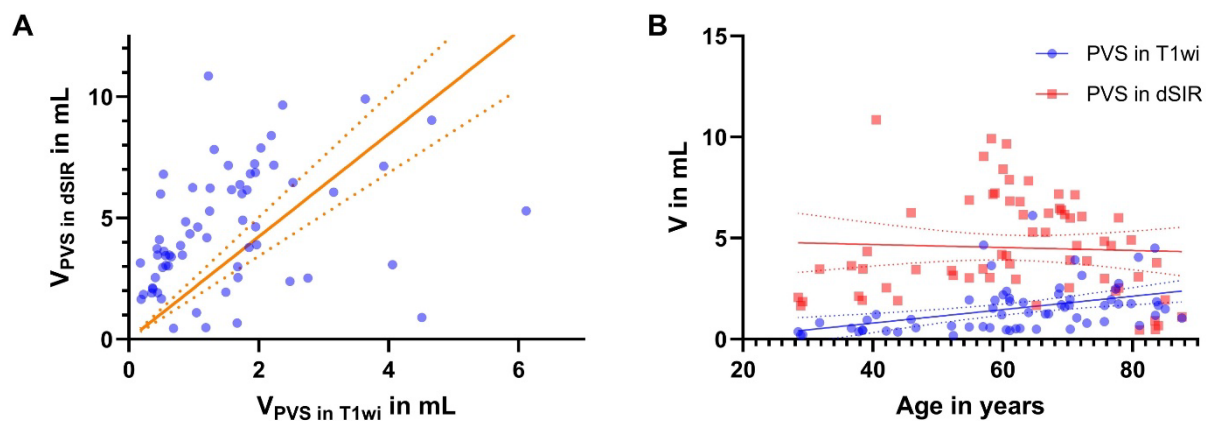
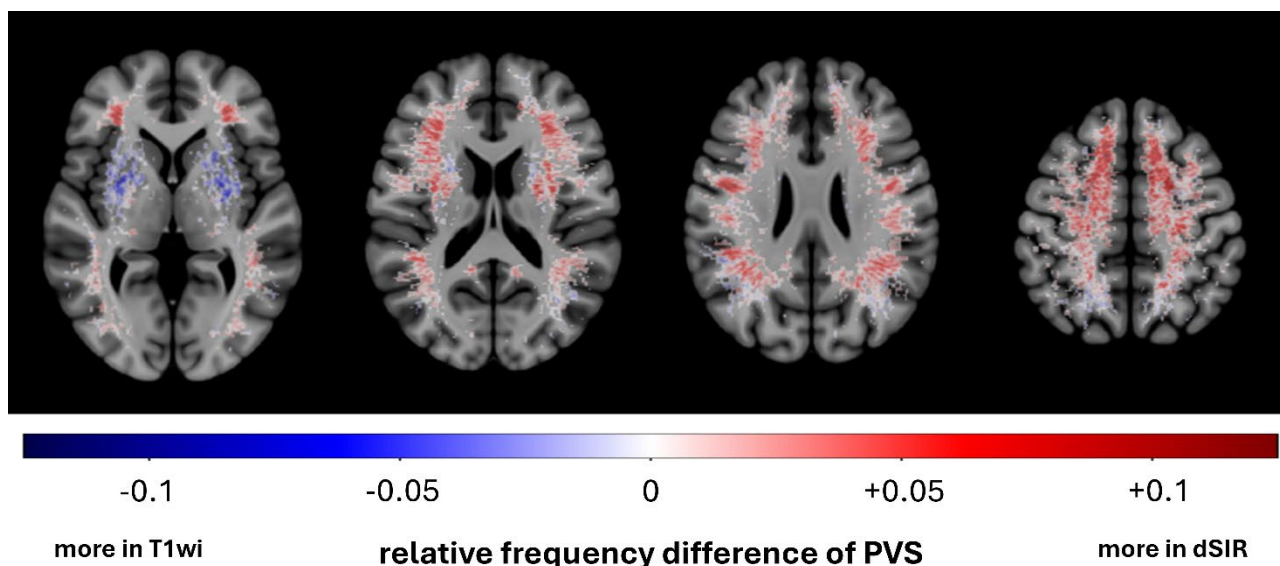


Illustration of the perivascular space imaging on an axial T1-weighted (T1wi) and divided subtracted inversion recovery (dSIR) images at two different heights in a 58-year-old male participant.



ng in both MR sequences (T1wi anThe total volume of perivascular spaces (PVS) presentid dSIR) are correlated with each other (A) and with age of the participant (B) using Spearman correlation.



Every segmented perivascular spaces (PVS) in T1wi (blue) and dSIR images (red) from each participant are projected to the common MNI-brain template to create a heat map.

Conclusion

dSIR identified more PVS in subcortical WM, while T1wi identified more PVS near the basal ganglia. Combining both sequences for more sensitive PVS assessment may contribute to an improved understanding of various etiologies affecting WM.

Encapsulated Papillary Carcinoma: Ultrasonography and Mammography Features

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Learning Objectives

Learning Objectives

Identify the key ultrasonographic and mammographic imaging characteristics of encapsulated papillary carcinoma, a rare subtype of breast carcinoma and its diagnostic relevance in breast imaging.

Background

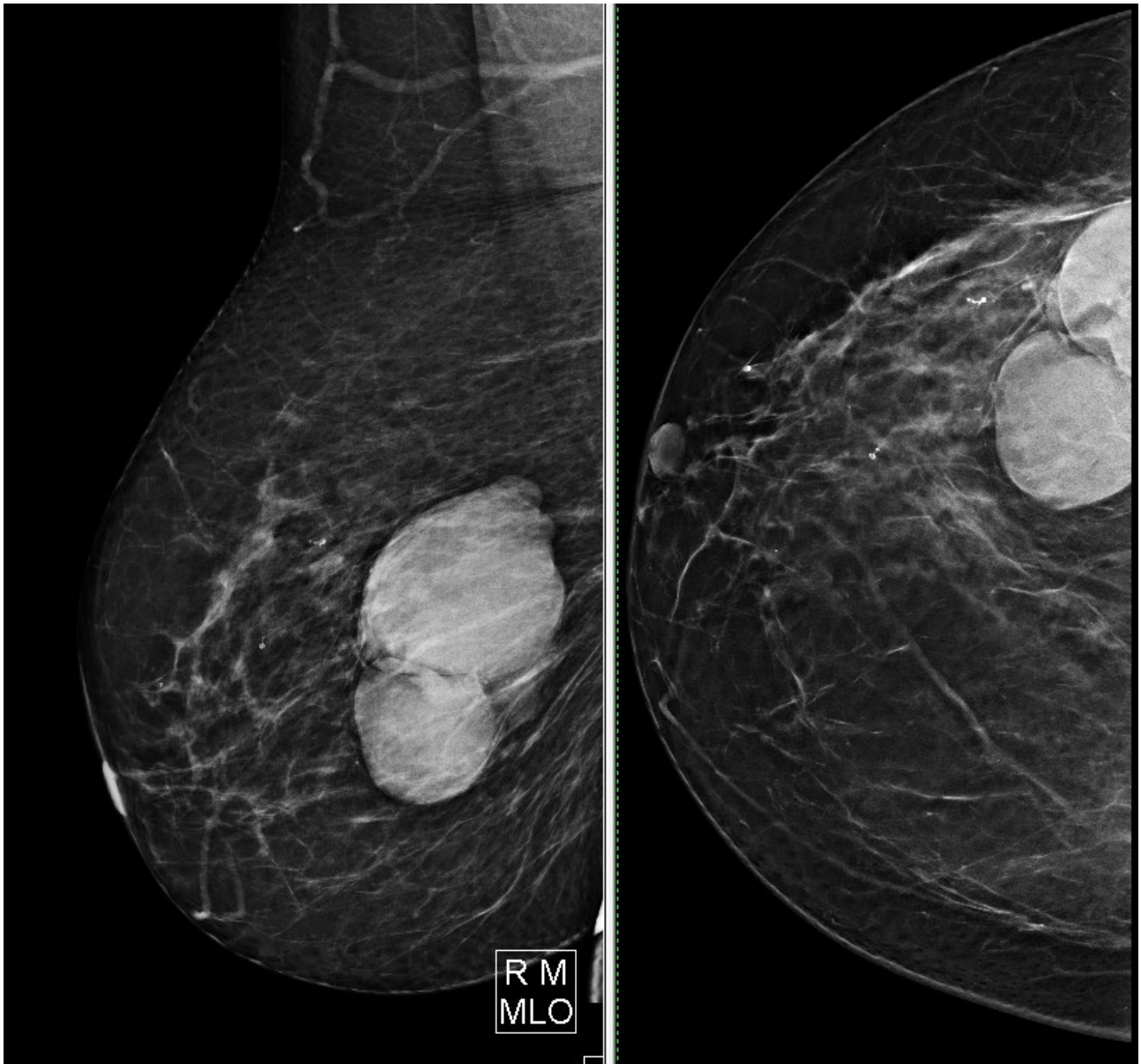
Background

Encapsulated papillary carcinoma (EPC) of the breast is an uncommon neoplasm, representing approximately 1–2% of all breast malignancies. It predominantly occurs in postmenopausal women and is characterized by a relatively indolent and not fully predictable clinical course[1]. Some cases have been described in males[2]. Statistically, this type of cancer occurs in Caucasian women with a median age at diagnosis of 67 years[3]. Absence of myoepithelial cells at the periphery is a characteristic histological feature[4]. Clinically, this subtype of breast carcinoma often presents with subtle and nonspecific symptoms, most commonly as a painless palpable breast mass and/or bloody nipple discharge[1].

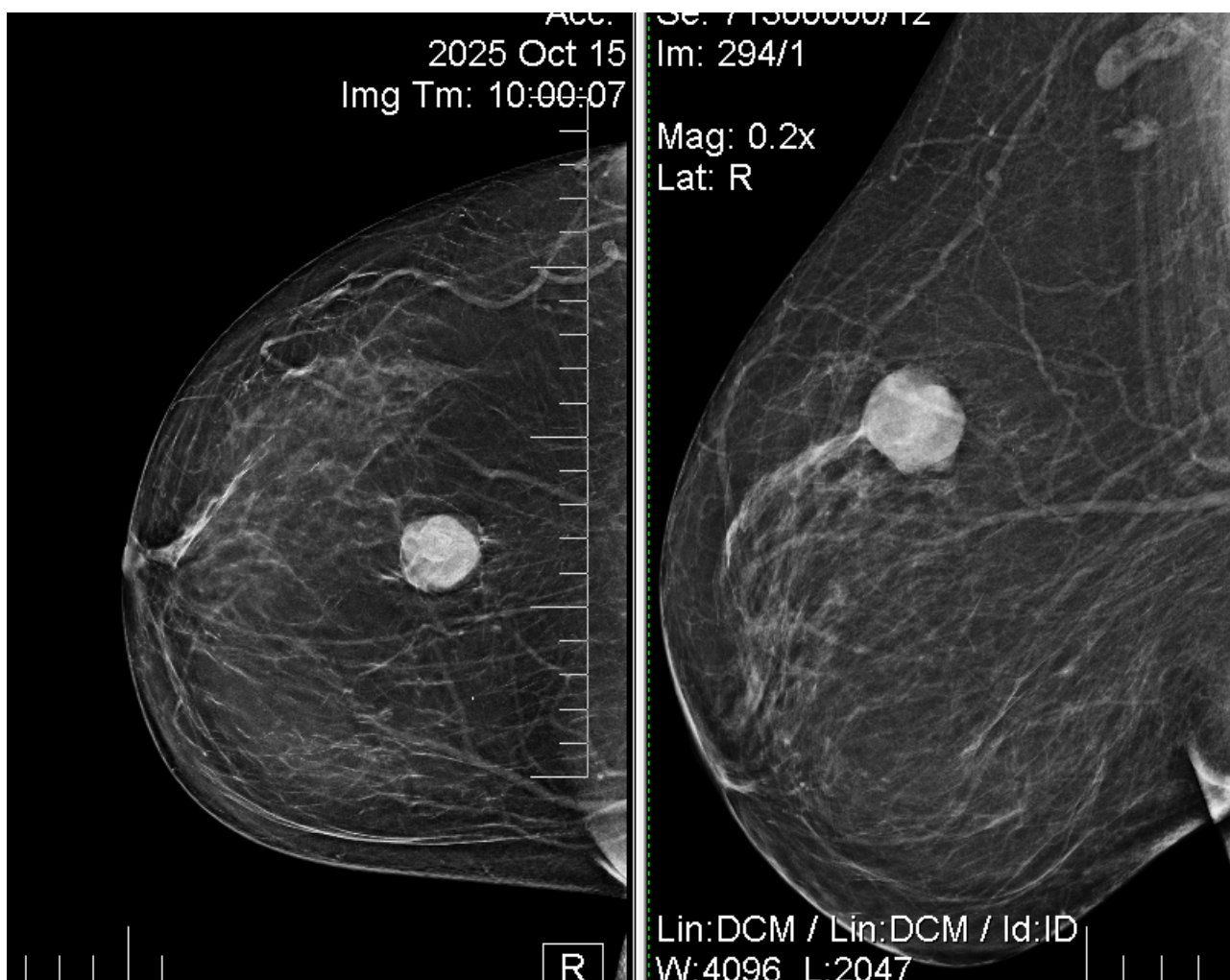
Imaging findings or Procedure details

Imaging findings

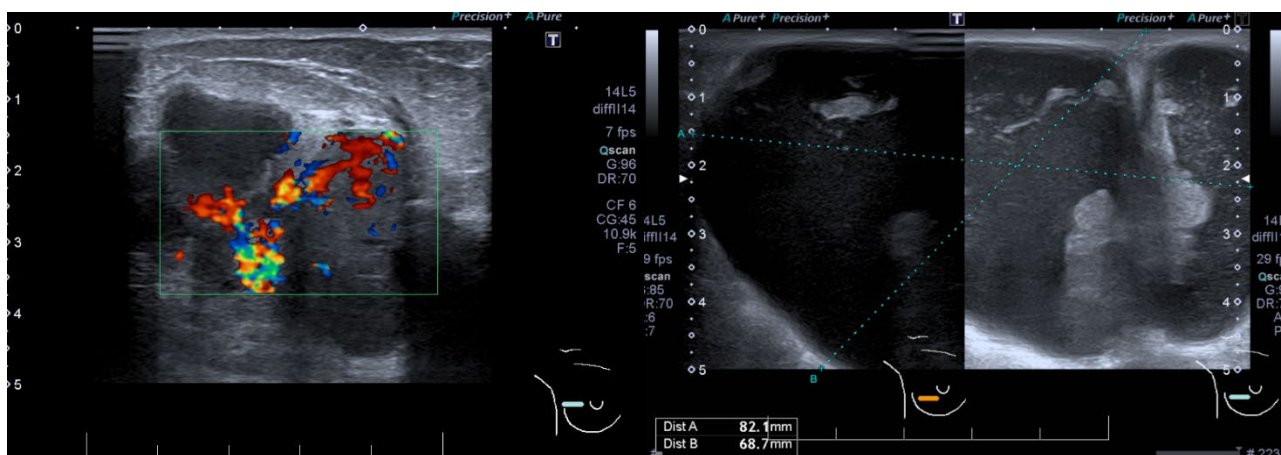
On mammography, encapsulated papillary carcinoma typically appears as a round or oval mass of high density. Margins are well-circumscribed in approximately half of cases, although focal areas of indistinctness may be present when associated invasive components are present[5][6][7][9]. These lesions tend to be located in the retroareolar region or in the central part of the breast in nearly 50% of patients[8]. US shows a cystic lesion with an intracystic solid component projecting from its posterior wall[2]. Color Doppler imaging may demonstrate a prominent feeding vessel with internal vascularity within solid mural nodules. In addition, layering echogenic intralesional debris, reflecting hemorrhage, may be present within cystically dilated spaces secondary to hemorrhagic infarction of papillary fronds or rupture of cyst wall capillaries, often manifesting as a fluid–debris level on ultrasound or MRI[5][7]. EPC may resemble a wide spectrum of breast lesions, including benign entities such as well-circumscribed fibroadenomas and phyllodes tumors, as well as malignant neoplasms, including medullary and mucinous carcinomas. Therefore, given the considerable overlap in imaging, histopathological verification is essential to establish the definitive diagnosis[10].



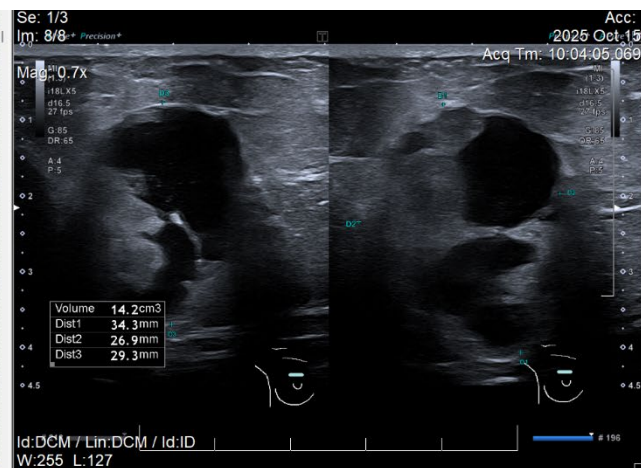
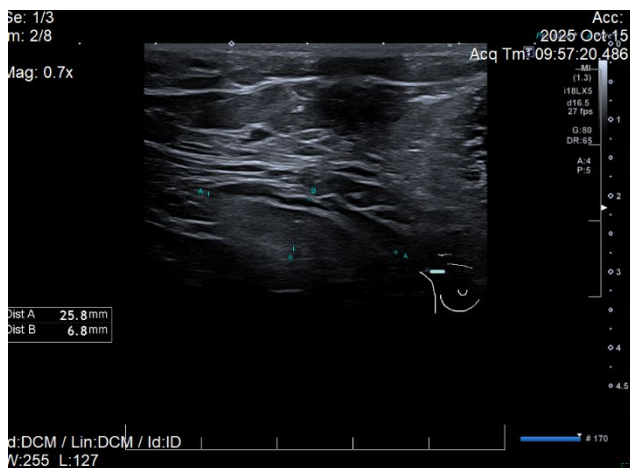
67-year-old women presenting with a palpable breast mass and bloody nipple discharge. MLO and CC images of the right breast demonstrate high-density, well-circumscribed lesions. Microcalcifications and macrocalcifications are identified within the background of unchanged fibroglandular breast tissue.



63-year-old women presenting with a palpable breast mass and bloody nipple discharge. MLO and CC mammographic views of the right breast demonstrate a high-density, well-circumscribed mass. Preserved axillary lymph nodes are visualized on the MLO projection.



67-year-old women presenting with a palpable breast mass and bloody nipple discharge. Corresponding ultrasonographic examination shows a well-defined heterogeneous solid-cystic lesion with marked vascularity on Doppler imaging.



63-year-old women presenting with a palpable breast mass and bloody nipple discharge. Sonographic evaluation corresponding to the mammographic lesion demonstrates a heterogeneous solid-cystic mass with indistinct margins. An axillary lymph node with preserved morphology is visualized in the axillary region.

Conclusion

Conclusion.

EPC is generally associated with an indolent clinical course, demonstrating low rates of local recurrence, axillary and distant metastasis and excellent long-term survival, even in cases with associated invasive carcinoma[11][12]but local recurrences have been observed[13]. The cases presented in this abstract highlight that any newly developed cystic breast lesion identified in women older than 60 years should be approached with a high index of suspicion and histological evaluation should be considered.

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Gastrointestinal adverse events from cancer immunotherapy: imaging CT-spectrum of enterocolitis

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Learning Objectives

To present the most relevant CT imaging findings and of immune-related enterocolitis.

Background

Immunotherapy has revolutionized the treatment of a variety of malignancies improving outcomes and survival rate[1]. Immune checkpoint inhibitors (ICIs) are monoclonal antibodies that enhance antitumor immunity targeting downregulators of the anti-cancer immune response. However, by amplifying immune activation, ICIs can also trigger immune-related adverse events (irAEs), which may involve multiple organ systems[2].

Gastrointestinal (GI) irAEs are among the most common toxicities associated with ICIs, occurring in approximately 35-50% of treated patients[3], with enterocolitis representing the leading cause of treatment discontinuation[4][5]. While the colon is the typical site of GI irAEs, inflammatory involvement may extend to the upper GI tract[6], whereas isolated ileitis in the absence of colitis is rare[7].

Prompt imaging recognition of irAEs, together with differentiation from their main mimics (including disease progression), are essential to guide appropriate treatment modification[8].

Imaging findings or Procedure details

Routine contrast-enhanced CT performed for oncologic surveillance frequently represents the first imaging modality to raise suspicion of GI irAEs, though colonoscopy with biopsy remains the reference standard for diagnosis of immune-related colitis[5][7].

CT findings include bowel wall thickening, mucosal hyperenhancement, pericolic fat stranding, mesenteric vessel engorgement, and fluid-filled bowel distension[7].

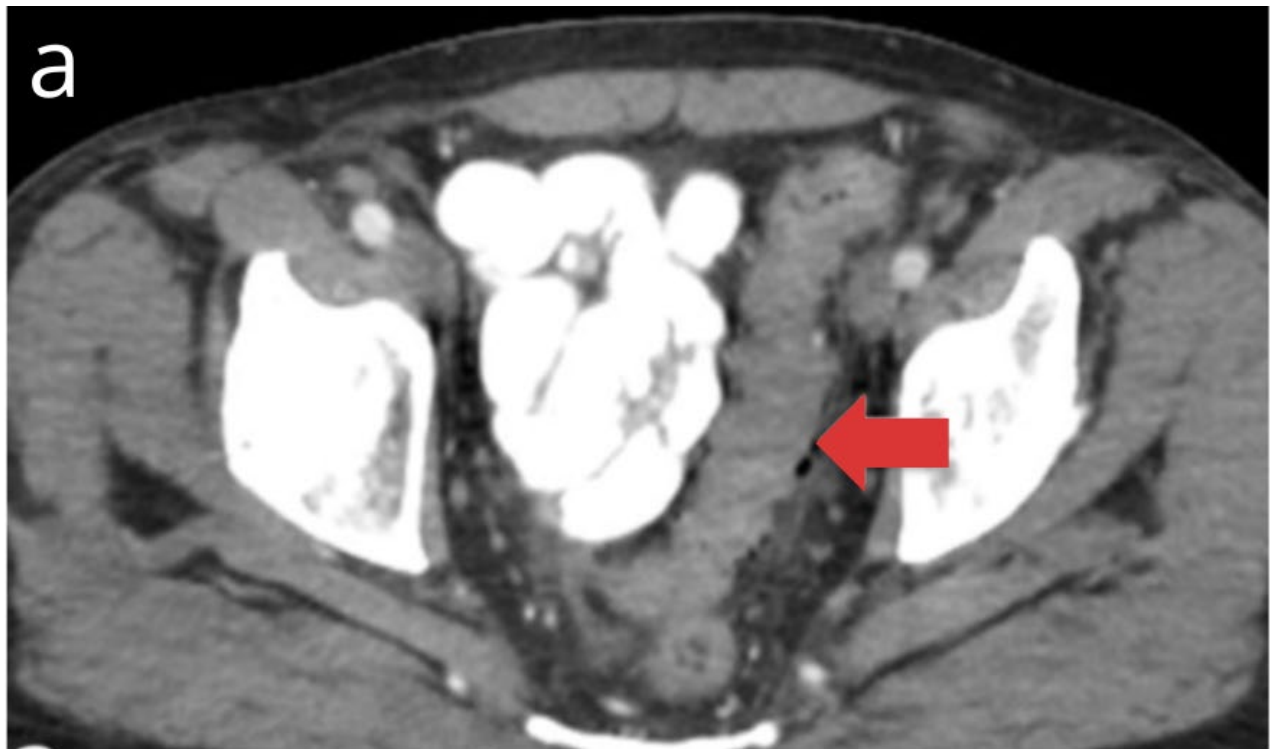
IMAGING MANIFESTATION	DESCRIPTION
Bowel wall thickening	Normal colonic wall thickness: 1–2 mm when distended, max 5mm when collapsed[8]; Focal: extension < 5 cm; Segmental: extension of 6–40 cm; Multisegmental: separate sites of segmental bowel wall thickening; Diffuse: extension >40 cm.
Mesenteric vessel engorgement	Prominence or tortuosity of the vasa recta on CT (at the time of symptoms or compared to pre-treatment exam)[9].
Mucosal hyperenhancement	Increased enhancement of the colonic mucosa compared to other GI tract segments (e.g., small bowel and stomach)[10].
Fluid-filled distended colon	Colonic dilatation: luminal diameter >8 cm for cecum and >6 cm for the rest of the colon[11].
Pericolic fat stranding	Abnormal increased attenuation in pericolic fat, producing various appearances depending on the pathophysiologic process (ground-glass like, reticular pattern, reticulonodular appearance)[12].

Main imaging manifestation of colitis[7].

Three main CT patterns of lower GI involvement have been described[7]: diffuse colitis[13], segmental colitis associated with diverticulosis[14] and isolated rectosigmoid colitis without diverticulosis[10].



40-year-old woman with melanoma presenting with diarrhea and high WBC count. Coronal-reformatted contrast-enhanced CT image performed 45 days after initiation of ipilimumab and nivolumab shows fluid-filled bowel segments with thickened walls and mucosal hyperenhancement



Contrast-enhanced CT in Patients receiving ICI therapy: (a) diffuse sigmoid (red arrow) wall thickening, mucosal hyperemia, and mesenteric vessel engorgement; (b) isolated rectosigmoid (white arrow) wall thickening with mucosal hyperenhancement, pericolic fat stranding, Upper GI/small bowel involvement (esophagitis, gastritis, duodenitis, isolated ileitis) is rare, with non-specific wall thickening, mucosal enhancement and edema; diagnosis requires endoscopic biopsy[5][7]. The main imaging manifestations and their prevalence are described in Table 2.

Feature	Diffuse Colitis	SCAD	Isolated Rectosigmoid Colitis	Upper GI / Small Bowel Involvement
Distribution / extent	Continuous (>40 cm) or with skip lesions	Segmental (6-40 cm). Typically sigmoid, site of	Confined to rectosigmoid	Esophagus, stomach, duodenum, ileum

		diverticulosis		(case-report level)
Wall thickening	Marked	Moderate	Usually absent / minimal	Variable
Mucosal hyperenhancement	Present	Variable	Prominent, dominant feature	Present, with perilesional edema
Mesenteric vessel engorgement	Frequent (prominent / tortuous vasa recta)	Less frequent than diffuse pattern	Not typical	Not applicable
Pericolic fat stranding	Variable	Characteristic	Not typical	Perilesional edema
Bowel distension	Fluid-filled	Not typical	Not typical	Not typical
Clinical correlate	Profuse watery diarrhea; highest complication risk	Mixed watery / bloody diarrhea, cramping	Bloody diarrhea	Nausea, vomiting, epigastric pain

CT patterns of immune-related gastrointestinal complications

Conclusion

Immune-related enterocolitis is a common and clinically significant complication of cancer immunotherapy and is often first suspected on CT performed for oncologic surveillance. Radiologists should be familiar with their characteristic imaging patterns as an early recognition is essential for timely management and may reduce associated morbidity and mortality.

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Gastrointestinal stromal tumors (GISTs) for radiologists. Beyond the basics

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Learning Objectives

- To review the imaging features of gastrointestinal stromal tumors (GISTs), emphasizing those aspects most relevant to their current multidisciplinary management
- To clarify specific characteristics of these tumors and their treatment that can be demanding to the radiologist
- To provide practical pointers for handling some challenging scenarios

Background

Gastrointestinal stromal tumors (GISTs) are the most frequent mesenchymal tumors in the gastrointestinal tract. Their unique histogenetic and morphological features come with specific diagnostic, prognostic and therapeutic implications that challenge the performance of radiologists.

Imaging findings or Procedure details

Imaging findings

We will review the imaging features and radiological implications of GISTs in the following settings:

Imaging techniques

- CT Scan optimization. Never skip the arterial phase. Read carefully and think twice: tips and pitfalls
- MRI has several indications. Acquisition protocol
- 18-FDG PET/CT: indications, added value and pitfalls

Diagnosis

- Imaging findings, typical and uncommon. Calcification? Nodal involvement?
- Spontaneous complications of GISTs: perforation, cavitation, bleeding, hemorrhagic metastases,...
- Is there a role for image-guided biopsy?
- Initial staging beyond TNM

Localized disease

- Risk stratification
- Surgical treatment. Normal post-surgical findings and complications
- Adjuvant treatment
- Surveillance. Can you spot recurrences?

Advanced disease

- Dissemination patterns
- Atypical metastases
- Response assessment to systemic therapy
- TKI-related complications beyond imatinib

Specific features and challenging concepts

- Sporadic GISTs *versus* genetic syndromes associated with GIST
- New lesions *versus* disease progression. Spurious new liver and bone mets.
- New ascites *versus* peritoneal carcinomatosis
- Bigger lesions *versus* disease progression. Beware density changes. Choi Criteria. Hemorrhage.
- Atypical progression patterns. *Nodule-within-a-mass* and oligoprogression

Conclusion

Conclusion

GISTs are complex tumors with unique features. Radiologists must be familiar with them and keep up to date to contribute to the optimal and multidisciplinary management of these patients.

Head-to-Head comparison of Three Commercial AI Systems for Screening Mammography

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Purpose

Artificial intelligence (AI) systems for mammography screening are increasingly available, yet differences in diagnostic performance across commercial platforms and operating thresholds remain insufficiently characterized. This study compared the diagnostic discrimination of three commercial AI systems and evaluated their performance at vendor-recommended thresholds, fixed-specificity operating points, and under multi-algorithm combination strategies.

Materials and Methods

In this retrospective enriched test-set study, the performance of three commercial AI systems for mammography interpretation (Lunit INSIGHT MMG version 1.1.8.2, Transpara Breast AI version 2.1, and Vara AI) was evaluated using 150 full-field digital mammography examinations from a parent dataset, including 30 biopsy-proven breast cancers and 120 screening-negative examinations with at least 2 years of follow-up. All examinations were acquired between 2018 and 2020 on a single mammography platform. Continuous abnormality scores from each AI system were assessed without recalibration. Performance was assessed using receiver operating characteristic (ROC) analysis and area under the curve (AUC), with pairwise comparisons using DeLong tests and Bonferroni correction. Threshold-dependent performance was evaluated at vendor-recommended cut-offs, fixed specificities (85%, 90%, and 95%), and combination rules (OR, majority vote, AND) using thresholds approximating 90% standalone specificity.

Results

All three AI systems demonstrated high and comparable discrimination. AUCs were 0.938 (95% CI, 0.893–0.984), 0.928 (95% CI, 0.877–0.978), and 0.916 (95% CI, 0.856–0.976), with no statistically significant pairwise differences. Despite similar ROC performance, score distributions differed substantially. One system exhibited clear bimodal separation between positive and negative cases, whereas the other two showed greater overlap. At vendor-recommended thresholds, sensitivity/specificity values were 90.0%/77.5%, 96.7%/75.0%, and 80.0%/85.8%, respectively. Of the 30 cancers, 18 (60.0%) were detected by all three systems and 1 (3.3%) by none. Combination strategies produced distinct operating profiles: the OR rule achieved 96.7% sensitivity and 82.5% specificity, majority voting achieved 80.0% sensitivity and 92.5% specificity, and the AND rule achieved 60.0% sensitivity and 96.7% specificity.

Conclusion

Although the three commercial AI systems achieved similarly high ROC discrimination, marked differences in score distributions and threshold-dependent behavior resulted in substantially different clinical operating characteristics. These findings highlight the importance of threshold calibration and algorithm-combination strategies when integrating AI into mammography screening workflows.

High-amplitude fractional motion encoding preserves wave SNR at shorter echo times in pancreatic multifrequency MR elastography

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Purpose

MR elastography (MRE) can quantify pancreatic stiffness, a candidate biomarker in pancreatic ductal adenocarcinoma (PDAC). The intrinsically low signal-to-noise ratio (SNR) of MRE is particularly limiting in the pancreas, whose deep retroperitoneal location, low proton density and short T_2 hinder robust phase encoding and so far no standardized protocol exists. Fractional encoding allows shorter encoding duration than the entire wave cycle. The wave SNR depends on two competing terms: motion-encoding efficiency, proportional to MEG amplitude and encoding duration and therefore rising with longer echo times (TE), and MR signal magnitude, decreasing with TE due to T_2 decay. So, an optimal TE compromise exists. We hypothesized that at short TE MRE is limited by insufficient encoding efficiency and that stronger gradients can achieve comparable encoding efficiency, thereby preserving MR signal, while maintaining wave SNR. We tested these relationships in vivo.

Materials and Methods

Following IRB approval and written informed consent single-shot spin-echo echo-planar imaging (EPI) multifrequency MRE of the upper abdomen was acquired in 8 healthy volunteers at 3 T (Siemens Magnetom Prisma). Series varied (i) TE (30-80 ms) at 70 mT/m and (ii) MEG amplitude, comparing a 80 mT/m high-performance MEG at reduced TE (50 ms) with a 60 mT/m reference acquisition at TE69. Shear-wave-speed maps were reconstructed by tomoelastography (k-MDEV). As a surrogate for wave SNR, we computed voxel-wise the reconstructed shear-wave amplitude at the vibration frequency. This was divided by the amplitude at the second harmonic where no regular signal is expected, processed as noise estimate. Pancreatic tissue was manually segmented with size-matched regions of interest (ROIs) across head, body and tail. Averages were compared with exploratory paired t-tests.

Results

At standard MEG, pancreatic wave SNR rose with TE across the encoding-limited range and peaked near TE65 (TE30 = 1.40 ± 0.30 vs TE60 = 2.20 ± 0.69 , $p = 0.031$; TE30 vs TE70 $p = 0.006$; trend over TE30-60 $p = 0.007$), then declined at TE80 (1.65 ± 0.42), consistent with T_2 decay. With high-performance MEG (80 mT/m), a TE50 acquisition produced similar wave SNR as TE69 acquisition at 60 mT/m across all ROIs (1.33 ± 0.15 vs 1.34 ± 0.15).

Conclusion

In pancreatic MRE, acquisitions with short echo times appear limited by insufficient motion-encoding efficiency. High-amplitude fractional motion encoding compensated for reduced encoding duration and achieved comparable pancreatic wave SNR at a 19 ms shorter TE, while avoiding additional T_2 -related signal loss. This strategy may support shorter and more robust pancreatic MRE protocols for future studies in PDAC.

Imaging and Multidisciplinary Management of Intrahepatic Cholangiocarcinoma in a Twin Pregnancy: A Case Report

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Learning Objectives

Recognize the MRI features of mass-forming intrahepatic cholangiocarcinoma (iCCA) in pregnant patients.

Understand the role of tailored, multidisciplinary imaging protocols for accurate oncological staging while minimizing fetal risk.

Highlight the feasibility of planning and executing major hepatic resections during the second trimester of pregnancy based on precise preoperative imaging.

Background

Pancreatobiliary malignancies during pregnancy are rare and present complex diagnostic challenges. We present a 21–22 week pregnant patient (twin gestation) suffering from right upper quadrant pain since 16 weeks, exacerbated by food intake and fetal movements. Initial ultrasound showed a Sg6 liver mass. A core biopsy (May 2024) revealed adenocarcinoma of gastrointestinal or pancreatobiliary origin, necessitating comprehensive staging to guide management.

Imaging findings or Procedure details

For primary staging, a multidisciplinary tumor board elected to perform a non-contrast chest CT alongside a contrast-enhanced MRI of the abdomen and pelvis.

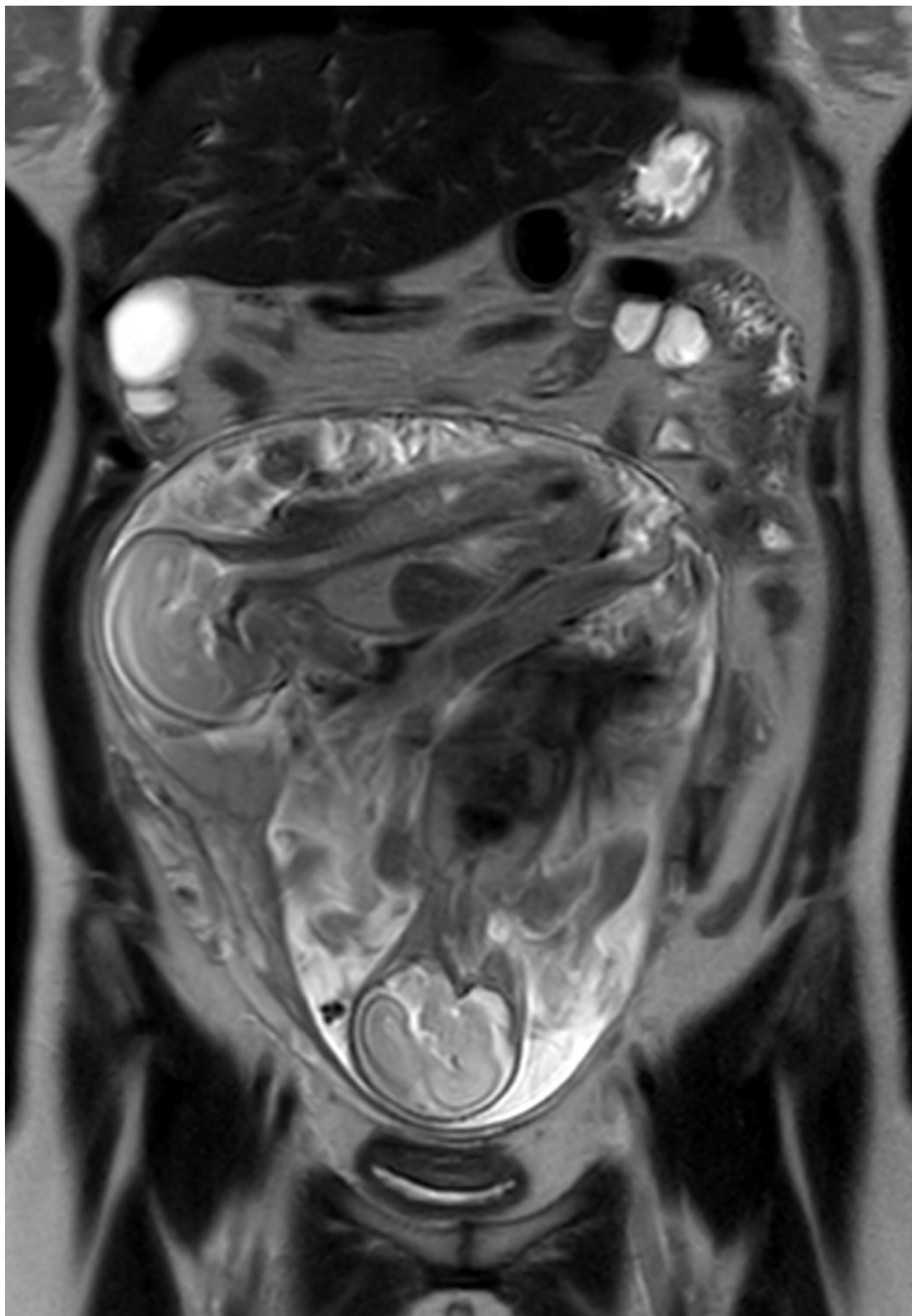


Figure 1. Coronal T2-weighted MRI of the abdomen and pelvis.

Primary MRI (June 18, 2024):

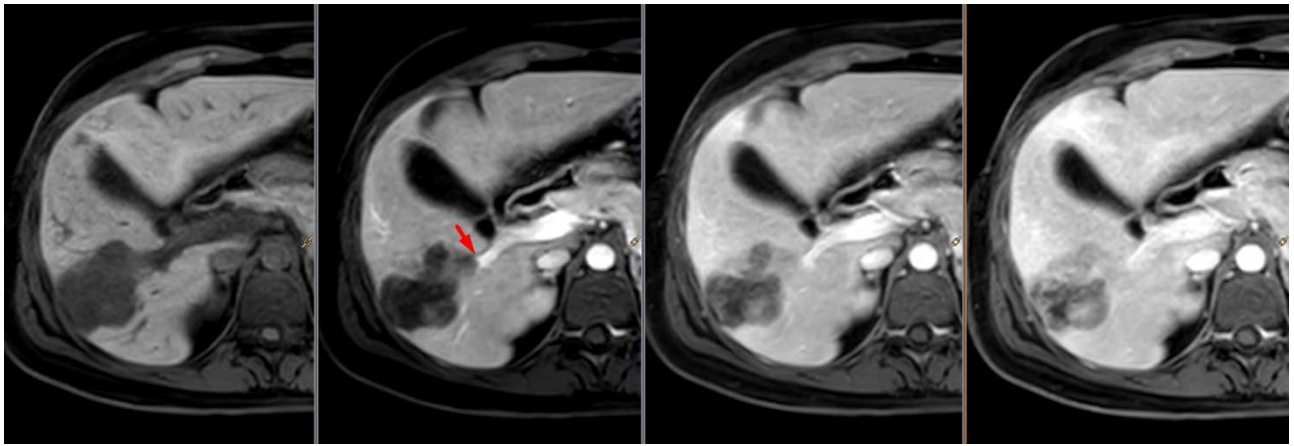


Figure 2: Multiphasic MRI Appearance of Mass-Forming iCCA

Imaging demonstrated a Sg6 liver tumor with capsular and venous invasion. The mass exhibited delayed contrast enhancement and minimal pre-stenotic dilation of the subsegmental bile ducts, highly suggestive of mass-forming intrahepatic cholangiocarcinoma (iCCA). Periportal lymphadenopathy was present, but no primary neoplasms were identified in the GI tract or pancreas. The clinical diagnosis was established as Stage III liver adenocarcinoma (cT3N1M0).

Surgical Intervention (June 27, 2024): Based on the imaging staging, major surgical intervention was performed during the pregnancy. The procedure included a right-sided laparotomy, right hemihepatectomy, D3 lymph node dissection, right diaphragmatic peritonectomy, and abdominal drainage.

Follow-up MRI (July 30, 2024):

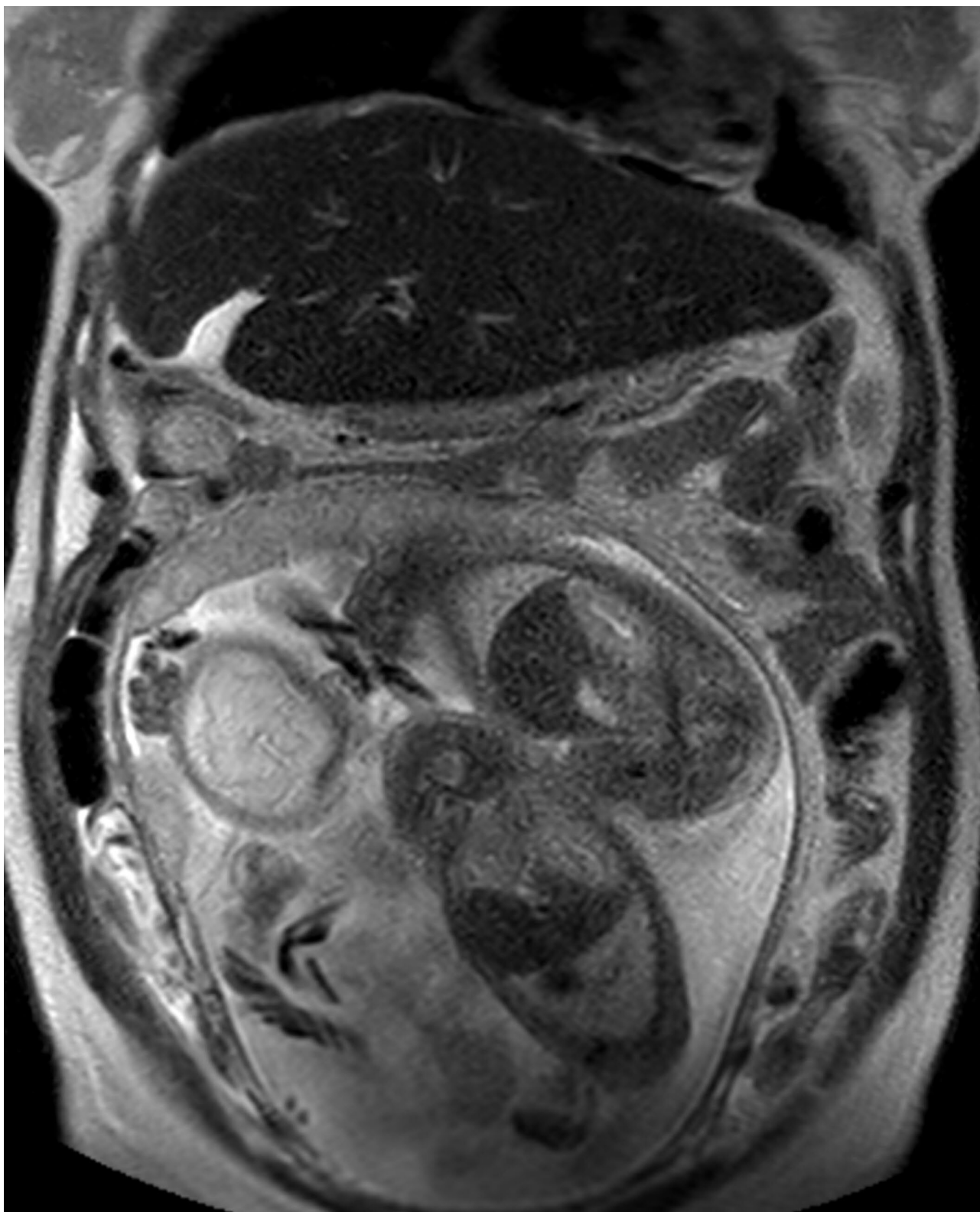


Figure 3. Post-operative Follow-up MRI at 25 Weeks Gestation

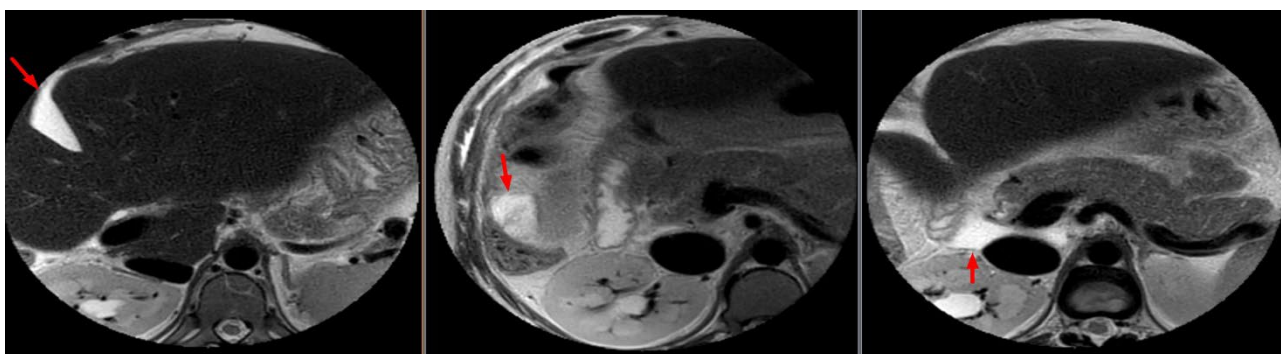


Figure 4. Axial Non-Contrast Follow-up MRI

A non-contrast follow-up MRI showed postoperative status following the right hemihepatectomy. The remaining liver parenchyma was homogeneous with no areas of restricted diffusion or evidence of residual/recurrent neoplasms. An expected postoperative fluid collection was noted.

Conclusion

This case underscores the critical role of advanced, tailored MRI in staging hepatobiliary malignancies in pregnant patients. Guided by accurate imaging and multidisciplinary planning, major oncological surgeries—including hemihepatectomy and extensive lymphadenectomy—can be safely executed during the second trimester of a twin pregnancy.

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Imaging as a driver of multidisciplinary cancer decision-making: A five-year analysis of 31,026 tumor board decisions

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Purpose

To quantify the contribution of imaging to multidisciplinary tumor board (MTB) decision-making by evaluating the frequency and pattern of imaging studies and image-guided procedures requested during case discussions.

Materials and Methods

This retrospective study included all MTB decisions recorded at a tertiary cancer center between January 2020 and January 2025. Overall, 31,026 decisions involving 15,564 patients across 17 disease-specific MTBs were analyzed. For each decision, requests for diagnostic imaging (CT, MRI, PET/CT, ultrasound, mammography, radiography, or nuclear medicine), staging examinations, and image-guided procedures (preoperative localization, percutaneous biopsy, and drainage) were recorded. Availability of prior imaging, repeat MTB discussion, and presentation across multiple MTBs were also assessed.

Results

Patients were discussed a median of two times (range, 1–15), and 50.7% were reviewed repeatedly. Repeat MTB discussion was recommended in 17.9% of decisions, most commonly while awaiting imaging or biopsy results. Imaging was already available in 90.6% of cases. Overall, 19.4% of MTB decisions generated a new radiological request, including diagnostic imaging (16.1%), preoperative localization (2.4%), and image-guided biopsy or drainage (1.9%), with multiple requests possible per decision. PET/CT was the most frequently requested modality, accounting for 7.1% of all decisions and 39% of imaging requests. Imaging demand differed substantially among MTBs, ranging from 5.1% in Medical Oncology to 34.6% in Skin/Melanoma, while Breast (29.3%) and Lung (28.1%) also showed high imaging utilization. Distinct modality-specific patterns emerged across tumor boards, reflecting disease-specific imaging needs. Furthermore, 14.2% of patients were discussed in multiple MTBs, underscoring the longitudinal role of imaging throughout the cancer care pathway.

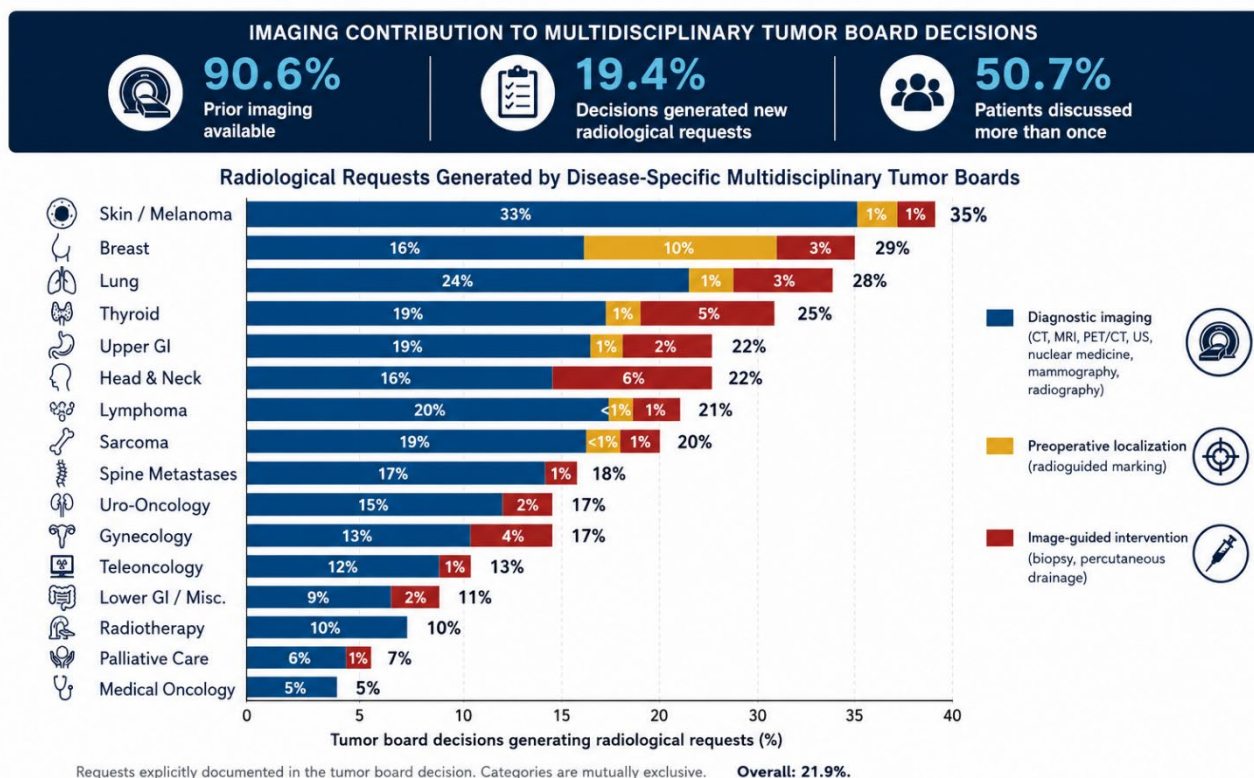


Figure 1. Radiological requests generated during multidisciplinary tumor board discussions, categorized as diagnostic imaging, preoperative localization, and image-guided intervention (percentage of decisions within each tumor board).

Figure 2. Modality-Specific Imaging Profile Across Disease-Specific Multidisciplinary Tumor Boards

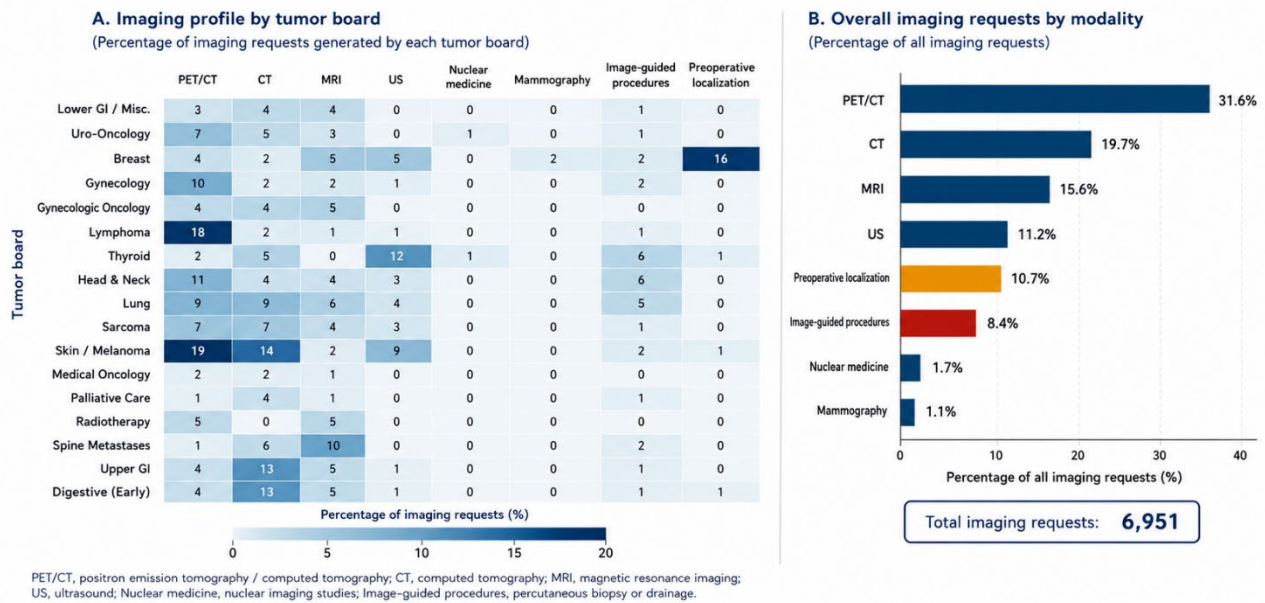


Figure 2. Modality-specific imaging profile across disease-specific multidisciplinary tumor boards (percentage of imaging requests generated by each tumor board) and overall imaging requests by modality (percentage of all imaging requests).

Conclusion

Imaging is a cornerstone of multidisciplinary cancer care, supporting virtually all MTB discussions and directly generating additional imaging or image-guided interventions in nearly one-fifth of decisions. The marked heterogeneity in imaging requirements across disease-specific MTBs highlights the value of dedicated subspecialty radiologists and structured radiology participation to optimize evidence-based, imaging-driven clinical decision-making.

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Leveraging Real-World Data for Equitable Implementation of Lung Cancer Screening: Insights from the SOLACE Consortium

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Purpose

With strong evidence from clinical trials demonstrating that lung cancer screening (LCS) improves patient outcomes, it is now critical to reinforce these findings by evaluating LCS participant data from newly implemented pilots and programs. The SOLACE consortium united 37 partners from 15 EU Member States across a variety of medical specialties to support the equitable implementation of LCS. The three SOLACE pilots focused on the engagement of previously underrepresented groups in LCS, including women, hard-to-reach individuals, and individuals with co-morbidities linked to lung cancer risk. The SOLACE project strove for the systematic collection of high-quality real-world data (RWD) across its 19 data-providing sites.

Materials and Methods

Through extensive multidisciplinary collaboration, SOLACE developed a core common data model to capture key LCS findings and harmonize data across heterogeneous clinical and national environments. Both individualized participant-level and aggregated data are centrally collected within the SOLACE Database. These data span the entire LCS pathway, including demographic, recruitment and referral pathways, smoking history, screening outcomes, and radiation dose metrics. Where applicable, it also captures pulmonary nodule characteristics, follow-up management, diagnostic procedures, and treatment pathways.

Results

The SOLACE Database contains 31,000 total participant records, including 23,000 individualized, participant-level records. The substantial proportion of individualized data provides a unique opportunity to perform detailed, multi-centric analyses across diverse European populations. Data completeness was assessed across all key variables to evaluate the quality of the dataset. Participants from previously underrepresented groups in LCS will comprise over 90% of the individualized dataset, allowing for robust subgroup-specific analysis to be performed.

Conclusion

The SOLACE Database will enable the systematic evaluation of the benefits and risks of LCS, efficacy of recruitment methods, as well as facilitate the in-depth analysis of sub-populations. This rich resource of RWD will provide critical evidence to guide the equitable implementation of LCS across Europe.

Malignancy Risk Prediction of Pulmonary Nodules: A Head-to-Head Evaluation of Three Fully Automated AI Tools

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Purpose

Differentiation between malignant and benign pulmonary nodules is essential to guide oncologic work-up and avoid unnecessary invasive procedures. Whereas parallel bicentric analyses showed good cross-institutional reproducibility of individual AI models, this study directly compared AI-based software tools regarding malignancy risk prediction, technical evaluability, and lesion size measurement.

Materials and Methods

In this retrospective single-centre study, 595 chest CT examinations acquired between 2010 and 2021 were screened. Exclusions comprised incomplete lung-kernel reconstructions (n=88), missing diagnostic confirmation and/or inadequate follow-up (n=207) as well as other predefined reasons (n=85), resulting in 215 patients. Malignancy required histopathologically confirmed primary lung cancer, whereas benignity was established by histopathology or imaging stability for at least 2 years without progression. Each examination was processed by Tool-A, Tool-B and Tool-C. Technical evaluability and identification of the reference lesion were documented. Automated longest-diameter measurements were compared with blinded radiologist measurements using intraclass correlation coefficients. Lung-RADS categorisation was compared with the radiologist reference, while malignancy discrimination was evaluated against the final diagnosis.

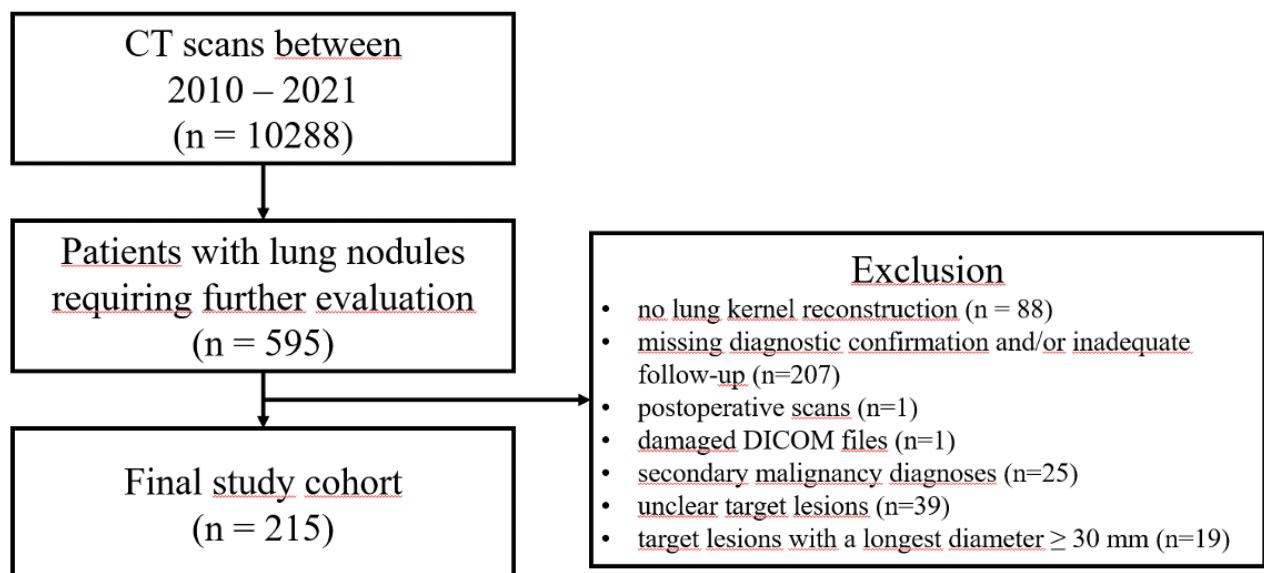


Image01

Results

Tool-B and Tool-C processed all 215 examinations without software errors. Tool-B missed the reference lesion in 10 cases and Tool-C in 5 cases. Tool-A had 19 processing errors and missed the reference lesion in 10 additional cases, leaving 186 evaluable examinations. The head-to-head cohort comprised 182 cases. Diameter agreement was highest for Tool-C (ICC 0.915), followed by Tool-A (0.816) and Tool-B (0.765). Exact Lung-RADS agreement was 74.2%, 66.5% and 64.8%. Tool-A achieved the highest malignancy discrimination (AUC 0.831; accuracy 79.7%; sensitivity 83.2%; specificity 75.9%), followed by Tool-B (AUC 0.77; accuracy 75.3%; sensitivity 84.7%; specificity 64.1%) and Tool-C (AUC 0.77; accuracy 71.1%; sensitivity 88.8%; specificity 51.0%). Differences in malignancy discrimination were not statistically significant.

	AUC	Accuracy	Sensitivity	Specificity	PPV	NPV
Brock score	0.830 [0.764- 0.887]	78.6%	83.2%	73.6%	77.5%	80.0%
Tool-A	0.831 [0.772-0.892]	79.7%	83.2%	75.9%	79.0%	80.5%
Tool-B	0.814 [0.750-0.872]	74.2%	74.7%	73.6%	75.5%	72.7%
Tool-C	0.789 [0.720-0.851]	75.8%	82.1%	69.0%	74.3%	77.9%

Table01

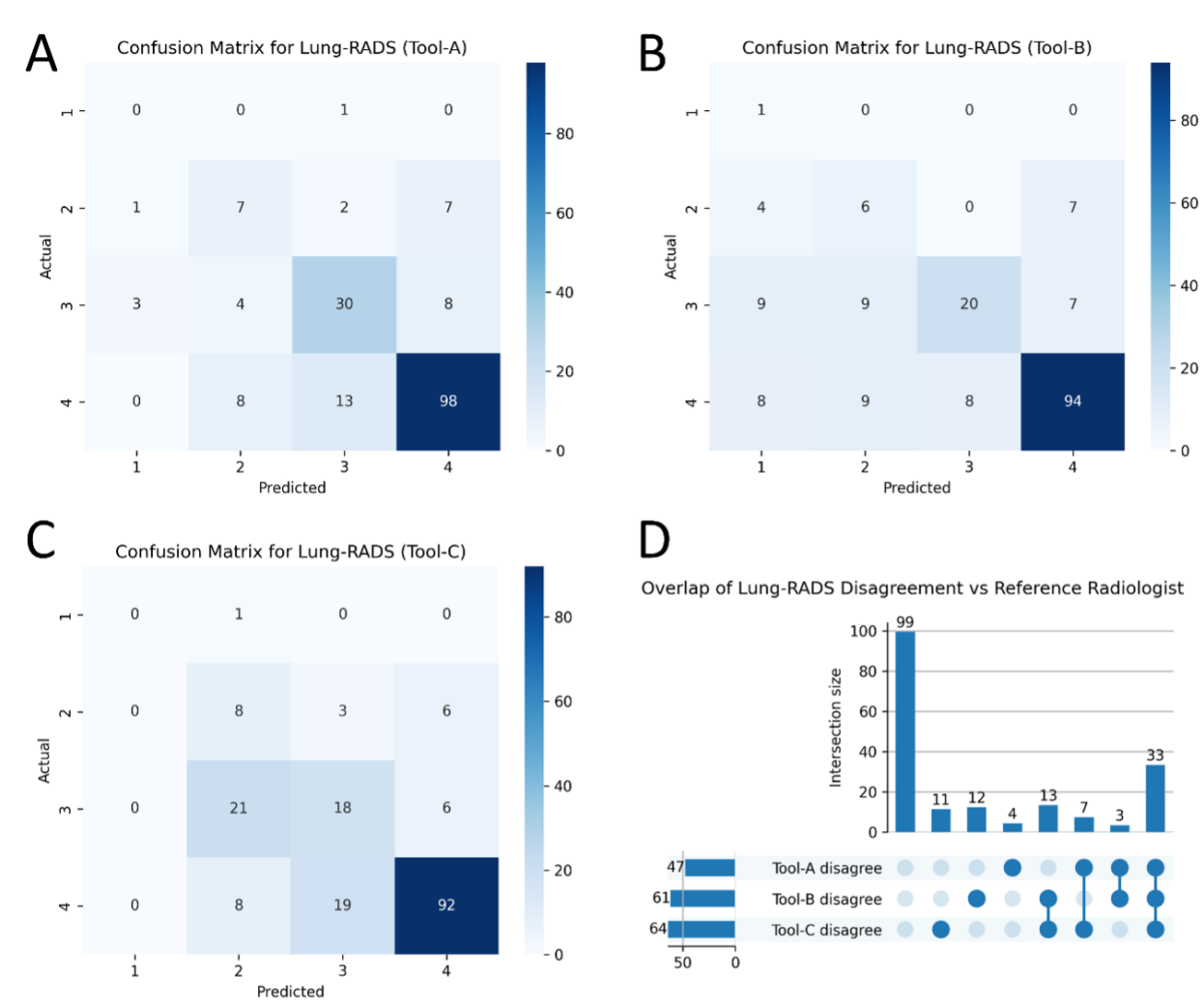


Image02

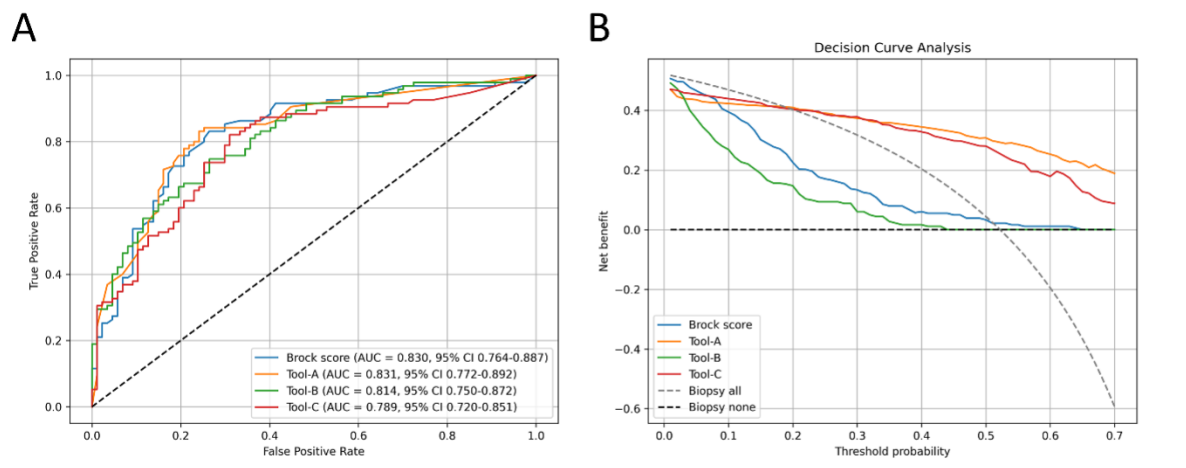


Image03

Conclusion

The tools showed comparable malignancy discrimination but distinct performance profiles. Tool-C was technically most robust and provided the most consistent diameter measurements, whereas Tool-A achieved the strongest malignancy prediction and highest Lung-RADS agreement among successfully analysed cases. These tool-specific differences should be considered in AI software selection and implementation in oncologic imaging workflows.

MR Neurography and External Muscle Stimulation in patients with chronic chemotherapy- and immunotherapy-induced peripheral neuropathy – First results of a prospective treatment study

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Purpose

Chemo- and immunotherapy-induced peripheral neuropathy (CIPN / IIPN) are common, debilitating and often dose-limiting side effects of cancer treatment. Treating CIPN and IIPN remains challenging due to a lack of sufficient therapies especially in patients with chronic neuropathic symptoms.

This study aims to visualize and quantify structural and functional nerve damage in CIPN and IIPN with MR-neurography (MRN) and clinical / electrophysiological testing. Another aim is to assess whether external muscle stimulation (EMS) allows to alleviate clinical symptoms in patients with chronic CIPN / IIPN and whether such changes can be objectified via MRN / clinical testing.

Materials and Methods

Twenty patients with confirmed neuropathy (15 with CIPN, 5 with IIPN) were prospectively enrolled and underwent 3 Tesla MRN of the sciatic nerve and the lumbosacral dorsal root ganglia (DRG), clinical testing, and electrophysiological examinations at baseline and after 3 months. The MRN protocol comprised T2-weighted and diffusion-weighted sequences (Figures 1 and 2)

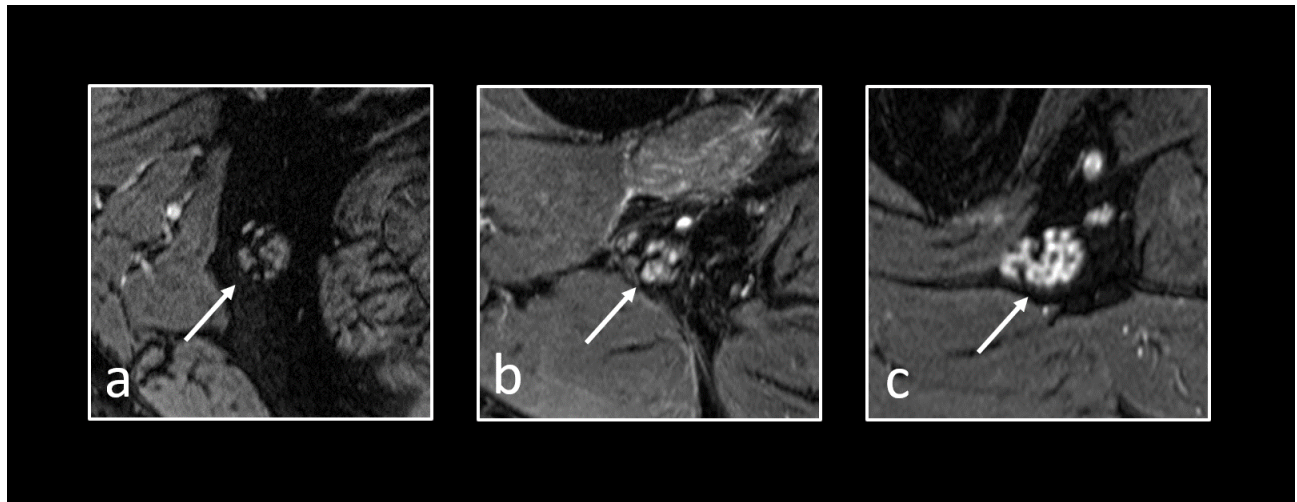


Figure 1: Three examples of axial T2-weighted sciatic nerve images (a) a mildly affected patient (m, 45) (b) a moderately affected patient (w, 64), and (c) a severely affected patient with CIPN. The sciatic nerve is marked with an arrow.

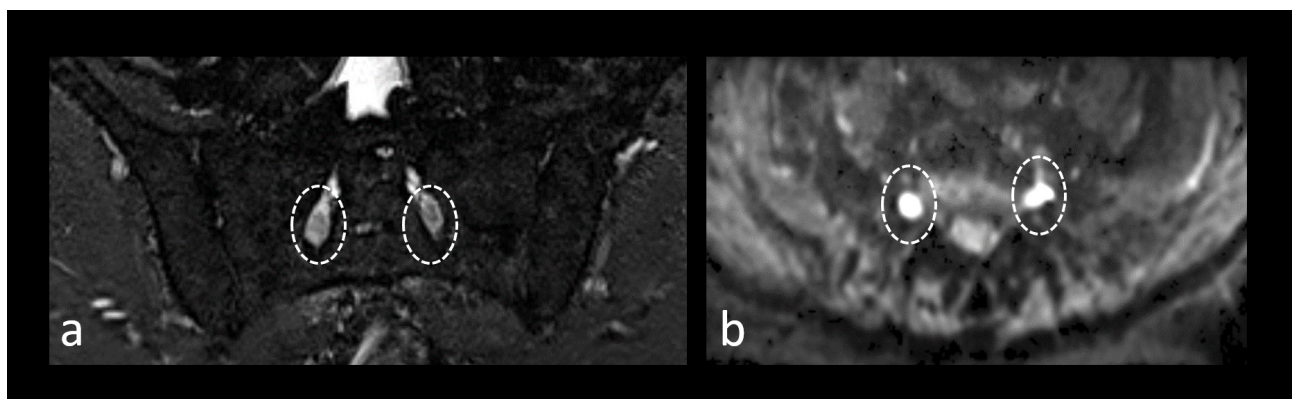


Figure 2: Imaging of the dorsal root ganglia (DRG) in a patient with moderate CIPN (a) coronal, T2-weighted image (b) axial b800 image. MRN parameters were compared with clinical and neurophysiological findings to identify potential associations. After baseline examinations were completed, all participants were instructed to use an EMS device for the stimulation of thigh muscles for one hour per day.

Results

For the baseline examinations of 20 participants (m=6, w=14, age range 35 to 77; mean age 59.75) we found that the fractional anisotropy (FA) of the sciatic nerve calculated from diffusion-weighted imaging was positively correlated with the tibial and peroneal nerve conduction velocity (NCV, $r=0.48$; $p=0.039$ and $r=0.49$; $p=0.034$, respectively), and that sural NCV was positively correlated with the FA of the S1 dorsal root ganglia ($r=0.61$, $p=0.006$, Figure 3)

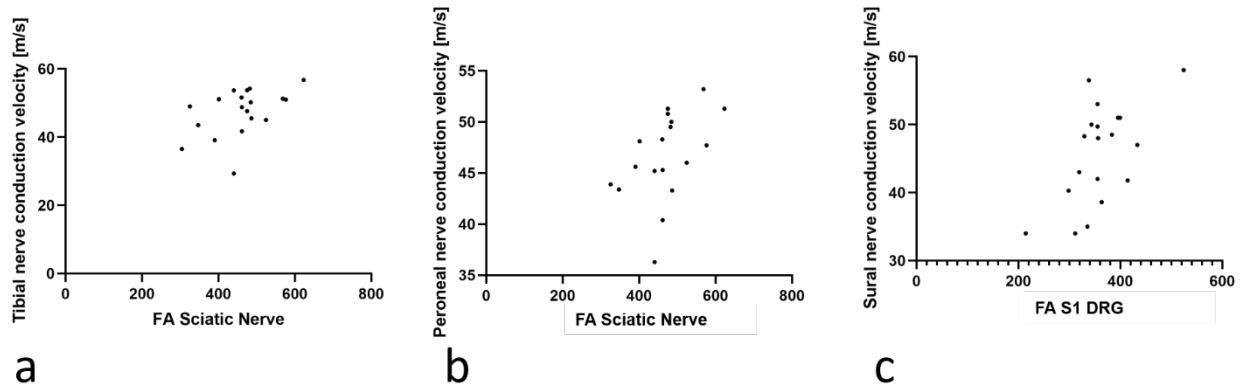


Figure 3: Correlations between nerve conduction velocities (NCV) and fractional anisotropy (FA) (a) tibial NCV and sciatic FA, $r=0.48$; $p=0.039$ (b) peroneal NCV and sciatic FA, $r=0.49$; $p=0.034$ (c) sural NCV and S1 dorsal root ganglia FA ($r=0.61$, $p=0.006$).

. The follow-up examinations of the first 9 patients revealed that patients reported a significant decrease in numbness after three months of EMS ($p=0.016$). MRN and electrophysiologic exams showed an increase of the sciatic nerve's FA and the sural nerve NCV that both failed to reach statistical significance ($p=0.098$ and $p=0.076$, respectively).

Conclusion

The baseline results of this study show that quantitative MRN parameters of the sciatic nerve are well related to the results of electrophysiologic assessments and therefore pose suitable markers for the assessment of proximal nerve damage in CIPN / IIPN. To our knowledge, this study is the first to show direct correlations between sural NCV and the FA of the S1 DRG, indicating that distal sural nerve integrity is directly linked to damage of proximal sensory neurons. The preliminary findings obtained after 3 months of EMS support the hypothesis that EMS poses a promising treatment option for chronic CIPN / IIPN.

MRI of pelvic fistulas after local oncologic treatment

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Learning Objectives

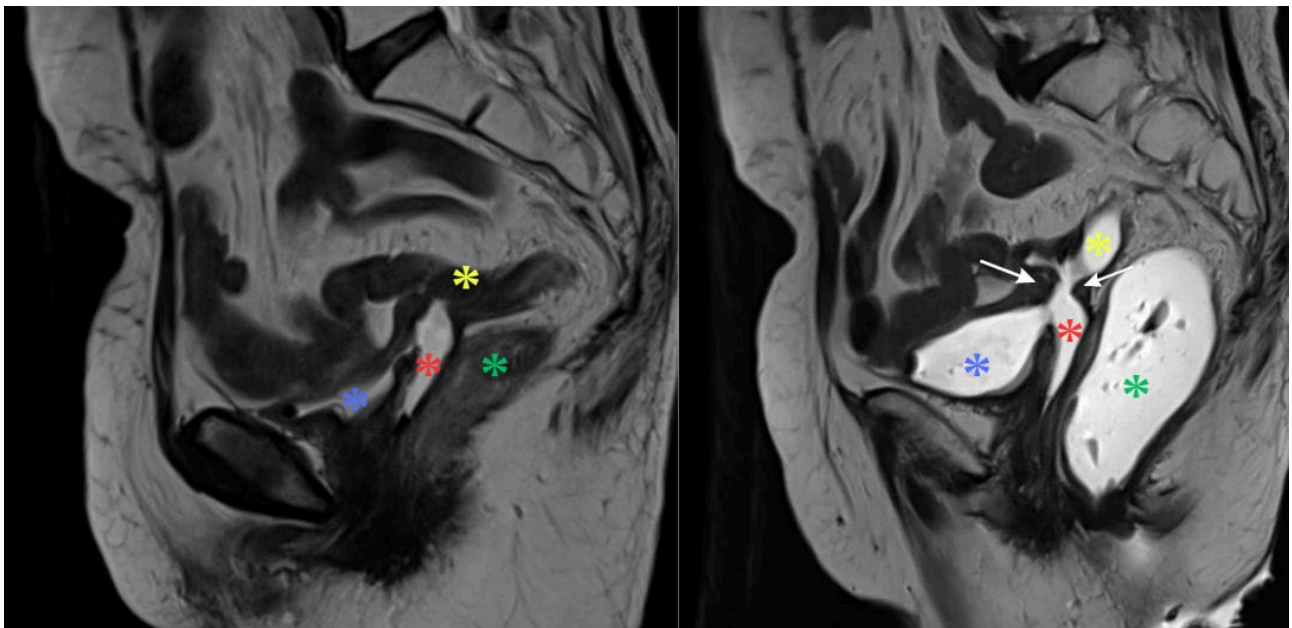
Assess the role of MRI and typical findings in pelvic fistula as a complication following local oncologic treatment (surgery and/or radiotherapy).
Detect how per-rectal and per-vaginal gel instillation improves fistula conspicuity on MRI.

Background

Pelvic fistulas are an uncommon but clinically significant late complication of local cancer therapy. Surgery and radiotherapy compromise tissue vascularity and healing, predisposing to abnormal communications between adjacent pelvic organs. [1] In women treated for gynecologic malignancies, vesicovaginal or rectovaginal fistulas may arise after hysterectomy, exenteration, or radiotherapy, sometimes involving multiple organs. [5] After prostate cancer treatment, rectovesical fistulas may follow prostatectomy or radiotherapy, while vesicosymphyseal fistulas typically follow endoscopic bladder neck interventions, often with pubic osteomyelitis. [3] Presentation is nonspecific, and small tracts may be missed.

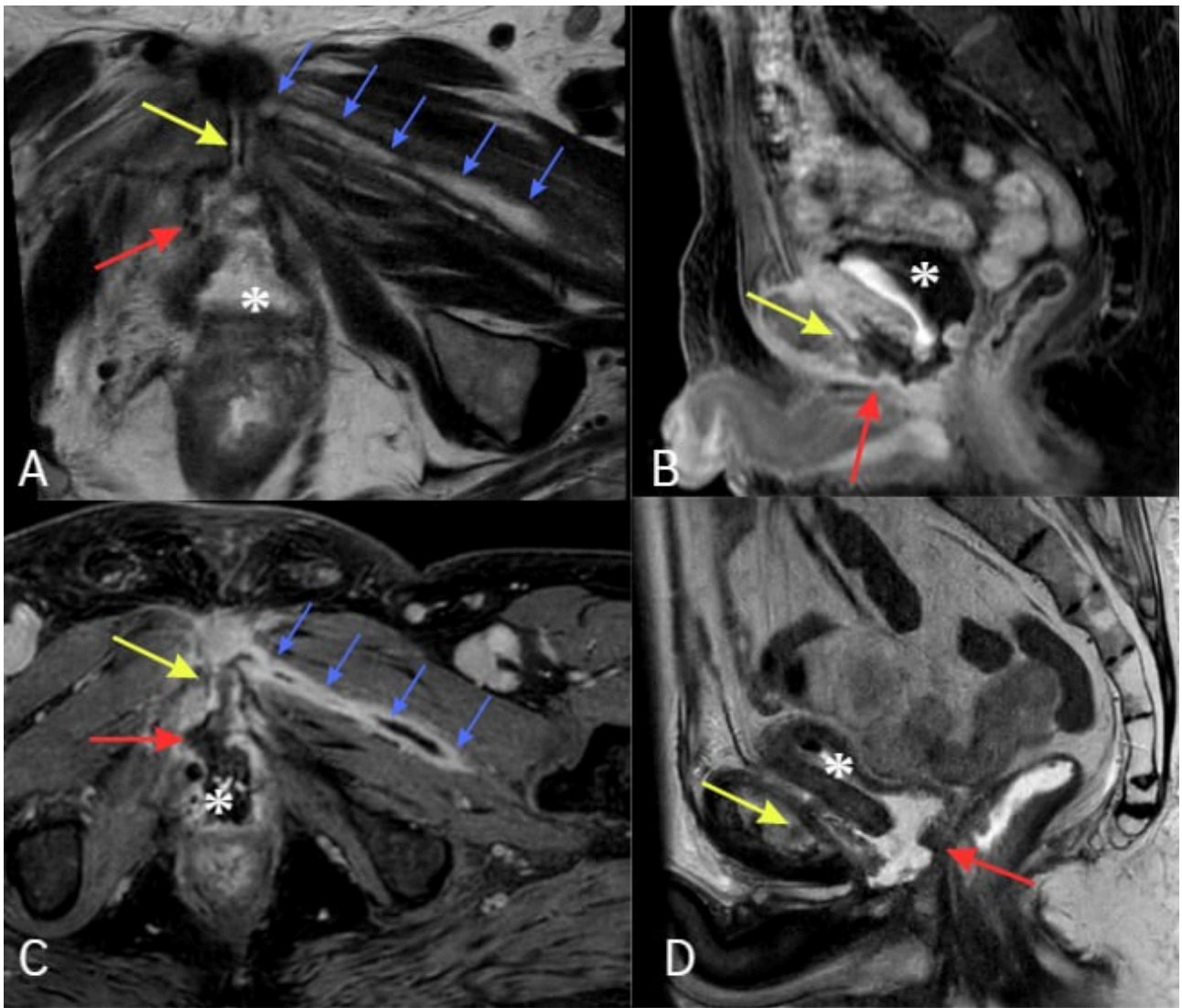
Imaging findings or Procedure details

MRI is the modality of choice due to superior soft-tissue contrast and multiplanar capability. Ultrasound gel instilled per rectum and/or per vagina before imaging distends the lumen and increases conspicuity of collapsed or subtle tracts by creating a high-signal column outlining the communication on T2-weighted images.

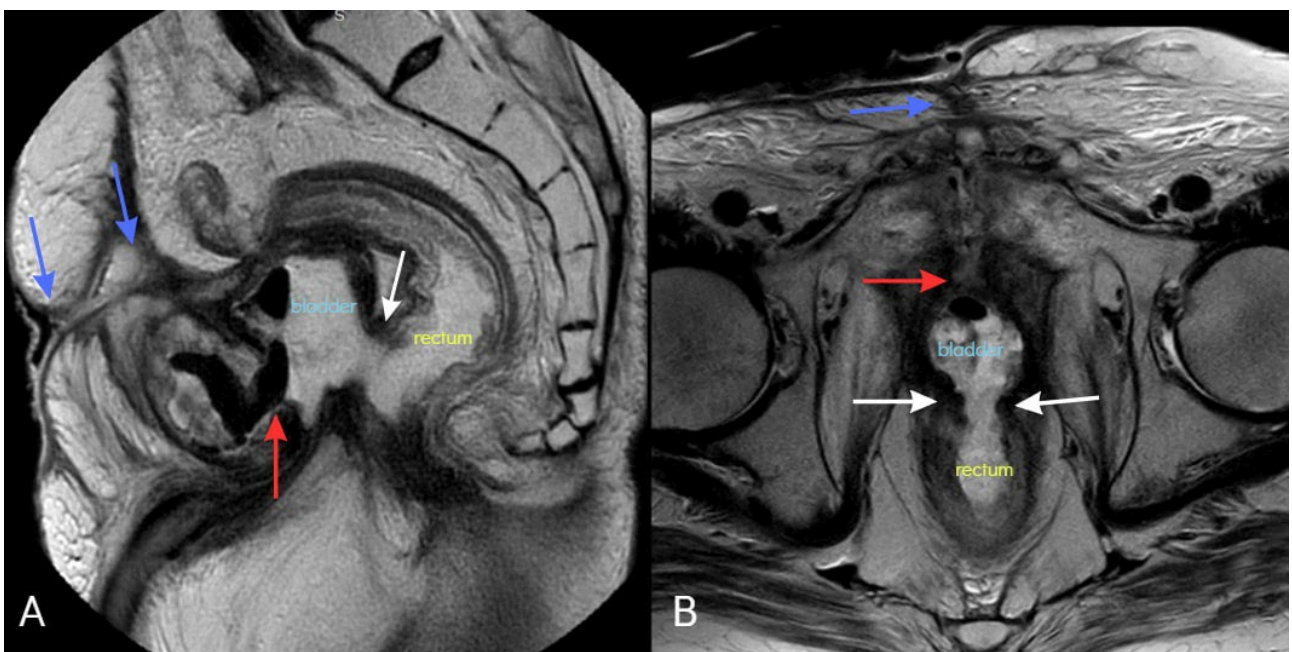


Patient after surgery and radiotherapy due to uterine cancer. T2 weighted sagittal sequences demonstrate complex fistula (white arrows) between sigmoid colon (yellow star), vaginal cuff (red star) and urinary bladder (blue star). On the left - before gel instilled per rectum (green star), on the right - after gel instilled per rectum.

Vesico-symphyseal fistulas appear as T2-hyperintense tracts extending from the bladder base/urethra to the pubic symphysis, frequently with marrow edema, cortical destruction, and adjacent fluid collections indicating osteitis/osteomyelitis, sometimes with tracts within nearest soft tissues or skin.

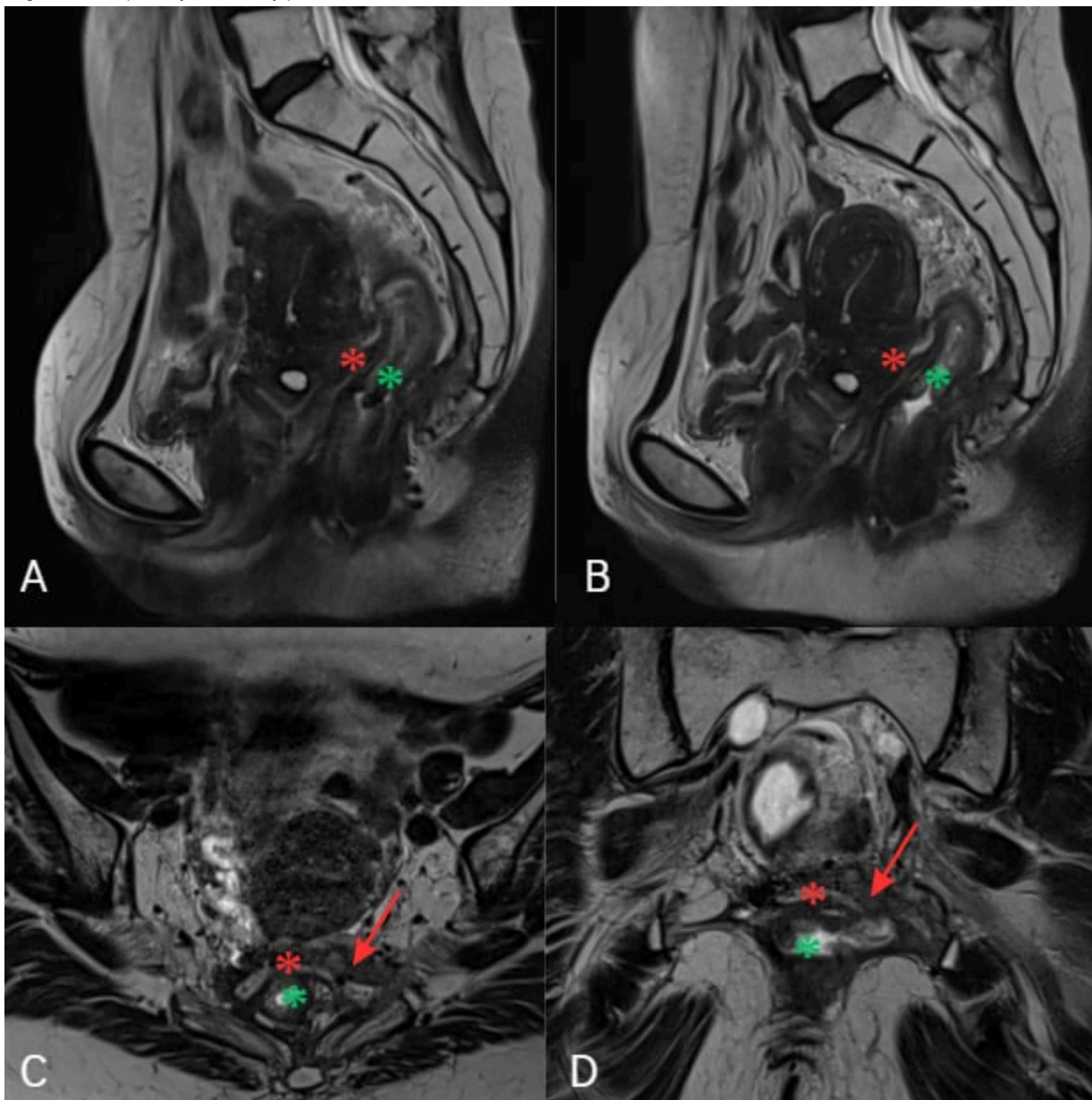


The patient after surgery due to prostate cancer. There is cystourethral anastomosis leak (red arrows), with symphyseal fistula (yellow arrows) and with tract within the left pectineus muscle (blue arrows), shown on axial T2 weighted sequence (A), sagittal postcontrast T1 weighted sequence (B), axial postcontrast T1 weighted sequence (C), and sagittal postcontrast T1 weighted sequence (D). Vesicorectal fistulas demonstrate a direct communication between bladder/urethra and rectum, best confirmed with combined bladder and rectal distension.



The patient with prostate cancer after surgery and radiotherapy. T2 weighted sequences (A - sagittal, B - axial) demonstrate rectovesical fistula (white arrows), vesicosymphiseal fistula (red arrows) with cutaneous extension to the pubic region (blue arrows). The presence of gas within the bladder, in the absence of prior instrumentation, is a useful indirect sign raising suspicion for fistula, as is the

presence of unexpected fluid and gas within the vagina. Rectovaginal fistulas show a T2-hyperintense tract between rectal and vaginal lumina, well delineated with rectal and vaginal gel opacification. Vesicovaginal fistulas present as tracts between bladder and vagina, often at the vaginal cuff in post-hysterectomy patients, or after rectal cancer treatment.



Rectal cancer after complex treatment. A - sagittal T2W before gel instilled per rectum. B-D - sagittal/axial/coronal T2W after gel instilled. Rectovaginal fistula (red arrows), rectum (green star), vagina (red star).

Conclusion

Male pelvic fistulas: Following radical prostatectomy and/or prostate radiotherapy, MRI accurately depicts vesico-symphiseal and vesicorectal fistulas, along with associated pubic osteomyelitis, guiding urologic and reconstructive planning. [2]

Female pelvic fistulas: After cervical or uterine cancer treatment, MRI with rectal and vaginal gel instillation reliably delineates rectovaginal and vesicovaginal tracts, providing critical anatomic detail for multidisciplinary surgical management. [4]

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Patient-reported experience of whole-body MRI versus PET/CT in patients with relapsed/refractory LBCL.

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Purpose

Patients with relapsed or refractory large B-cell lymphoma (LBCL) may require repeated imaging examinations. While PET/CT and CT are established for lymphoma staging and response assessment, whole-body MRI (WB-MRI) is increasingly investigated as a radiation-free complementary modality. As patient acceptance is essential for the implementation of new imaging strategies, we compared patient-reported experience of same-day WB-MRI and PET/CT.

Materials and Methods

Patients with LBCL scheduled for imaging before CAR T-cell therapy completed a structured questionnaire after undergoing WB-MRI followed by PET/CT on the same day. They rated their experience of both examinations and, where applicable, their previous experience with contrast-enhanced CT. Patient-reported outcomes were assessed using numeric rating scales ranging from 0 to 10. Items included discomfort, pain, examination-related anxiety and worries, claustrophobia, calmness, perceived safety, general satisfaction, perceived risks and benefits, and likelihood of recommending the respective examination to others. A psychological burden composite score was calculated from anxiety, worries, claustrophobia, and reversed calmness. Paired comparisons between WB-MRI and PET/CT were performed using exact two-sided Wilcoxon signed-rank tests. For items including CT, Friedman tests were used.

Results

Forty-seven patients were included, with 40-45 valid responses per item. WB-MRI was associated with significantly more discomfort than PET/CT (mean 2.77 vs. 1.56; median 2 vs. 1; exact $p < 0.001$). Psychological burden was also higher for WB-MRI than PET/CT (exact $p = 0.002$; Cronbach's alpha 0.67 for WB-MRI and 0.74 for PET/CT). This reflected higher claustrophobia during WB-MRI ($p = 0.031$) and greater calmness during PET/CT ($p = 0.035$), while worries and pain did not differ significantly in exploratory single-item analyses. However, satisfaction, perceived benefits, and recommendation were high for both modalities, with medians of 10 and no significant differences. WB-MRI was perceived as carrying significantly lower overall risk than PET/CT (mean 1.88 vs 2.44; $p = 0.015$) and contrast-enhanced CT (mean 1.88 vs 2.53; $p = 0.033$; Friedman $p = 0.040$), whereas contrast-agent risk, perceived benefit, and likelihood of recommendation did not differ significantly.

Conclusion

In patients with LBCL prior to CAR T-cell therapy, both WB-MRI and PET/CT were highly accepted. WB-MRI was associated with greater discomfort and psychological burden, whereas PET/CT was perceived as carrying higher overall risk. These findings support the feasibility of WB-MRI in this setting, while highlighting the need for patient-centered measures to reduce MRI-related discomfort and anxiety.

PSA Density as a Decision-Making Tool for Biopsy or Follow-up in Indeterminate Prostate MRI Lesions

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Purpose

To assess the role of PSA density (PSAD) in guiding biopsy versus follow-up in patients with indeterminate prostate lesions (PI-RADS 3/3+1) on multiparametric MRI (mpMRI), and to evaluate the additional diagnostic value of dynamic contrast-enhanced (DCE) imaging

Materials and Methods

In this retrospective multicenter study, 106 patients with isolated PI-RADS 3 or PI-RADS 3+1 lesions who underwent mpMRI followed by MRI-targeted fusion biopsy between January 2020 and June 2025 were included. Clinical, imaging, and pathological data were analyzed. ROC analysis was performed to evaluate the diagnostic performance of PSAD and identify the optimal cutoff value for predicting positive target biopsy

Results

PSAD was the only variable significantly associated with biopsy positivity (median 0.18 vs 0.095 ng/mL/cc in positive and negative biopsies, respectively; $p=0.0004$). ROC analysis showed moderate diagnostic accuracy (AUC=0.75; 95% CI: 0.65-0.85). A PSAD cutoff of 0.12 ng/mL/cc yielded 79% sensitivity, 70% specificity, 43% positive predictive value, and 92% negative predictive value. Patients with PSAD ≤ 0.12 ng/mL/cc had a low likelihood of clinically significant cancer, supporting imaging surveillance rather than immediate biopsy. DCE positivity (PI-RADS 3+1) did not improve the prediction of biopsy outcome ($p=0.69$), with poor discriminative performance (AUC=0.53)

Conclusion

PSAD is a valuable adjunct to mpMRI for risk stratification of indeterminate PI-RADS 3 lesions. A cutoff value of 0.12 ng/mL/cc may safely reduce unnecessary prostate biopsies while maintaining a high negative predictive value. In contrast, DCE did not provide incremental diagnostic value in this cohort, supporting the potential use of biparametric MRI for evaluating indeterminate prostate lesions. Prospective validation in larger cohorts is warranted

Radiologic errors in oncologic imaging

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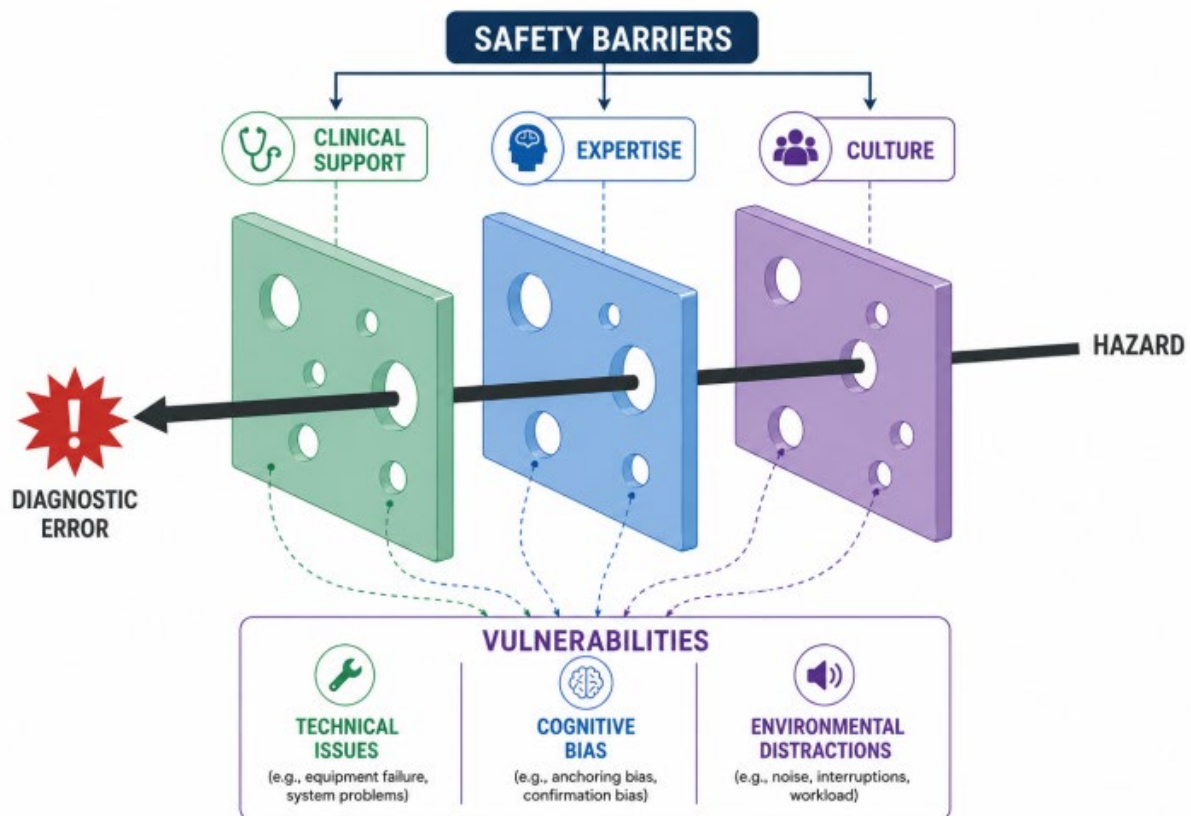
Learning Objectives

To improve diagnostic accuracy and reduce misinterpretations in oncologic imaging by understanding, classifying, and monitoring radiological errors throughout the diagnostic pathway.

Background

Given the substantial burden of cancer worldwide, radiological errors are more readily recognized and more frequently associated with severe patient outcomes and public health implications[1]. Accordingly, oncologic imaging is associated with the highest rate of diagnostic-error-related malpractice claims compared with other areas of radiology[2].

Radiologic errors result from both latent failures (system, technical, and communication issues) and active failures, including human errors, procedural, patient-related, and reporting mistakes, often influenced by cognitive biases[3].



The Swiss Cheese Model [11] highlights that diagnostic errors occur when multiple vulnerabilities and failed safety barriers align. Therefore, effective risk management must extend beyond individual performance, addressing environmental and organizational factors contributing to errors, as well as weak safety systems, through prevention strategies.

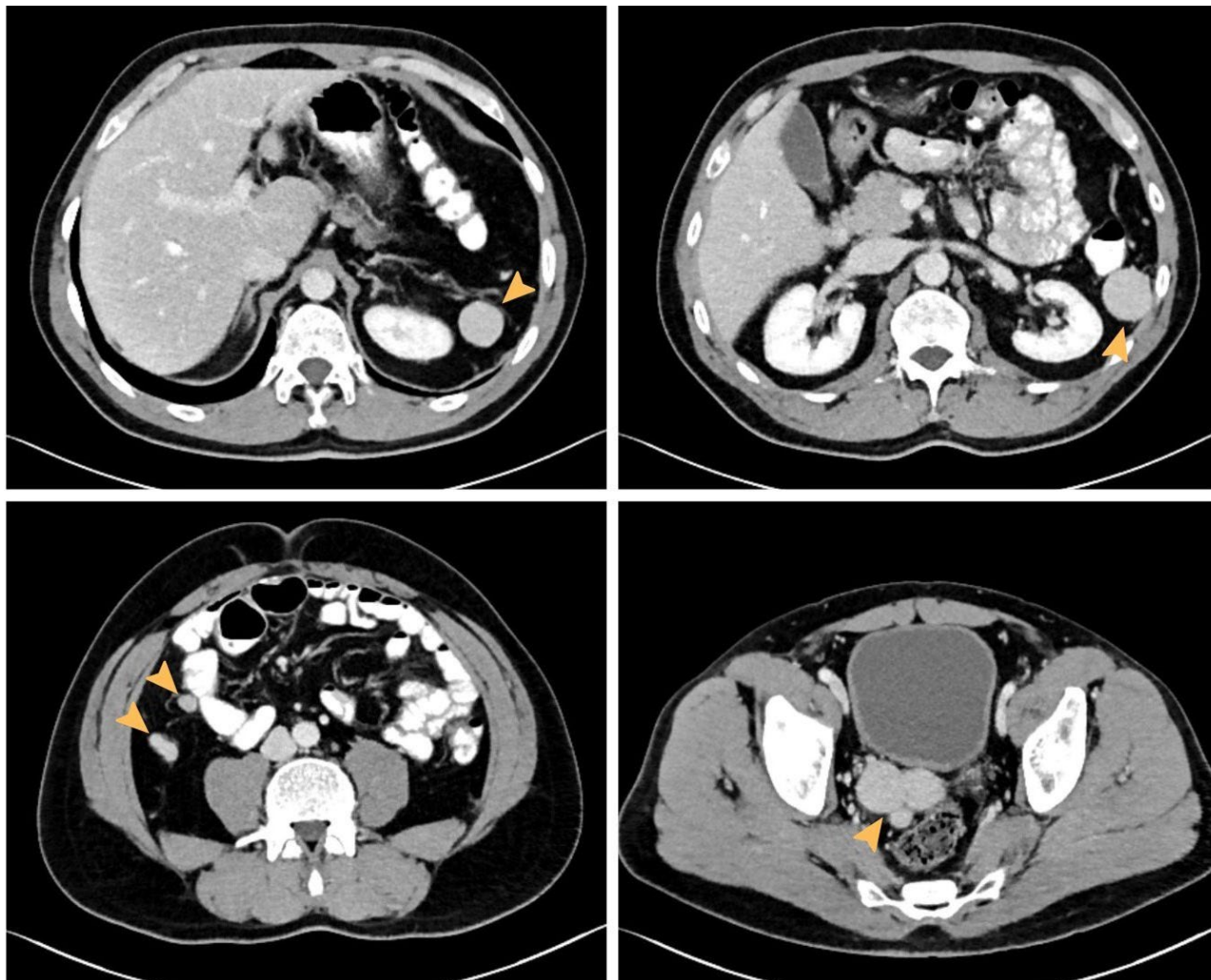
Several classification systems for radiologic errors have been proposed. The most widely used is Kim and Mansfield's, based on underlying causes (12 error types)[4]. Onder et al. classify errors by workflow stage into pre-, intra-, or post-reporting[5]; a third system, focused on oncologic imaging, maps errors to three phases of the diagnostic process: data acquisition (D), cognitive analysis (A), and communication of results (C) [1].

TYPE ERROR			PREVENTION
ONDER et. Al	KIM and MANSFIELD	DAC framework	
 Pre-reporting	6 Technique 7 Prior examination 8 History 9 Location 11 Complication	D – Data Collection (failure to collect pixel and non-pixel information)	- diversify clinical information sources - retrieve the imaging history - adapt the protocol to the region of interest - contact the referring physician - postpone analysis when information is lacking
	1 Over-reading 2 Faulty reasoning 3 Lack of knowledge 4 Under-reading 10 Satisfaction of search 12 Satisfaction of report	A – Analysis A1 – detection (failure to see a retrospectively visible finding) A2 – characterization (failure to recognize a finding, misclassification)	- systematic analysis of what is unrelated to specific question - checklist - systematic search for additional findings - keep theoretical knowledge up to date - postpone decisions to consider and confirm the first interpretation - awareness of the most common cognitive bias
 Post-reporting	5 Poor communication	C – Communication (failure to communicate the analysis result)	- use consensus-based criteria to guide oncologic follow-up - consider structured reports and template - be comparative - be able to communicate a notion of uncertainty

Classifications of radiological error types according to the reporting process and toolbox to prevent errors type DAC [1, 4, 5].

Imaging findings or Procedure details

Type D errors occur when relevant clinical or technical information is inadequately collected. In oncologic radiology, clinical history, prior imaging, and contextual data are essential. These are considered "errors of means", reflecting failure to obtain the information needed for diagnosis[1].



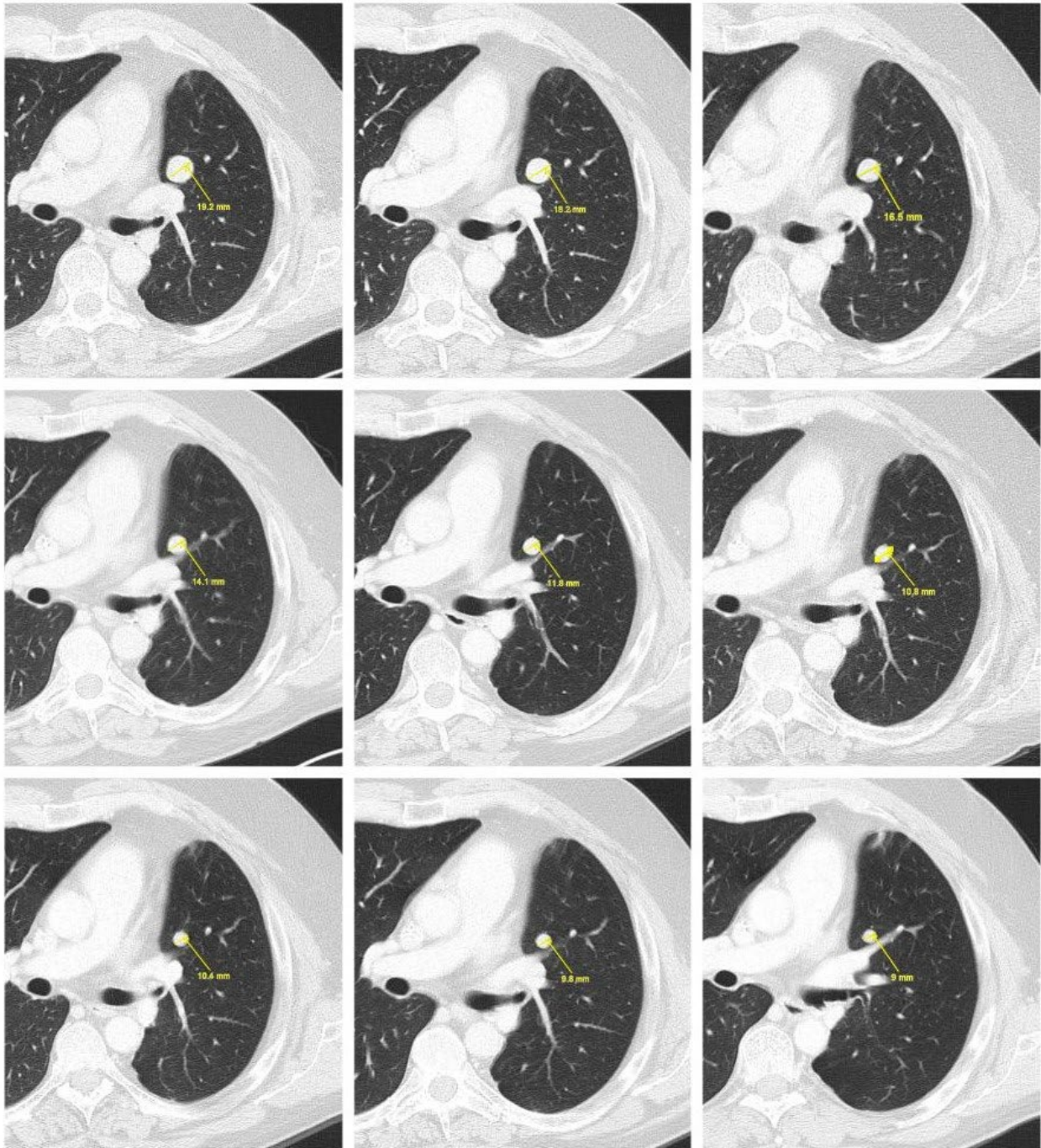
Type D error: misinterpretation due to missing information (splenectomy following trauma) in a Patient with history of colorectal cancer. Post-

traumatic splenosis presenting as multiple solid nodular lesions (arrowheads) was erroneously interpreted as peritoneal carcinomatosis, resulting in significant implications for the patient.

Type A (cognitive) errors account for up to 80% of reported cases and involve perceptual and decision-making failures; they may result from either under-detection of a lesion (A1) or misinterpretation of a detected finding (A2) [1] [4] [6].

Type A1 errors occur when lesions are missed due to limited visibility, suboptimal search, reduced attention, or cognitive biases, such as satisfaction of search (reduced detection of additional findings after a first abnormality[7]) or inattention blindness (overlooking visible but unexpected findings [8][9]).

Type A2 errors occur when correctly detected findings are assigned an incorrect diagnostic significance, often due to cognitive biases (anchoring, confirmation, availability) rather than insufficient knowledge.



Type A2 error: anchoring bias and measurement distortion. A pulmonary lesion initially considered stable relative to the previous examination clearly demonstrated disease progression when reassessed through longitudinal comparison over time.

Type C errors arise from failures in communicating diagnostic findings through incomplete, ambiguous, delayed or misunderstood reports resulting in inappropriate clinical decisions or delays in patient care[10].

Conclusion

Diagnostic errors in oncologic radiology are more likely to have a high impact. Therefore efforts should focus on improving access to oncologic imaging expertise and reducing diagnostic misinterpretations, thereby improving patient safety and care quality.

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Retrospective Analysis of Intervention Risk, Survival and Local Control after CT-Guided Thermoablation of Pulmonary Lesions

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Purpose

CT-guided thermoablation is a minimally invasive local treatment option for pulmonary tumors when surgery is not possible due to comorbidities or advanced lung disease. This study aims to evaluate the safety and effectiveness of this treatment method.

Materials and Methods

Radiofrequency ablation (n=133, 66%) and microwave ablation (n=69, 34%) were performed using cooling systems from different manufacturers. Until December 2019, ablations were performed under general anesthesia with double-lumen intubation, then under analgosedation with spontaneous breathing. When indicated, ablation was combined with core-cut biopsy in the same session (n=132, 65%). Ablation was mainly used as an adjuvant local therapy (61%, n=123), occasionally combined with chemotherapy (25%, n=51) or radiotherapy (18%, n=37) of other lesions, and rarely for tumor reduction or pain control. The cohort included NSCLC (87%, n=175), metastases (7%, n=15), and SCLC (2%, n=4). Severe emphysema (34%, n=68) or interstitial lung disease (9%, n=18) was also present in some patients. Overall, 24 patients underwent multiple ablations, including 11 re-ablations of the same lesion, 9 patients had two ablations during a single session. Only the first ablation per patient was analyzed in this study.

Results

Pneumothorax requiring drainage occurred after intubation anesthesia in 35% (n=47) and after analgosedation in 8% (n=5). Local hemorrhage was observed in 35% (n=71), minor pleural effusion in 8% (n=16), soft tissue emphysema in 11% (n=23), infection in 7% (n=15), and 30-day mortality in 1% (n=2). Local control was achieved in 62% (n=126) of patients with available follow-up after 1 year, 44% (n=89) after 2 years, and 17% (n=34) after 5 years. Survival was 76% (n=153) after 1 year, 60% (n=121) after 2 years, and 24% (n=48) after 5 years. In 87% (n=140), post-ablation FEV1 remained ≥90% of baseline at least once during follow-up at 1, 3, or 6 months.

Conclusion

CT-guided lung tumor ablation is an alternative treatment for solitary and small pulmonary tumors, particularly in patients with severe lung disease. Since microwave ablation has become available, procedures can be performed under analgosedation with spontaneous breathing, as ablation takes only a few minutes. As a result, the risk of pneumothorax is only slightly higher compared to CT-guided lung biopsy, with which the procedure can be combined within the same session if necessary. Local control is comparable to SBRT, ablation can usually be repeated in case of recurrence and lung function does not show clinically relevant deterioration.

Role of Multiparametric MRI for anal squamous cell carcinoma in chemoradiotherapeutic treatment

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Purpose

To evaluate the role of mpmMRI in local response assessment and detection of early local relapse after chemoradiotherapy (CRT) in patients with squamous cell carcinoma of the anal canal (SCCA).

Materials and Methods

23 patients with histologically proven SCCA who completed pre-(t0), post-CRT 4-week(t1) and 20-week(t2) mpmMRIs and pre-(t0) and post-CRT 20-week(t2) FDG-PETs scan were prospectively included. Tumor size (D-mm), tumor volume (V-cc), Apparent Diffusion Coefficient (ADC-mm²/s), Time-To-Peak (TTP-sec) and SUV (PET-scan) were recorded. Lesion biopsy performed at 6-month was regarded as the gold standard test for evaluating the local response to treatments.

Data were analyzed with non-parametric tests (Mann-Whitney, Wilcoxon) and ROC curve procedure.

Results

20 patients (87%) were classified as Responders. Responders exhibited

a significant difference with treatment for all variables D, V, ADC and TTP: in particular, D ($p_1 = 2 \cdot 10^{-4}$; $p_2 = 3 \cdot 10^{-4}$), V ($p_1 = 9 \cdot 10^{-5}$; $p_2 = 3 \cdot 10^{-4}$) and SUV ($p = 10^{-4}$) shown a decrease; while ADC ($p_1 = 3 \cdot 10^{-4}$; $p_2 = 4 \cdot 10^{-3}$) and TTP ($p_1 = 0.03$; $p_2 = 10^{-4}$) increased instead.

At any given time t, D was significantly higher for the Non-Responder group:

D0 (nr80mm (77-80mm) vs r50mm (43-58mm), $p=0.03$); D1 (50mm (50-62mm) vs

26mm (14-37mm) $p=0.02$); D2 (28mm(27-39mm) VS 4mm(0-15mm), $p= 0.03$).

Since V is dependent on D, it follows the same pattern: V0 (nr 180cc (156-210cc) vs r 35 (13-52cc), $p=0.008$); V1 (79cc (70-89cc) VS 4cc (1-11cc), $p=0.006$); V2 (13cc(9-46cc) VS 0.13(0-1.3), $p = 0.01$). Responders exhibited a larger volume reduction $\Delta V\%$: r 83% (69-94%), nr 53% (49-60%)

No statistically significant differences were found between the two groups regarding the variables ADC, TTP, SUV (e.g. for t0 respectively $p=0.36$, $p=0.08$, $p=0.75$)

The ROC curve procedure identified as a threshold for the Responder group

V0 < 120cc (AUC=0.99, Se 100%, Sp 95%), V1 < 40cc (AUC=1.00, Se 100%, Sp 100%), $-\Delta V\%_1 > 80\%$ (AUC=0.925, Se 100%, Sp 67%), D1 < 40mm (AUC=0.92, Se 100%, Sp 85%).

Conclusion

Despite the low number of Non-Responder patients, the study highlights significant higher values for D and V at any given time t. V < 120cc at baseline and D < 4cm, V < 40c and $\Delta V\% > 80\%$ at t1 were identified as good markers of response to treatment; this proves the relevance of 3D-MRI in SCCA staging. The therapy caused significant evolution for the ADC and TTP parameters, however they were not found to be significantly different between groups: this could be due to the low number of Non-Responder patients.

Suspected Immunotherapy Pneumonitis: A Radiologist's Checklist

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Learning Objectives

1. To present a structured, stepwise radiological approach for evaluating suspected immune checkpoint inhibitor–related pneumonitis
2. To illustrate the main Computer Tomography (CT) patterns associated with immunotherapy-induced lung toxicity
3. To highlight key differential diagnoses and common diagnostic pitfalls
4. To emphasize the importance of integrating imaging findings with clinical context and temporal evolution

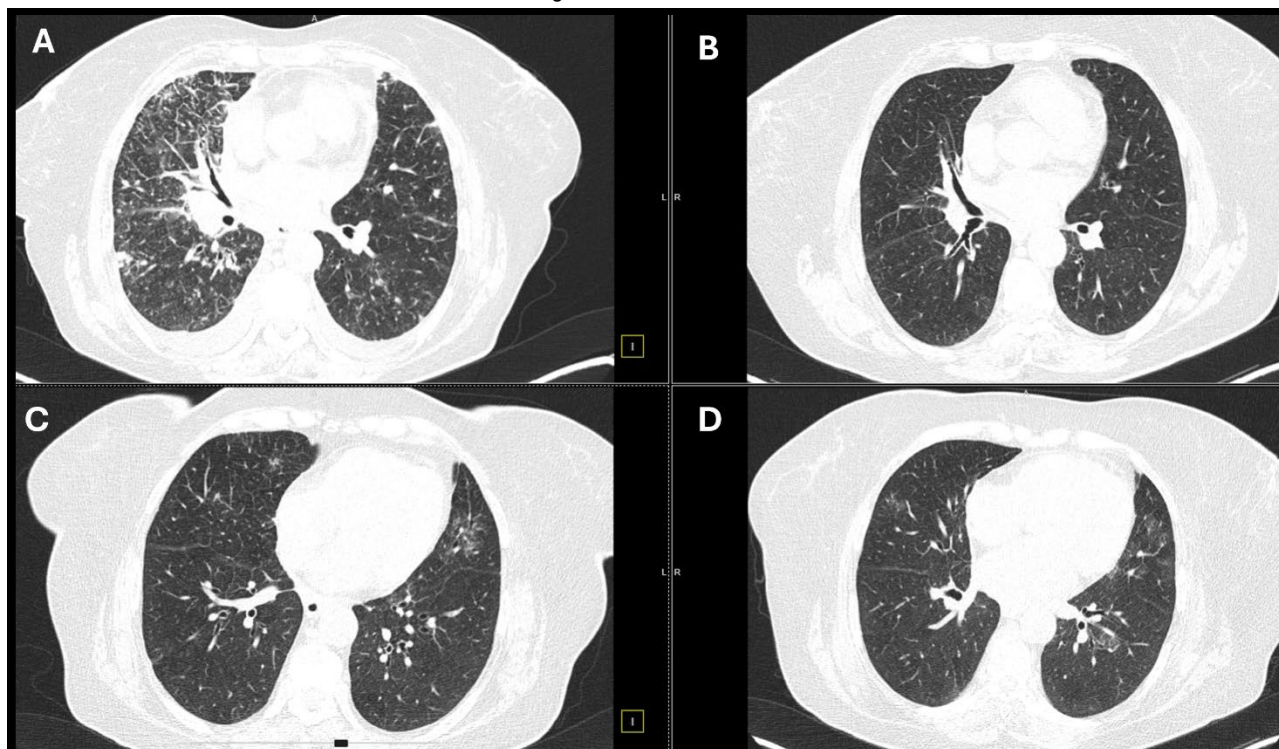
Background

Immune checkpoint inhibitors (ICIs), including PD-1, PD-L1, and CTLA-4 inhibitors, have improved oncologic outcomes but may cause immune-related adverse events such as pneumonitis, a potentially severe complication. CT plays a central role in detection and follow-up; however, imaging findings are often non-specific and may overlap with infection, tumor progression, or radiation-induced lung injury, making diagnosis challenging.

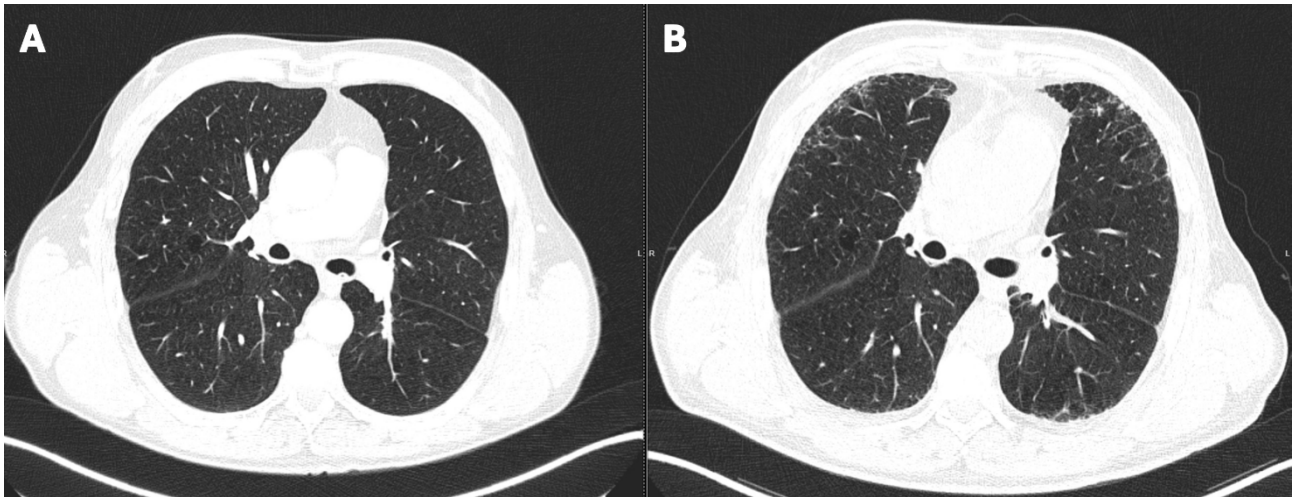
Imaging findings or Procedure details

A stepwise checklist-based evaluation is proposed:

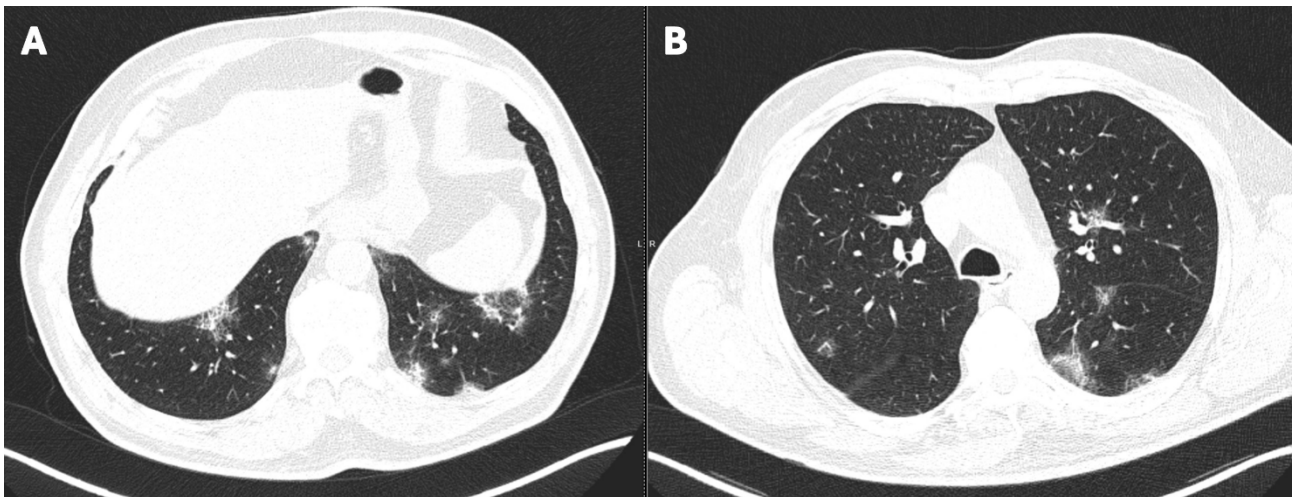
- 1. Clinical context:** Assessment begins with confirmation of ICI therapy and evaluation of timing relative to treatment initiation, as pneumonitis can occur at variable intervals
- 2. Comparison with prior imaging:** Identification of new or evolving abnormalities is essential, as stable findings are less suggestive of active pneumonitis
- 3. Pattern recognition:** The most common CT patterns include organizing pneumonia -OP (peripheral or peribronchovascular consolidations), non-specific interstitial pneumonia -NSIP (bilateral ground-glass opacities with or without reticulation), hypersensitivity pneumonitis-like pattern (mosaic attenuation and air trapping) and diffuse alveolar damage –DAD (diffuse ground-glass opacities and consolidation, often with a “crazy paving” appearance)
- 4. Distribution analysis:** evaluation of lesion distribution (peripheral vs central, upper vs lower lobe predominance, focal vs diffuse, symmetric vs asymmetric) provides additional diagnostic clues
- 5. Exclusion of alternative diagnoses:** ICI-related pneumonitis is a diagnosis of exclusion. Key differentials include: tumor progression, infectious pneumonia (bacterial, viral, opportunistic), radiation pneumonitis, pulmonary edema
- 6. Severity assessment:** radiological extent correlates with clinical severity: **mild** (limited ground-glass opacities), **moderate** (bilateral involvement), **severe** (diffuse lung involvement, “white lung” appearance)
- 7. Reporting recommendations:** Radiology reports should include suspicion of pneumonitis, dominant imaging pattern, extent and severity, recommendations for clinical correlation and further management



Serial CT examinations in a patient treated with pembrolizumab demonstrate baseline CT (A), initial tumor response (B) followed by development of new bilateral patchy ground-glass opacities (C, D) compatible with immune checkpoint inhibitor–related pneumonitis (OP/NSIP overlap pattern)



Baseline CT (A) with no evident abnormalities; Follow-up CT (B) after pembrolizumab therapy demonstrates new bilateral peripheral ground-glass and fine reticular opacities, predominantly in the upper lobes, compatible with an NSIP-like pattern of immune checkpoint inhibitor-related pneumonitis



Organizing pneumonia pattern showing peripheral consolidations in a patient undergoing immune checkpoint inhibitor therapy.

Conclusion

A structured, checklist-based radiological approach facilitates early recognition of immunotherapy-related pneumonitis and helps differentiate it from competing diagnoses.

The Ovarian Origin of Encephalitis: A Diagnostic Odyssey.

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Learning Objectives

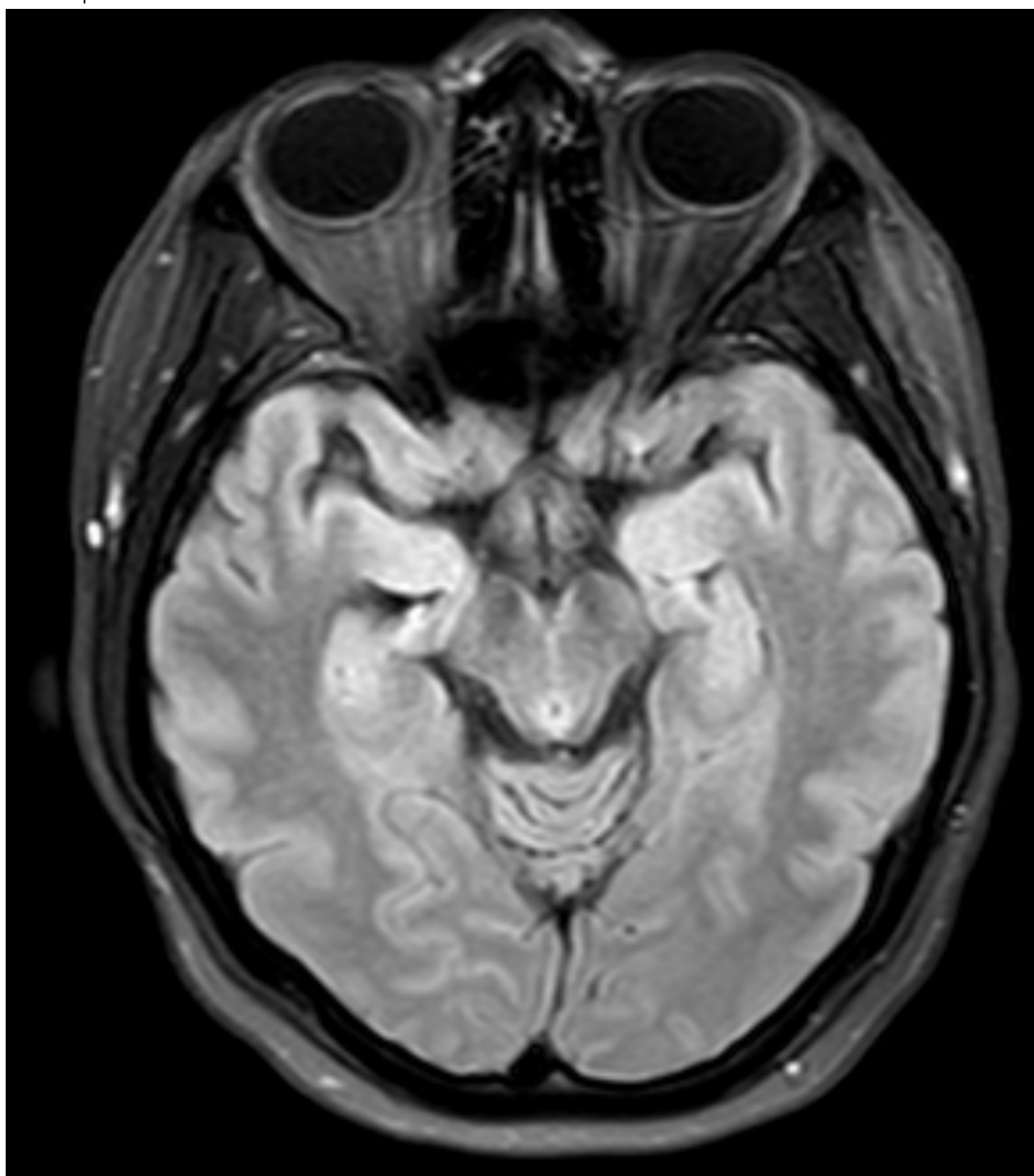
1. To recognize ovarian dermoid/teratoma as an important underlying cause of autoimmune encephalitis in young females.
2. To identify the importance of systematic extracranial imaging in patients with unexplained encephalitis, particularly when autoimmune encephalitis is suspected.
3. To emphasize the radiologist's contribution in facilitating early diagnosis of paraneoplastic autoimmune encephalitis through timely detection of an occult ovarian lesion.

Background

A 28-year-old previously healthy woman presented with acute-onset neuropsychiatric symptoms, including altered mental status and behavioral changes, which failed to improve with initial pharmacologic therapy. Cerebrospinal fluid and serum analyses demonstrated elevated anti-N-methyl-D-aspartate receptor (NMDAR) antibody titres, confirming the diagnosis of anti-NMDAR encephalitis. Subsequent imaging was performed to identify an underlying neoplasm, given the known association between anti-NMDAR encephalitis and ovarian teratomas.

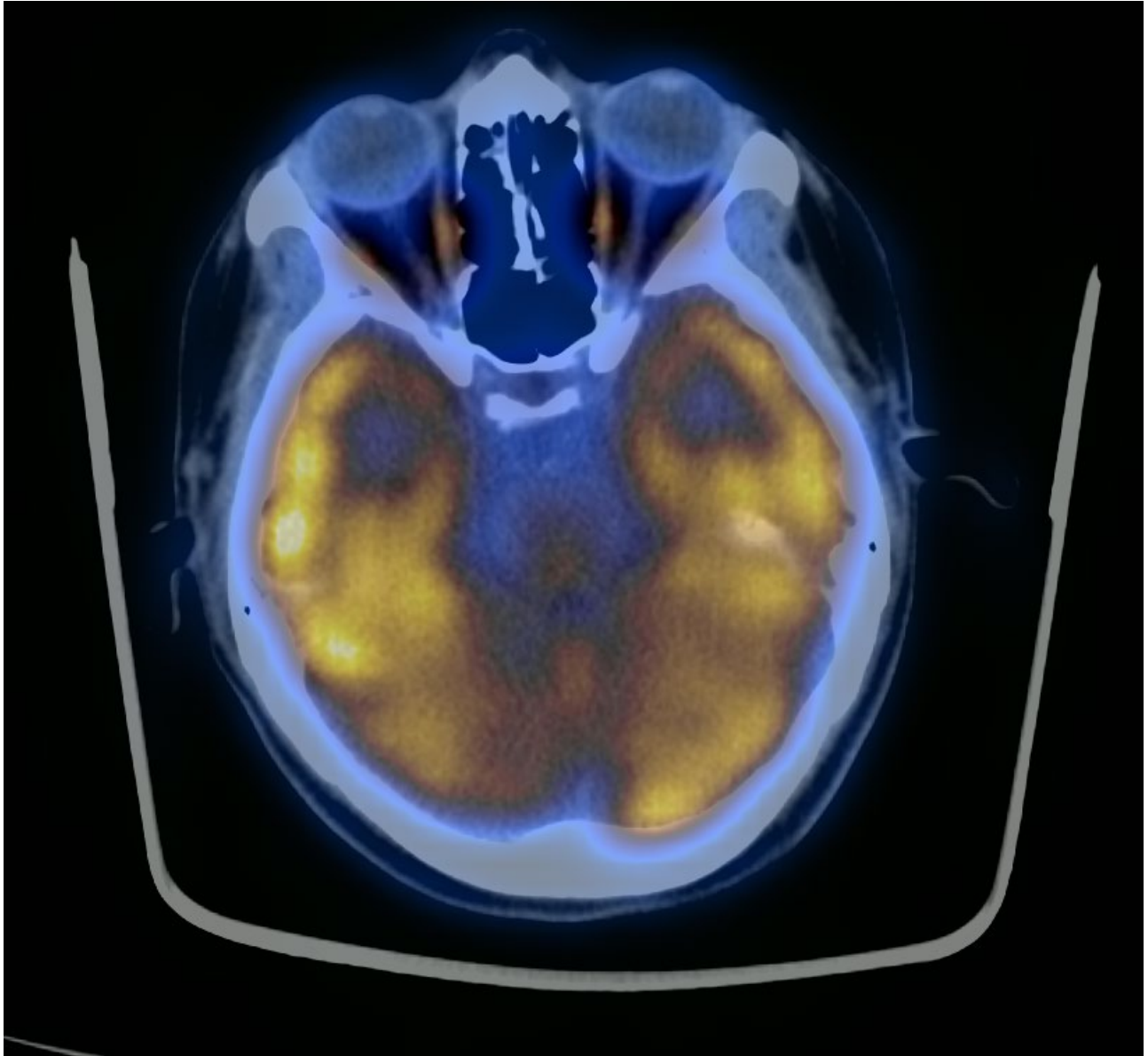
Imaging findings or Procedure details

MRI of the brain demonstrated symmetric FLAIR hyperintensities involving the bilateral medial temporal lobes, with no diffusion restriction, or abnormal post-contrast enhancement.



FLAIR hyperintensity in bilateral medial temporal lobes.

Given the confirmed diagnosis of anti-NMDAR encephalitis, whole-body ¹⁸F-FDG PET/CT was performed to evaluate for an underlying neoplasm. Brain PET images demonstrated symmetric hypometabolism involving the bilateral medial temporal lobes, consistent with metabolic dysfunction related to autoimmune encephalitis. No other significant cerebral metabolic abnormality was identified.



Symmetric hypometabolism in bilateral medial temporal lobes on PET image.

On whole-body imaging, a well-defined 2.8 x 2.2 cm left ovarian lesion containing macroscopic fat component was identified, suggestive of a mature cystic teratoma (ovarian dermoid cyst). No evidence of additional hypermetabolic lesions suggestive of an alternative neoplastic process was seen elsewhere in the body.



Left ovarian lesion with demonstrable macroscopic fat, suggesting dermoid cyst.

The combination of bilateral medial temporal lobe abnormality on MRI and FDG PET/CT, positive serum and cerebrospinal fluid anti-NMDAR antibodies, and the presence of an ovarian dermoid cyst supported the diagnosis of paraneoplastic anti-NMDAR encephalitis secondary to ovarian teratoma.

Conclusion

Anti-NMDAR encephalitis is a rare but potentially reversible autoimmune encephalitis that is frequently associated with ovarian teratomas in young women. This case underscores the value of imaging in detecting both the cerebral abnormalities and the underlying ovarian dermoid, enabling timely diagnosis, surgical management, and improved clinical outcomes.

Toward the Future of Oncologic Reporting: A Reproducible Style-Guide Pipeline that Improves Automated Chest-Radiograph Reporting

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Purpose

Chest radiography (CXR) remains a high-volume tool in oncologic care, contributing to lung-cancer detection and screening, and surveillance of thoracic metastatic disease. As automated drafting moves to the center of the future of oncologic reporting, output quality may hinge on prompt design. We developed a novel pipeline that automatically converts an institution's own reports into a radiology style guide and a deployable system prompt, and tested whether this pipeline-generated prompt improves report quality across two frontier models.

Materials and Methods

The pipeline runs in three phases, with no model training and near-zero cost. Phase 0 deidentifies and filters institutional CXR reports. Phase 1 mines empirical style statistics: 1-to-5-gram phrasing, negation patterns, severity and modifier vocabulary, abbreviations, sentence- and body-length distributions, and canonical examples. Phase 2 has an large language model (LLM) synthesize these into a concise style guide and a system prompt. The pipeline-generated prompt was compared against a baseline ("<indication> findings:"). On a 10% pilot of CheXpert-Plus (~4,550 studies), GPT-5.5 and Gemini-3.5-Flash generated findings in a paired design. Outputs were scored against the radiologist-written Findings using BLEU-2, BERTScore-F1, SemScore (CheXbert), RadGraph-F1, and the composite RadCliQ-v1; paired differences were tested with paired t-tests and Wilcoxon signed-rank tests.

Results

The pipeline-generated prompt improved every metric for both models (all $p < 0.001$, both tests). GPT-5.5 ($n=4,538$): BLEU-2 0.122 to 0.158, BERTScore-F1 0.298 to 0.346, SemScore 0.321 to 0.357, RadGraph-F1 0.153 to 0.183, and RadCliQ-v1 (lower is better) 1.448 to 1.295. Gemini-3.5-Flash ($n=4,550$): BLEU-2 0.095 to 0.159, BERTScore-F1 0.112 to 0.335, SemScore 0.268 to 0.317, RadGraph-F1 0.110 to 0.169, and RadCliQ-v1 1.862 to 1.373.

Conclusion

The reproducible pipeline, requiring no model training and near-zero cost, produced statistically significant gains in automated CXR reporting across two frontier LLMs. By turning an institution's own reporting style into a deployable system prompt, the pipeline offers a practical, model-agnostic route to higher-quality oncologic reporting; full-cohort and multi-institutional validation is warranted.

Towards MRI-based biomarkers for predictive response assessment of biologically adaptive radiotherapy of non-small cell lung cancer (NSCLC)

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Purpose

Daily online adaptive radiotherapy (oART) improves target coverage while reducing exposure of organs at risk. Magnetic resonance imaging (MRI), with its superior soft-tissue contrast, may further enhance oART and enable functional assessment by diffusion-weighted imaging (DWI). Such imaging could facilitate early tumor response evaluation to oART. Yet, evidence for oART in lung cancer in combination with offline diagnostic MR guidance is limited and has not yet been extensively explored.

Materials and Methods

20 patients included in the ongoing PUMA and MARS study with locally advanced NSCLC underwent chemoradiotherapy at the ETHOS linear accelerator (Varian Medical Systems) for daily oART. All patients received weekly 3T MRI (T1, T2, DWI) which is utilized for plan adaptation - i.e. offline diagnostic MR-guidance - in treatment position using a shuttle (CQ Medical Limited). Target volumes were segmented in the daily cone beam computed tomography aided by the weekly co-registered MRI sequences. Radiomic features of the tumor - a.o. first order and shape features - were extracted using the Mint Lesion software (Mint Medical GmbH).

Results

A weekly morphological and functional 3T MRI imaging of the thorax and of the NSCLC was possible during the course of oART. The improved resolution and contrast allowed for resolving the tumor's internal architecture as well as a more accurate assessment of tumor infiltration into neighboring organs. The DWI provided a significant advantage of differentiating tumor tissue from adjacent atelectasis and delineating paramediastinally localized tumors. The median volume shrinkage of the tumor during oART accounted for approx. 43% and for 68% under T2 and DWI imaging, respectively (N= 10). The tumor volume shrinkage in DWI correlated with increasing ADC values and decreasing ADC entropy of median factor (25th and 75th percentile) 1.16 ([1.00; 1.84]) and 0.95 ([0.85; 0.96]), respectively, indicating a radiological surrogate for therapy success. The ADC values itself remained constant within a single MRI imaging time slot.

Conclusion

The ongoing PUMA and MARS study will address the characterization and response assessment of oART of NSCLC in combination with weekly offline 3T MRI. The DWI together with morphological (T2) sequences will guide for biologically oART approaches including multiparametric MRI based definition of focal boosts of regions of very low ADC values, i.e. high cell density.