

VALUE OF 18FDG PET/CT METABOLIC PARAMETERS IN NODAL STAGING OF NON-SMALL CELL LUNG CANCER

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Introduction: Although histology remains the gold standard, many studies have explored the role of 18F-fluorodeoxyglucose Positron Emission Tomography (18FDG PET) in nodal characterization of non-small cell lung cancer (NSCLC). This study aims to assess the performance of metabolic parameters in evaluating lymph node involvement.

Methods: We conducted a retrospective study including patients referred to the department of nuclear medicine of Salah Azaïez Institute for 18FDG PET as part of NSCLC staging.

For each lymph node, we measured the maximum standardized uptake value (SUVmaxG) and calculated its ratio to the liver (SUVG/L), mediastinum (SUVG/M) and to primary tumor (SUVG/T).

Lymph nodes were grouped according to the SUVmax and histological type of the primary tumor.

PET parameters were compared to the gold standard (histology) of to follow-up.

Results: A total of 43 patients and 173 lymph nodes were analyzed.

The SUVmaxG and the SUVG/L were the most discriminative parameters, with both sensitivity and specificity exceeding 90% in the overall analysis and across subgroups based on tumor SUVmax and histology. Predictive values for these two parameters were consistently above 90%, regardless of subgroup.

Optimal cut-offs were identified:

- SUVmaxG = 3,4; Sensitivity: 91.4%, Specificity: 88,0%
- SUVG/L = 1.3; Sensitivity: 90.1%, Specificity: 89.1%.

Conclusion: 18FDG PET significantly improves lymph node characterization in NSCLC, particularly due to its high negative predictive value. However, the determination of optimal cut-off values remains subject to debate.

18F-FDG PET IN THE EVALUATION OF NON-SMALL CELL LUNG CANCER TREATED WITH IMMUNE CHECKPOINT INHIBITORS

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Introduction: Immune checkpoint inhibitor (ICI) therapy has revolutionized the management of non-small cell lung cancer (NSCLC). However, treatment response assessment through imaging remains challenging, particularly regarding the optimal use of 18F-FDG PET scans.

Methods: This single-center retrospective study examined NSCLC patients treated with anti-PD1/PDL1 therapy. We analyzed the performance of baseline PET scans (PET0), adherence to recommended timeframes, evaluation frequency, and concordance with computed tomography (CT).

Results: The study included 17 patients, with only 5 patients (29.4%) receiving baseline PET scans. Ten patients (58.8%) underwent multiple follow-up PET evaluations, while 7 (41.2%) had only one post-treatment scan. The recommended 8-12 week evaluation timeframe was respected in just 3 patients (17.6%). PET-CT discordance was observed in 10 patients (58.8%), with equal instances of PET detecting more lesions (29.4%) or fewer lesions (29.4%) than CT. Immunotherapy-specific patterns were identified, including one case of dissociated response with control of pre-existing lesions but sub-diaphragmatic lymph node progression, confirmed during follow-up. Two suspected pseudoprogression cases lacked confirmatory follow-up PET scans. In one case, PET guided the discontinuation of maintenance therapy after 2 years and 10 months of complete response.

Conclusion: The significant PET-CT discordance observed in over half the cases highlights the decisive impact of PET imaging, particularly for distinguishing immunotherapy-specific response patterns. This first Tunisian study reveals significant gaps in implementing recommendations for 18F-FDG PET in NSCLC patients under ICI therapy. Systematic integration of PET imaging with adherence to recommended timeframes is essential for optimizing therapeutic decision-making.

BONE SCINTIGRAPHY AS A CRITICAL DIAGNOSTIC TOOL IN CARDIAC AMYLOIDOSIS

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Introduction: Transthyretin-related cardiac amyloidosis (ATTR-CA) is a progressive and potentially fatal cardiomyopathy. Early and accurate diagnosis is essential, yet conventional diagnostic tools such as transthoracic echocardiography (TTE) and cardiac magnetic resonance imaging (MRI) have notable limitations. Bone scintigraphy

with technetium-labeled tracers has emerged as valuable non-invasive alternative to endomyocardial biopsy, especially when monoclonal gammopathy is excluded.

Methods: We conducted a retrospective study involving 26 patients with clinical suspicion of cardiac amyloidosis. All patients underwent bone scintigraphy using ^{99m}Tc-HMDP, as well as ECG, TTE, and cardiac MRI. A Perugini score ≥ 2 was considered diagnostic for ATTR-CA. ECG identified conduction and rhythm abnormalities, while TTE and MRI assessed myocardial hypertrophy and structural abnormalities.

Results: Among patients with positive bone scintigraphy (Perugini ≥ 2), 80% showed abnormalities on TTE, 40% had abnormal cardiac MRI findings, and only 20% demonstrated ECG abnormalities. These results highlight the variable sensitivity of conventional imaging tools, underscoring the importance of nuclear imaging in the diagnostic algorithm.

Conclusion: Our findings support the utility of a bone scintigraphy for optimal diagnosis and early management of Transthyretin-related cardiac amyloidosis.

REDICTING COLORECTAL CANCER RECURRENCE USING MACHINE LEARNING: A STEP TOWARD PERSONALIZED CARE

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Aim: This study aims to evaluate the performance of machine learning (ML) models in predicting the risk of postoperative recurrence in patients with colorectal cancer (CRC), with the goal of optimizing and personalizing follow-up care.

Methods: This retrospective study was conducted over 49 months (November 2019 – December 2023) in the nuclear medicine department of Sahloul University Hospital. It included 46 patients who underwent surgery for CRC and were referred for ¹⁸F-FDG PET/CT due to suspected recurrence. Seven ML algorithms were tested: Support Vector Machine (SVM), Stochastic Gradient Descent (SGD), Logistic Regression (LR), XGBoost, Random Forest (RF), K-Nearest Neighbors (KNN), and Decision Tree (DT). The models were trained using clinical and paraclinical data to identify predictive factors for recurrence.

Results: Four models (SVM, LR, RF, and KNN) demonstrated optimal performance, with both F1-scores and precision reaching 100%. The SGD model also achieved 100% precision, but with slightly lower accuracy (90%). In contrast, XGBoost and DT showed lower performance, with respective precision scores of 88.9% and 87.5%. Key predictors of recurrence included elevated tumor markers, initial disease stage, associated metabolic syndrome, and postoperative complications.

Conclusion: ML enables effective prediction of CRC recurrence risk. Four models (SVM, LR, RF, and KNN) stand out for their optimal performance, highlighting

their potential to enhance patient management and follow-up strategies.

ROLE OF ^{99m}Tc-PSMA SCINTIGRAPHY IN THE MANAGEMENT OF PROSTATE CANCER: THE FIRST TUNISIAN CASE SERIES

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Introduction: Prostate cancer remains a leading malignancy among men, often requiring advanced imaging for staging and recurrence assessment. PSMA-targeted molecular imaging has significantly improved lesion detection, especially with PET tracers. However, in centers without access to PET, ^{99m}Tc-labeled PSMA scintigraphy may offer a practical alternative.

Methods: We report our first experience with ^{99m}Tc-HYNIC-PSMA SPECT-CT through a case series of five patients. The radiotracer was prepared following standard protocols, and imaging was performed four hours post-injection using whole-body planar scans and regional SPECT-CT.

Results: The average age in our series was 73 years. Three patients underwent ^{99m}Tc-HYNIC-PSMA scintigraphy for initial staging of prostate adenocarcinoma. Their Gleason scores were 7 (3+4), 8, and 7 (4+3), with PSA levels of 12, 9.8, and 300 ng/mL, respectively. The scan was negative in the first patient, showed mildly avid mediastinal lymph nodes suggestive of inflammation in the second, and revealed a strongly PSMA-avid suspicious lung nodule in the third. Two other patients were evaluated for suspected recurrence after treatment, triggered by an 80% PSA rise from nadir. Scintigraphy excluded recurrence in the first case but detected small bone metastases in the second.

Conclusion: This small series illustrates the potential utility of ^{99m}Tc-HYNIC-PSMA scintigraphy in both initial workup and recurrence assessment. It enabled detection of metastatic lesions not visible on standard imaging in at least one case and helped guide further management. While not a substitute for PET, this technique offers a cost-effective and accessible alternative in nuclear medicine departments with limited resources.

CONTRIBUTION OF TEKTRITYD SCINTIGRAPHY IN BONE METASTASIS FROM NEUROENDOCRINE TUMORS

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Introduction: Neuroendocrine tumors (NETs) commonly metastasize to the liver and lungs. Bone metastasis (BM) is less common. This study aims to evaluate the role of Tektrotyd scintigraphy in detecting and characterizing BM from NETs.

Methods: We conducted a retrospective, descriptive single-center study including patients referred to the nuclear medicine department of Salah Azaiez Institute for Tektrotyd scintigraphy for NET evaluation. All patients underwent whole-body planar imaging at 1h and 4h post-injection, completed by SPECT/CT.

Results: Among 359 patients, 15 with confirmed BM (85 lesions) were included. Primary tumors were unknown in 3 cases, and others were in small intestine (n=6), lung (n=2), pancreas (n=1), stomach (n=1) and paraganglioma (n=2).

BM were synchronous in 69% and metachronous in 31% (6 months after diagnosis of NET).

Lesions were in the spine (34%), pelvis (22%), ribs (26%), long bones (10%), scapular/sternal (8%).

Morphologically, 31 lesions were lytic, 38 sclerotic, 7 mixed and 9 initially radiologically occult which later became lytic.

The median Krenning score for bone lesions were 3.

A significant correlation was found between NET grade and Krenning score ($p=0.001$): 67% of grade 3 NETs had a score ≥ 3 versus 10% for grade 1-2.

Grade 3 NETs also showed a higher rate of spinal BM (56% vs 17% for grade 1-2: $p=0.023$).

Conclusion: Tektrotyd scintigraphy is a valuable tool for detecting both primary and metastatic NETs, especially in bone, and may help guide clinical management based on tumor grade and metastatic pattern.

CONTRIBUTION OF 18F-FDG PET IN SUSPECTED INFECTIVE ENDOCARDITIS

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Introduction: Infective endocarditis (IE) remains a serious condition with significant mortality despite diagnostic advances. The 2015 ESC guidelines incorporated 18F-FDG PET/CT into the diagnostic arsenal. This study evaluates the diagnostic value of 18F-FDG PET/CT in suspected IE.

Methods: We retrospectively analyzed all patients referred to Salah Azaiez Institute's nuclear medicine department for 18F-FDG PET/CT for suspected IE between January 2021 and March 2025.

Results: Our study included 34 patients (sex ratio 1:1, mean age 56 years). PET/CT was positive for IE in 10 patients (29.4%), with 9 having prosthetic valves. The examination detected distant infectious foci in 3 IE-positive patients (two pneumonias, one parapharyngeal abscess). Four patients with positive scans had started antibiotic therapy before imaging.

Among 24 IE-negative patients (70.6%), 5 were on antibiotics during examination. Notably, PET/CT identified alternative infection sites in 8 IE-negative patients (pneumonia, osteomyelitis, septic arthritis, abdominal collections), altering their therapeutic management.

One examination was considered suboptimal due to inadequate cardiac preparation causing persistent

physiological myocardial uptake.

Conclusion: 18F-FDG PET/CT enhances the diagnostic sensitivity of modified Duke criteria for IE. Beyond aiding positive diagnosis, it provides valuable information about disease extent, identifies alternative diagnoses in IE-negative cases, and remains effective despite ongoing antibiotic therapy. Proper cardiac preparation is essential for optimal imaging quality.

PROGNOSTIC VALUE OF 18F-FDG PET/CT PARAMETERS IN RADIOACTIVE IODINE-REFRACTORY DIFFERENTIATED THYROID CARCINOMA

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Introduction: Patients with radioactive iodine-refractory differentiated thyroid carcinoma (RAIR-DTC) represent a major therapeutic challenge. This study aims to evaluate the prognostic value of ¹⁸F-FDG PET/CT parameters in predicting progression-free survival (PFS), based on the experience of a Tunisian population.

Methods: We conducted a retrospective study from November 2019 to January 2025, including 25 patients followed in the Nuclear Medicine Department of Sahloul University Hospital for RAIR-DTC. All underwent ¹⁸F-FDG PET/CT for metastatic workup, with a minimum follow-up of one year after the scan.

Results: The mean follow-up period after PET/CT, until disease progression or last clinical visit, was 19.6 ± 10.5 months. PET/CT parameters were predictive of PFS, with sensitivity ranging from 71% to 93% and specificity from 82% to 100% ($p < 0.05$). A significantly shorter PFS was observed in patients with more than three FDG avid lesions on TEP ($p=0.001$), with a SUVmax > 6.39 g/ml ($p=0.0002$), MTV > 3.73 cm³ ($p=0.007$), TLG > 15.41 g/ml $\times$ cm³ ($p=0.001$), tMTV > 6.61 cm³ ($p=0.021$), and with tTLG > 19.71 g/ml $\times$ cm³ ($p=0.001$).

Conclusion: In addition to conventional prognostic factors, 18F-FDG PET/CT parameters may serve as effective tools for dynamic risk stratification in patients with RAIR-DTC, helping to guide personalized management strategies.

CONTRIBUTION OF PET-CT TO THE INITIAL STAGING OF PEDIATRIC HODGKIN'S LYMPHOMA

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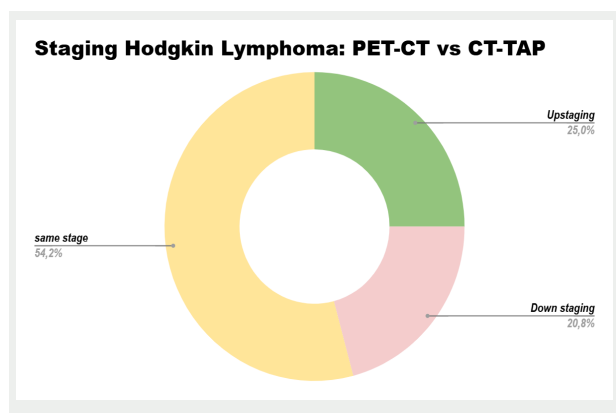
Introduction: Hodgkin lymphoma (HL) in children is rare. Due to high 18F-FDG uptake, PET-CT provides superior staging accuracy compared to CT, especially for nodal, extranodal, and bone marrow involvement.

Aim: This study compares PET and thoraco-abdomino-pelvic CT (CT-TAP) for initial staging of pediatric HL and evaluates how staging differences influence treatment decisions.

Methods: This retrospective, single-center study was conducted from January 2022 to January 2025 at the pediatric hematology department of Aziza Othmana Hospital. Pediatric patients with HL treated according to the EURONET PHL-C2 protocol.

Results: A total of 24 patients were included, CT-TAP was performed in 83.3% of cases, while all patients underwent PET-CT. PET-CT led to disease stage modification in 11 patients (45.8%). Upstaging occurred in 6 patients (25%); Four of these patients had a therapeutic escalation. In 2 cases, upstaging did not alter treatment. Downstaging occurred in 5 patients (20.8%), leading to de-escalation in 2 cases.

Conclusion: PET-CT had a significant impact on staging and treatment decisions in pediatric HL. Accurate risk stratification using PET-CT is essential to balance effective therapy with minimizing long-term toxicity.



ASSESSMENT OF MYOCARDIAL VIABILITY: GATED-SPECT VS ECHOCARDIOGRAPHY

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Introduction: Ischemic heart disease remains a major public health concern due to its high morbidity and mortality. Left ventricular dysfunction caused by myocardial ischemia is a predictor of poor prognosis. Identifying hibernating myocardium is crucial for determining the benefit of revascularisation. Gated-SPECT and [18F]FDG PET are useful tools in assessing myocardial viability.

Methods: We conducted a retrospective study involving 40 patients, comparing left ventricular ejection fraction (LVEF) and segmental wall motion analysis between two-dimensional echocardiography (TTE) and Gated-SPECT using Corridor 4DM software. Agreement between both modalities in assessing segmental abnormalities was evaluated using the Kappa index.

Results: A strong correlation was observed between both techniques for the analysis of hypokinetic ($r=0.62$) and akinetic ($r=0.7$) segments ($p<0.001$), with the strongest

agreement in the right coronary artery territory ($r=1$; $p<0.001$), followed by the left anterior descending artery ($r=0.75$; $p=0.000$) and the circumflex artery ($r=0.6$; $p<0.001$). LVEF values derived from 4DM were significantly higher (mean 49.6 ± 16.48) compared to TTE (mean 40.95 ± 12.57) with a strong correlation ($r=0.8$; $p<0.001$), suggesting a slight overestimation by Gated-SPECT.

Conclusion: Gated-SPECT proves to be a reliable method for assessing myocardial viability, offering more accurate quantification of LVEF and segmental wall motion than TTE. Its use may guide revascularisation decisions, thereby improving patient management and outcomes.

DIFFERENTIATED THYROID CARCINOMAS IN CHILDREN AND ADOLESCENTS: EVOLUTION AFTER 10 YEARS OF FOLLOW-UP

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Introduction: Differentiated thyroid carcinoma (DTC) in children under the age of 19 is rare but increasing, with a generally good prognosis. Recent research has shown an increase in mortality related to second cancers following irradiation. This study aims to assess long-term prognosis by analyzing remission, recurrence, and factors affecting survival outcomes.

Methods: This is a retrospective study including 11 patients diagnosed with DTC during childhood, and followed for at least 10 years. The analysis focused on initial management, clinical, biological, and imaging follow-up, as well as remission, recurrences, prognostic factors, and long-term complications.

Results: Eleven patients, including 10 girls and 1 boy, were included in the study. The mean age at diagnosis was 14.82 years. Among them, 8 patients had papillary carcinoma and 3 had follicular carcinoma. The mean follow-up duration was 14.91 years. Nine patients achieved complete remission, defined by an undetectable stimulated thyroglobulin level and negative imaging, and showed no recurrence after 10 years of follow-up. The average time to remission was 3 years. Two patients with pulmonary metastases did not achieve complete remission, with an incomplete or indeterminate response. Additionally, 45% of patients experienced symptoms related to high doses of levothyroxine, such as hyperthyroidism, and one patient developed a mood disorder. Overall survival analysis showed a 100% survival rate, and the majority of patients remained recurrence-free. The two patients with persistent disease have not shown any recurrence to date.

Conclusion: Pediatric DTC has a favorable prognosis, but pulmonary metastases is an unfavorable prognostic factor. Although the survival rate is excellent, reducing treatment-related morbidity is key. Long-term, careful follow-up is essential for optimal care.

CORRELATION BETWEEN PSA LEVELS AND BONE METASTASIS IN PROSTATE CANCER: A COMPREHENSIVE ANALYSIS

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Introduction: Prostate cancer (PCa) is one of the most prevalent malignancies in male pathology, and bone metastasis significantly worsens prognosis. Prostate-specific antigen (PSA) is widely used for diagnosis and monitoring, but its predictive value for bone metastasis remains debated. This study investigates the correlation between PSA levels and bone metastasis in newly diagnosed PCa patients.

Methods: This retrospective study analyzed 60 newly diagnosed PCa patients from our institute, who were evaluated between January 2024 and January 2025. Patients underwent PSA testing and bone scintigraphy using Tc-99m HMDP. Based on PSA levels (cut-off 20ng/ml), patients were categorized into two groups: Descriptive statistics, Mann-Whitney U test, Chi-square test, and logistic regression were applied to analyze the data.

Results: Of the 60 patients, 20 (33.3%) had bone metastasis, while 40 (66.7%) did not. The PSA range in metastatic patients was 27.00 to 1250.00 ng/mL, with a median of 202.5 ng/mL, while non-metastatic patients had PSA levels ranging from 3.90 to 153.00 ng/mL, with a median of 21.77 ng/mL. The Mann-Whitney U test confirmed a statistically significant difference between the two groups, with a p-value of < 0.001. Logistic regression confirmed PSA as a strong predictor of metastasis, with an odds ratio (OR) of 1.024 per ng/mL increase ($p < 0.001$). Chi-square analysis revealed a significant association between PSA ≥ 20 ng/mL and bone metastasis ($\chi^2 = 14.37$, $p < 0.001$).

Conclusion: PSA levels, particularly ≥ 20 ng/mL, are strong predictors of bone metastasis in PCa, aiding in screening and reducing unnecessary diagnostic procedures.

IMMUNE-RELATED ADVERSE EVENTS DETECTED BY 18F-FDG PET IN NSCLC PATIENTS TREATED WITH IMMUNE CHECKPOINT INHIBITORS.

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Introduction: Immune checkpoint inhibitor (ICI) therapy has revolutionized non-small cell lung cancer (NSCLC) management. However, these treatments can induce potentially constraining immune-related adverse events (irAEs). This study aims to characterize these effects using 18F-FDG PET imaging.

Methods: This retrospective study included NSCLC patients referred for therapeutic evaluation by

18F-FDG PET/CT during anti-PDL1 immunotherapy. Hypermetabolic patterns suggestive of immune-related adverse events were characterized according to type, frequency, and time of onset.

Results: The study included 21 patients (3 women, 18 men). Immunotherapy-related adverse events were identified in 8 patients (38.1%):

- Colitis was detected in 5 cases (23.8%), characterized by intense and diffuse 18F-FDG hypermetabolism in the colon, appearing on average 1 year after treatment initiation. All these patients had received chemo-immunotherapy combination.
- Thyroiditis occurred in 2 cases (9.5%) with moderate bilateral thyroid hypermetabolism, appearing within 7 months of treatment initiation.
- Synovitis was found in 1 case (4.8%) with moderate hypermetabolism around the scapulohumeral (L>R) and coxofemoral (L>R) joints, appearing within a year of treatment and persisting on several subsequent follow-up examinations.

Conclusion: In this unique Tunisian study of 21 patients, 18F-FDG PET/CT revealed that colitis predominates (23.8%) among irAEs under anti-PDL1 therapy, particularly in patients receiving chemo-immunotherapy, followed by thyroiditis (9.5%) and synovitis (4.8%). Immune-related adverse events vary under anti-PDL1 therapy. 18F-FDG PET/CT enables early detection in asymptomatic patients through characteristic hypermetabolic patterns and facilitates longitudinal monitoring to guide therapeutic adjustments necessary for optimal management.

ELEVATED TUMOR MARKERS IN COLORECTAL CANCER: DIAGNOSTIC CONTRIBUTION OF 18F-FDG PET/CT

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Introduction: Tumor markers (TMs) such as CEA and CA19-9 lack specificity for detecting colorectal cancer (CRC) recurrence. This study aims to support the integration of 18F-FDG PET/CT as an additional diagnostic tool in cases of elevated TMs.

Methods: This retrospective study included patients with treated CRC referred to our nuclear medicine department at Sahloul Hospital between November 2019 and December 2023 for 18F-FDG PET/CT due to suspected recurrence. PET/CT findings were compared to histological results and clinical-radiological follow-up.

Results: Among the 30 patients, 19 had elevated TMs. Recurrence was confirmed in 13 of them (68.4%), while six (31.6%) were disease-free. Of the latter, two had moderate CEA elevation [6–10 ng/mL], and the rest had isolated CA19-9 elevation.

Among 11 patients with normal TMs, five had recurrence detected by PET/CT.

The sensitivity (Se) and specificity (Sp) of TMs were

72.22% and 50%, respectively. Concordance between PET/CT results, TMs, and final status was observed in 63% of the cases (n=19): 13 with recurrence and six were disease-free.

In cases of elevated TMs, PET/CT showed a Se of 100% and a Sp of 83.33%, compared to 85.71% and 40% for CT. In the group with normal TM, PET/CT demonstrated a Se and Sp of 100% each.

Conclusion: Adding 18F-FDG PET/CT to the evaluation of biologically suspected recurrence of CRC improves the diagnostic reliability of TMs by enhancing sensitivity and specificity, confirming its value in this setting.

COMPARATIVE STUDY OF MANUAL VERSUS AUTOMATED 18F-FDG INJECTION IN A NUCLEAR MEDICINE DEPARTMENT

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Introduction: 18F-FDG can be administered either manually or via an automated injector such as the MEDRAD® Intego®. This study aims to compare these two injection methods in terms of dose accuracy and daily patient throughput.

Methods: A retrospective study was conducted at Sahloul Hospital (Sousse, Tunisia) over 20 days each of manual (September–December 2024) and automated injection (January–February 2025). Days involving patients under 15 were excluded. Age, weight, theoretical and actual injected doses, and imaging modality were collected from the Electronic Medical Record (DMI®). Image quality was assessed for both methods. Statistical analysis using SPSS®23 compared daily patient numbers (Shapiro-Wilk test followed by Mann-Whitney) and the accuracy of manual injection (Shapiro-Wilk followed by Wilcoxon).

Results: In the manual group, 192 patients were injected (12 days with 10 patients, 8 with 9). The automatic group included 180 patients (15 days with 9 patients, 2 with 10 and 3 with 8). The Average weight was 71.39 kg for manual and 75.42 kg for automatic. The average injected dose was 185.11 MBq (manual) and 194.2 MBq (automatic). Five imaging modalities were used; standard exams were most common (82.81% manual versus 76.67% automatic). Manual injections showed higher throughput (p=0.002) but greater dose variability between theoretical and actual doses injected (p=0.016) with deviations of +10.47% and -20%.

Conclusion: Manual injection enables higher throughput but less precision. The Intego® improves accuracy and radiation safety but involves radiopharmaceutical losses. As image quality remains comparable, the main challenge is to balance workflow efficiency, dose precision, cost, and radiation protection.

IMPACT OF 18F-FDG INJECTION AUTOMATION ON THE DOSIMETRIC EXPOSURE OF NUCLEAR MEDICINE TECHNICIANS

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Introduction: The optimization of 18F-FDG injection practices in nuclear medicine is essential to reconcile diagnostic performance and radiation protection of medical staff. While automation has marked a major advance, some operational constraints may require a temporary return to manual procedures. This study evaluates the impact of this alternation on the radiological exposure of nuclear medicine technicians.

Methods: Two four-month periods were analyzed: from January to April 2024, 18F-FDG was injected using the Intego® automatic injector; from May to August 2024, injections were performed manually. Three experienced technicians conducted the injections in both periods, each equipped with passive thermoluminescent dosimeters (TLDs) worn at chest level. Dosimetric data, including whole-body effective dose and equivalent skin dose, were provided by the National Centre for Radiation Protection and analyzed to compare radiation exposure across both methods.

Results: Radiation exposure increased significantly during manual injection. Whole-body doses increased from 0.33–0.39 mSv (automated, mean: 0.37 mSv) to 0.50–0.55 mSv (mean: 0.53 mSv), and skin doses increased from 0.34–0.36 mSv (automated, mean: 0.35 mSv) to 0.46–0.47 mSv (manual, mean: 0.46 mSv). The average whole-body dose rose by 43% and skin dose by 31%.

Conclusion: The significant increase in doses observed with manual injection reinforces the need to favor the automatic injector in order to ensure optimal radiation protection.

CLINICAL SIGNIFICANCE OF OVARIAN HYPERMETABOLISM ON 18F-FDG PET/CT: A 19-CASE STUDY

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Introduction: Incidental ovarian hypermetabolism detected on 18F-FDG PET/CT is a relatively frequent finding, yet its clinical interpretation remains challenging. This study aimed to evaluate the diagnostic significance and clinical characteristics associated with this phenomenon.

Methods: We retrospectively analyzed 19 female patients with incidental ovarian hypermetabolism identified on 18F-FDG PET/CT. Collected data included age, time since last menstruation (LMP), primary diagnosis, maximum

standardized uptake value (SUVmax), and correlation with additional imaging (ultrasound, MRI). Clinical and/or histological follow-up was used to confirm diagnosis.

Results: The mean patient age was 35.26 years (range: 15–74), with a mean LMP interval of 13.18 days. Three patients were postmenopausal or amenorrheic due to chemotherapy. The most common primary diagnosis was lymphoma (n=10), followed by gynecologic cancers (n=3). The mean SUVmax for ovarian uptake was 8.75 (range: 3.6–53). Among the 19 cases, three were malignant: one ovarian lymphoma, one germ cell tumor metastasis, and one neuroendocrine tumor metastasis. The remaining 16 were benign, corresponding to simple ovarian follicles.

Conclusion: Most cases of incidental ovarian hypermetabolism on 18F-FDG PET/CT are benign and related to physiological follicular activity. However, high SUVmax values or morphological abnormalities may indicate malignancy. A comprehensive approach considering hormonal status, menstrual cycle, and complementary imaging is essential to guide interpretation and avoid misdiagnosis.

VALUE OF 18F-FDG PET/CT IN INITIAL STAGING OF CERVICAL CANCER: A 38-PATIENT STUDY

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Introduction: 18F-FDG PET/CT is an emerging imaging modality in Tunisia, offering combined functional and anatomical assessment in malignancies. We report the first study evaluating its role in the initial staging of locally advanced cervical cancer.

Methods: We conducted a retrospective study of patients with histologically confirmed cervical cancer who underwent 18F-FDG PET/CT between November 2019 and June 2023. Only treatment-naïve patients, apart from prior conization, were included. Cases with incomplete data or death prior to treatment initiation were excluded. Initial staging before PET/CT and any subsequent changes were compared.

Results: Of 57 eligible cases, 38 were included. The mean age was 61.3 ± 13.5 years, with 34.2% aged 60–70. The primary tumor was hypermetabolic in all cases (mean SUVmax: 20.04). Compared to MRI, PET/CT identified pelvic lymph node involvement in 52.6% (vs. 42.1%) and para-aortic nodes in 15.8% (none detected by MRI). Distant metastases were revealed in 15.6% of patients. PET/CT led to a change in staging in 42.1% of cases, mostly upstaging (39.5%), due to better nodal detection.

Conclusion: 18F-FDG PET/CT significantly enhances the initial staging of cervical cancer by identifying lymph node and distant metastases not detected by conventional imaging. Its integration into the staging workflow improves treatment planning and prognostic accuracy.

IMPACT OF 18F-FDG PET/CT ON INITIAL MANAGEMENT OF LOCALLY ADVANCED CERVICAL CANCER: A 38-CASE STUDY

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Introduction: 18F-Fluorodeoxyglucose positron emission tomography combined with computed tomography (18F-FDG PET/CT) is a relatively recent imaging modality in Tunisia, offering both anatomical and metabolic tumor assessment. This study evaluates the clinical impact of 18F-FDG PET/CT on the initial therapeutic strategy in patients with locally advanced cervical cancer.

Methods: We conducted a retrospective study of 38 patients diagnosed with histologically confirmed cervical cancer, who underwent 18F-FDG PET/CT between November 2019 and June 2023. Patients who had received treatment other than conization or had incomplete records were excluded. We compared the planned initial management before PET/CT with the therapeutic adjustments made following the imaging results.

Results: Initial treatment consisted of concurrent chemoradiotherapy in 89.4% of cases and palliative chemotherapy in 10.6%. PET/CT led to changes in treatment planning in 39.4% of patients. These changes included pelvic nodal radiotherapy boost (26.3%), para-aortic nodal boost (5.2%), and field expansion to include metastatic nodules detected exclusively by PET/CT (5.2%).

Conclusion: 18F-FDG PET/CT significantly contributes to the management of locally advanced cervical cancer by refining radiotherapy planning and allowing better locoregional control. It should be considered a key imaging tool for staging and therapeutic decision-making in cervical cancer.

THERAPEUTIC VALUE OF 18F-FDG PET/CT IN STAGING AND MANAGEMENT OF MELANOMA: TUNISIAN EXPERIENCE

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Introduction: Cutaneous melanoma is the fastest-growing cancer in terms of incidence. In Tunisia, the 5-year prevalence is 0.58 per 100,000 inhabitants, with approximately 60,000 deaths reported in 2022 (WHO) [1]. Patient classification relies primarily on the assessment of metastatic spread. 18F-FDG PET/CT is a valuable tool for staging metastatic melanoma.

Methods: This was a monocentric, analytical diagnostic study conducted in the nuclear medicine department of Sahloul Hospital between December 2019 and February 2024. A total of 23 patients diagnosed with malignant melanoma underwent both conventional thoracoabdominopelvic CT (TAP CT) and 18F-FDG PET/CT for initial staging.

Results: The mean age was 60 years with a male predominance (M/F ratio: 1.3). No patient underwent

sentinel lymph node biopsy. PET/CT reclassified lymph node involvement in 6 patients (4 upstaged, 2 downstaged; sensitivity: 91.7%, specificity: 90.9%) and distant metastases in 9 patients (6 upstaged, 3 downstaged; sensitivity: 87.5%, specificity: 93.3%). These changes led to TNM/AJCC stage adjustments in 15 cases and therapeutic modifications in 11 (47.8%), including systemic therapy, radiotherapy, or lymph node dissection. Despite guidelines favoring ultrasound and sentinel node biopsy in early stages, PET/CT showed clinical value in select stage I–II patients. It was particularly effective for detecting in-transit metastases and distal skin-muscle involvement, especially in the lower limbs. Nivolumab was confirmed as indicated in 11 patients. No targeted therapy was administered despite systematic BRAF testing.

Conclusion: 18F-FDG PET/CT is a key imaging modality for initial staging of melanoma, significantly influencing staging accuracy and therapeutic decision-making. [2]

18F-FDG PET/CT IN THE DETECTION OF HEPATIC RECURRENCE OF COLORECTAL CANCER: CORRELATION WITH MORPHOLOGICAL FINDINGS

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Introduction: Hepatic recurrence marks a major prognostic turning point in patients with colorectal cancer (CRC), with a five-year survival rate under 5% if left untreated. This study aims to assess the performance of 18F-FDG PET/CT in diagnosing this type of recurrence.

Methods: We conducted a retrospective study including patients with treated CRC referred to our nuclear medicine department at Sahloul Hospital between November 2019 and December 2023 for 18F-FDG PET/CT due to suspected recurrence. PET/CT findings were compared with histological results and clinical-radiological follow-up data.

Results: Among 46 patients, hepatic involvement was confirmed in ten, totaling 36 malignant lesions, three were confirmed histologically and the rest through follow-up.

PET/CT identified 38 suspicious lesions in 11 patients. Lesion-based analysis showed 36 true positives, 35 true negatives, two false positives, and no false negatives. Sensitivity (Se) and specificity (Sp) of PET/CT were 100% and 94.6%, respectively, with positive predictive value (PPV) and negative predictive value (NPV) of 94.7% and 100%.

In comparison, conventional CT showed a Se of 75% and a Sp of 86.11%, with PPV and NPV of 84.38% and 77.5%, respectively.

Conclusion: 18F-FDG PET/CT outperforms CT in diagnosing hepatic recurrence of CRC, supporting its integration into the diagnostic workup for suspected liver involvement.

FDG PET/CT: A VALUABLE TOOL IN DIFFICULT DIAGNOSES OF INFECTIVE ENDOCARDITIS – 7 CASE REPORTS

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Introduction: Infective endocarditis (IE) is a severe condition with high morbidity and mortality. Its diagnosis remains complex, particularly in patients with prosthetic valves or cardiac devices, and in cases with inconclusive clinical and microbiological findings. The 2015 European Society of Cardiology (ESC) guidelines recognize 18F-FDG PET/CT as a major diagnostic criterion in selected cases.

Methods: A retrospective analysis was conducted on seven patients who underwent 18F-FDG PET/CT between January 2021 and November 2024 for suspected IE with non-conclusive Duke classification (Duke $\pm$ or Duke $-$). PET/CT scans were evaluated for cardiac involvement (native or prosthetic valves, pacemaker leads) and for distant septic foci. Final diagnoses were established based on clinical, imaging, and microbiological data.

Results: Among the seven patients, five had suspected prosthetic valve endocarditis (PVE) and two had suspected native valve endocarditis (NVE). 18F-FDG PET/CT was positive in five cases: periprosthetic hypermetabolism (n=3), pacemaker site infection (n=1), and native valve uptake (n=1). Two patients had additional hypermetabolic distant foci consistent with spondylodiscitis, leading to therapeutic modification. One patient with suspected NVE and another with PVE under antibiotic therapy showed negative PET/CT findings, suggesting reduced sensitivity in these contexts.

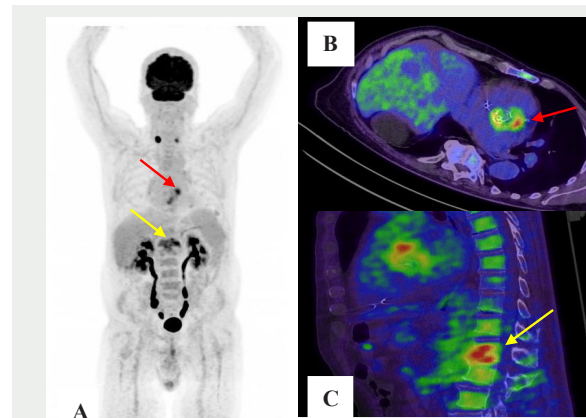


Figure. MIP image (A) and axial fused PET/CT image in lung window (B) showing heterogeneous ring-shaped periprosthetic hypermetabolism around the aortic valve (red arrow). Axial PET/CT image in bone window (C) reveals L1-L2 disco-vertebral hypermetabolism extending into the L1 vertebral body, suggestive of infectious spondylodiscitis (yellow arrow).

Conclusion: 18F-FDG PET/CT is a valuable diagnostic tool in the assessment of infective endocarditis, particularly in cases involving intracardiac devices or inconclusive clinical presentations. Its integration into the diagnostic pathway enhances accuracy and can significantly influence therapeutic decisions.

THERAPEUTIC STRATEGY IN PEDIATRIC HODGKIN'S LYMPHOMA: ROLE OF INTERIM PET-CT EVALUATION

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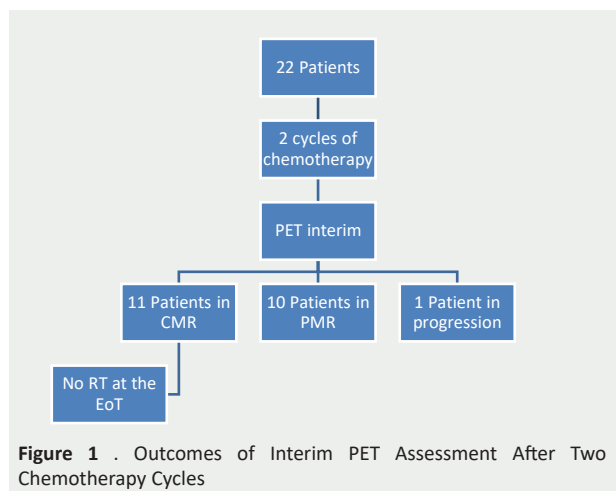
Introduction: Hodgkin's lymphoma (HL) in children is an aggressive disease with a favorable prognosis, significantly improved by recent therapeutic protocols. Positron Emission Tomography (PET) imaging enables early evaluation of treatment response, facilitating a more tailored treatment approach.

Aim: To evaluate interim PET-CT findings in pediatric HL and their impact on radiotherapy decisions.

Methods: We conducted a retrospective, monocentric study at the Pediatric Clinical Hematology Department of Aziza Othmana Hospital, Tunis, from January 2022 to January 2025. Twenty-two patients treated according to the EURONET PHL-C2 protocol were included. All underwent interim PET-CT after two OEPA cycles and end-of-treatment (EoT) evaluation after COPDAC chemotherapy.

Results: At interim PET, 11 patients achieved a complete metabolic response (CMR) and did not receive radiotherapy. Of the 10 patients with partial metabolic response (PMR), 4 achieved CMR by EoT and, along with one case of persistent inflammatory uptake, received targeted radiotherapy. The remaining 6 patients (5 with persistent PMR, 1 with progression) underwent salvage therapy and autologous stem cell transplantation, achieving CMR post-transplant.

Conclusion: Interim PET is a crucial tool in the management of pediatric Hodgkin's lymphoma, allowing for the identification of patients in CMR who can safely avoid radiotherapy (RT). This approach reduces treatment-related toxicity while preserving progression-free survival.



ONCOCYTIC ADENOMA OF THE THYROID: THE DECEIVER OF METABOLIC IMAGING

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Introduction: Oncocytic thyroid tumors are rare, comprising 3-10% of thyroid epithelial tumors. They can be benign (adenomas) or malignant (carcinomas), often mimicking malignancy on parathyroid scintigraphy with ^{99m}Tc-MIBI and on PET/CT with ¹⁸F-FDG.

Methods: presentation of clinical cases referred to our department. Case 1: A 25-year-old woman sought consultation regarding a right basicervical nodule of 3 cm. The PTH levels at 74 pg/mL suggested a parathyroid adenoma. A parathyroid scan revealed a large area of intense uptake in the lower pole of the right thyroid lobe. Case 2: A 77-year-old man with anaplastic lymphoma kinase negative underwent a PET/CT scan for extension assessment showing a hypermetabolic lesion in the thyroid with diffusely metabolically active lymph node involvement. After 8 chemotherapy cycles, lymph node involvement regressed but thyroid hypermetabolism persisted.

Results: Low levels of PTH observed in our first patient prompted to perform a thyroid scintigraphy for better diagnostic orientation. The thyroid scan showed infero-external cold nodule of the right lobe. The marked MIBI uptake in this thyroid nodule was suggestive of a malignant lesion. A right lobeisthmectomy was performed. The anatomical pathology analysis revealed an oncocytic adenoma measuring 3 cm. For the second patient, the cervical ultrasound showed an hyperechoic lesion of 35 mm with increased mixed vascularization. The patient underwent a right lobeisthmectomy. The anatomical pathology analysis reported a 3.5 cm oncocytic adenoma.

Conclusion: Recognizing oncocytic adenomas as potential benign causes of intense ^{99m}Tc MIBI and ¹⁸F-FDG uptake is crucial for accurate differential diagnosis of thyroid incidentalomas.

ROLE OF ¹⁸F-FDG PET/CT IN INITIAL STAGING OF UNDIFFERENTIATED NASOPHARYNGEAL CARCINOMA (UCNT)

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Introduction: Undifferentiated carcinoma of the nasopharynx (UCNT) is the predominant form of nasopharyngeal carcinoma (NPC) in intermediate- and high-incidence regions such as Tunisia. Management and prognosis depend closely on accurate TNM classification and disease staging.

Methods: We conducted a retrospective descriptive study from January 2020 to January 2024 including 47 patients referred for initial staging of UCNT. All patients underwent a conventional workup including nasopharyngeal MRI and/or CT, thoracoabdominopelvic

CT, and, when indicated, bone scintigraphy. TNM staging was assessed using conventional imaging and compared to 18F-FDG PET/CT findings. The impact of PET/CT on staging and therapeutic management was evaluated.

Results: T staging: 18F-FDG PET/CT provided no additional value due to its limited spatial resolution for nasopharyngeal soft tissue; MRI remained the gold standard.

N staging: PET/CT modified nodal status in 42.6% of cases (upstaging in 29.8%, downstaging in 12.8%), which is notable since lymph node biopsies are rarely performed in UCNT.

M staging: PET/CT detected distant metastases in 14.9% of patients initially classified as M0 using conventional imaging (bone, lung, distant nodes, liver). Overall, disease stage was altered in 46.8% of cases, and PET/CT led to changes in therapeutic management in 48.9%. Among these, 38.3% underwent intermodal changes (14 escalated, 4 de-escalated), and 10.6% had intramodal adaptations

Conclusion: 18F-FDG PET/CT plays a key role in UCNT staging, particularly for nodal and distant metastases, and significantly improves initial therapeutic decision-making compared to conventional imaging.

ROLE OF 18F-FDG PET/CT IN PARAGANGLIOMAS AND PHEOCHROMOCYTOMAS: A RETROSPECTIVE STUDY

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Introduction: Pheochromocytomas and paragangliomas (PPGLs) are rare neuroendocrine tumors with variable biological behavior and metastatic potential. 18F-fluorodeoxyglucose PET/CT (18F-FDG PET/CT) is an important imaging tool for assessing tumor aggressiveness and metastatic spread. However, not all PPGLs are FDG-avid, especially well-differentiated or indolent tumors.

Methods: We retrospectively reviewed eight patients with histologically or clinically confirmed PPGLs who underwent 18F-FDG PET/CT for metabolic evaluation. Lesion avidity was measured by maximum standardized uptake value (SUVmax), and the presence of metabolically active metastases was assessed.

Results: Among the eight patients, six had paragangliomas (retroperitoneal: 3; cervical: 2; pancreatic: 1) and two had adrenal pheochromocytomas. Seven out of eight patients showed high FDG uptake in the primary tumor (SUVmax range: 3.88–33.5), indicating high metabolic activity. One adrenal pheochromocytoma showed no FDG uptake but had significant uptake on 123I-MIBG scintigraphy. Two patients had metastatic lesions: one showed a hypermetabolic supraclavicular lymph node (SUVmax = 12), while the other had a non-FDG-avid suspicious peritoneal lesion.

Conclusion: 18F-FDG PET/CT is valuable for the metabolic evaluation of PPGLs, especially for detecting aggressive and metastatic forms. However, its sensitivity may be limited in well-differentiated or non-aggressive tumors. Therefore, a multimodal imaging approach, integrating other functional tracers like 123I-MIBG, is crucial for accurate prognostic stratification and optimal management of PPGL patients.

ROLE OF 18F-FDG PET/CT IN THE MANAGEMENT OF SARCOIDOSIS

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Introduction: Sarcoidosis is a multisystem granulomatous disease of unknown etiology with heterogeneous clinical manifestations. Its variable course, treatment response, and fibrotic complications pose diagnostic and therapeutic challenges. This study aims to identify the indications for and evaluate the impact of FDG PET/CT in managing sarcoidosis.

Methods: We conducted a retrospective study (September 2021 – October 2024) including 9 patients referred to our nuclear medicine department for suspected or confirmed sarcoidosis. All underwent 18F-FDG PET/CT using a standardized protocol, considering ongoing anti-inflammatory treatments.

Results: Three main indications for FDG PET/CT emerged. First, disease suspicion and biopsy guidance: two patients had inconclusive conventional tests. One had a positive PET/CT, which guided a diagnostic biopsy.

Second, evaluation of disease activity post-treatment: five patients had positive scans indicating active disease, directly impacting therapeutic decisions.

Third, staging and lesion mapping: in two patients with confirmed sarcoidosis, PET/CT revealed additional extra-thoracic sites, modifying staging.

PET-positive sites were distributed as follows: 35% mediastinal-hilar, 29% pulmonary, and 36% extra-thoracic, comprising lymph nodes (24%), bone (6%), and skin (6%).

VALIDATION OF A GC METHOD FOR DETERMINATION OF RESIDUAL SOLVENTS IN ¹⁸F-PSMA-1007 ACCORDING TO ICH

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Sisora Industry

Introduction: Residual solvents in radiopharmaceuticals must be controlled to ensure product safety and regulatory compliance. DMSO and ethanol, both Class 3 solvents, are commonly used but require precise quantification due to their impact on formulation stability. This study validates a GC method for determining residual DMSO and ethanol in ¹⁸F-PSMA-1007.

Methods: A Shimadzu GC-2010 Plus with a DB-624

capillary column and a flame ionization detector was used. The method involved helium as the mobile phase and temperature programming from 40°C to 240°C to ensure effective separation. Standard solutions of DMSO and ethanol were prepared to assess linearity, accuracy, and precision.

Results: Linearity was confirmed for ethanol (7.9–948 mg/10 mL, $R^2 = 0.9955$) and DMSO (0.494–59.4 mg/10 mL, $R^2 = 0.9974$), showing strong correlation across tested ranges. Accuracy showed excellent repeatability. RSDs for DMSO were 1.384%, 1.045%, and 2.137% at low, medium and high concentrations respectively. Ethanol RSDs were 0.561%, 0.601%, and 2.479%, confirming method accuracy. Precision was evaluated via repeated injections. For DMSO at 49.5 mg/10 mL, AUC remained consistent with RSDs of 1.03% and 0.79% over two days. Ethanol at 790 mg/10 mL also showed minimal AUC variation (RSDs 0.604% and 1.53%), confirming robustness.

Conclusion: This combined assessment confirms the GC method's suitability for accurate and reproducible quantification of residual DMSO and ethanol in ^{18}F -PSMA-1007. The results align with ICH Q2 (R2) standards, support its reliability in radiopharmaceutical quality control, and demonstrate its broader applicability in analytical settings requiring precise solvent determination.

THE VALUE OF ^{18}F -FLUORODESOXYGLUCOSE POSITRON EMISSION TOMOGRAPHY IN FOLLICULAR LYMPHOMA

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Introduction: Follicular lymphoma (FL) is high avid for ^{18}F -Fluorodeoxyglucose. But the use of positron emission tomography (PET) in this type of lymphoma remains controversial. The aim was to assess the contribution of PET to the initial work-up, evaluation and in the prognosis.

Methods: We conducted a retrospective study including patients treated for grade 1, 2 or 3a FL who had undergone at least one PET scan during their care in the clinical haematology department of Aziza Othmana Hospital between January 2019 and december 2023.

Results: Eight patients underwent at least one PET scan, including six during the extension work-up. PET allowed upstaging in one patient, reclassifying a stage III into an osteomedullary, muscular and peritoneal stage IV. In four cases, additional lymph node areas were detected. PET scans identified bone marrow infiltration in two of the three confirmed cases. Seven patients received immunochemotherapy. At intermediate evaluation by computed tomography (CT), three patients had a complete response (CR), including two with a complete metabolic response on PET, three with uncertain CR and one with a complete metabolic response on CT. At final evaluation, PET showed a complete metabolic response in 4 cases, three of which had uncertain CR at final CT.

No relapses were observed at follow-up. One patient progressed after treatment abstention and was awaiting management.

Conclusion: PET is a modern imaging that improves initial staging and guides treatment strategy. However, its use in evaluation has no therapeutic impact. Larger studies are needed to establish a correlation between PET results and patient survival.