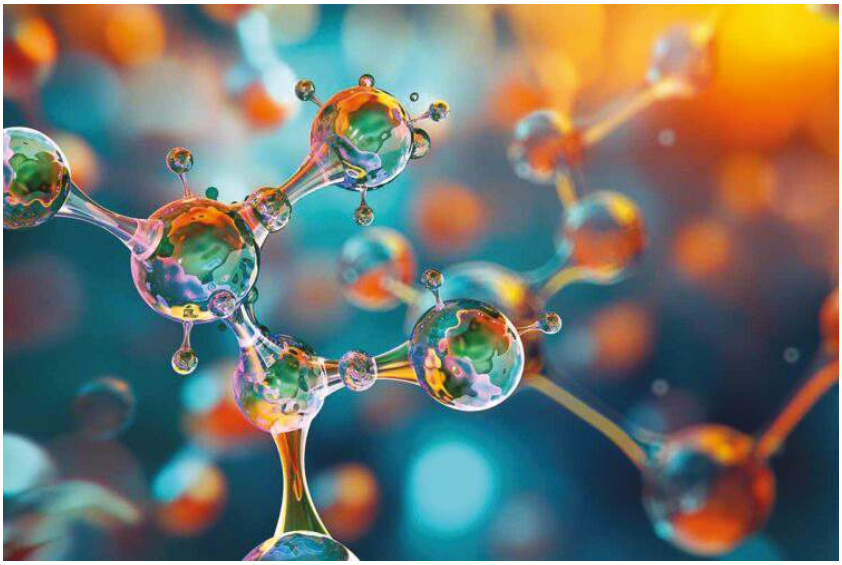
INTERNATIONAL SYMPOSIUM ON NUCLEAR MEDICINE THERANOSTICS

Novi Sad March 27th, 2026



Organizers:
Faculty of Medicine, University of Novi Sad
Academy of Medical Sciences of the Serbian Medical Society

ABSTRACT BOOK

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Editor: Prof. Jasna Mihailović

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Dear guests,

On behalf of the Organizing Committee, it is my great pleasure to welcome you to Novi Sad and to the International Symposium on Nuclear Medicine Theranostics.

The program highlights recent advances in nuclear medicine, integrating diagnostic imaging and therapeutic applications with a special focus on theranostics. This combined approach continues to transform clinical practice and expand possibilities for personalized patient care.

We are honored to host distinguished invited speakers — leading experts who will present state-of-the-art lectures as well as their latest research and clinical experiences.

In addition to these presentations, the Symposium offers an excellent opportunity for participants to share work, exchange ideas, and learn from one another. Through this meeting, we aim to review the current state of nuclear medicine, including general nuclear medicine, metabolic imaging, and therapy, and to discuss future challenges and directions in this rapidly developing field.

Scientific meetings are not only about learning new facts and technologies but also about bringing people together. They allow us to meet colleagues from different countries, build new friendships and professional contacts, strengthen collaborations, and gain fresh perspectives that inspire future research and clinical practice.

We wish you a warm welcome to Novi Sad, a pleasant stay, and a memorable and enriching scientific experience..

Sincerely Yours,
Prof. Jasna Mihailovic
President, Organizing Committee

Mihailović Jasna

CONTENT

INVITED LECTURES

Invited Lecture

SPECT/CT FOR ASSESSMENT OF AXILLARY LYMPH NODE STATUS IN BREAST CANCER AFTER NEOADJUVANT THERAPY: SENTINEL LN BIOPSY & MARI TECHNIQUE

Pavel Krzhivitskiy[1], Sergey Novikov[1], Sergey Kanaev[1], Alexander Emelyanov[2], Petr Krivorotko[2]

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Introduction: In patients with triple negative and HER2 positive breast cancer, modern neoadjuvant systemic treatment (NACT) is associated with a 40-70% rate of pathological complete response and improved prognosis. It has been proposed that, in patients with limited lymph node involvement (N1), assessment of axillary lymph node status can shift from the more invasive axillary lymph node dissection (ALND) to a less traumatic targeted axillary procedure (TAD). Targeted axillary dissection (TAD) involves removal of metastatic lymph nodes, which are marked prior to neoadjuvant chemotherapy, in addition to sentinel lymph node biopsy (SLNB). Marking techniques for lymph nodes often include placement of radioactive iodine-125 seeds (MARI procedure), but this technique is not widely available. In this study, we evaluate the role of SPECT/CT imaging with ^{99m}Tc-MIBI and ^{99m}Tc-colloids for assessment of lymph node status as an alternative approach, which we refer to as targeted sentinel lymph node biopsy. Aim: The aim of our study was to evaluate a combined SPECT/CT approach (SPECT/CT with ^{99m}Tc-MIBI before NACT and SPECT/CT with ^{99m}Tc-colloids before surgery) in assessing lymph node status in patients with node-positive breast cancer after NACT. Materials and Methods: Twenty-four breast cancer patients (aged 40-65 years) with biopsy-proven, clinically staged T1–3, N1+, M0 disease were enrolled. All patients first underwent SPECT/CT examination with ^{99m}Tc-MIBI, which precisely localized metastatic lymph nodes in the axillary region in all cases. Patients then received standard systemic neoadjuvant treatment according to guidelines over a period of 6 months. Following NACT, and prior to surgery, all patients underwent a second SPECT/CT imaging for sentinel lymph nodes (SLNs) using ^{99m}Tc-colloids. All regional lymph nodes with radiocolloid uptake were considered sentinel lymph nodes. The number and topography of SLNs were analyzed on these SPECT/CT images. The primary objective was to match the localization of SLNs identified by SPECT/CT with ^{99m}Tc-colloids after

NACT with the location of metastatic lymph nodes detected by SPECT/CT with ^{99m}Tc-MIBI before NACT. Results: Sentinel lymph nodes were visualized in all patients after NACT. In 19 patients (79%), SPECT/CT identified 1-2 SLNs, while 5 patients (21%) had 3-5 SLNs. A discordance in the topography between metastatic LNs visualized by SPECT/CT with ^{99m}Tc-MIBI and SLNs by ^{99m}Tc-colloids was found in 6 patients (25%). In the remaining 18 patients (75%), there was convergence in the localization of post-NACT SLNs and pre-NACT metastatic. neoadjuvant chemotherapy. In patients with convergence in the localization of metastatic LNs (SPECT/CT with ^{99m}Tc-MIBI) and sentinel lymph nodes (SPECT/CT with Tc-99m colloids), sentinel lymph node biopsy can be used instead of MARI. Discordant localization of metastatic and sentinel lymph nodes should be considered an indication for lymph node dissection.

Keywords: SPECT/CT, Sentinel Lymph Node, Biopsy

Invited Lecture

BONE SCINTIGRAPHY IN OSTEOSARCOMA

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Bone scintigraphy is a very sensitive nuclear medicine imaging that plays a key role in the accurate diagnosis and precise staging of osteosarcoma. That is crucial for optimal treatment planning and prognosis. Osteosarcoma is the most common primary malignant bone tumor and is an aggressive mesenchymal neoplasm producing osteoid. Osteosarcoma occurs most frequently at the metaphyseal ends of long bones, such as the distal femur, proximal tibia, and proximal humerus. The most common site of metastases is the lungs, with early pulmonary involvement usually asymptomatic. Bone scintigraphy and hybrid SPECT/CT method enable evaluation of the whole-body, as well as detection of multifocal disease and distant skeletal metastases (3). The sensitivity rate of planar skeletal scintigraphy falls within the range of 70% and 90%; Nevertheless, with supplemental imaging SPECT and SPECT/CT, the sensitivity rate may be as high as 95%. Although the sensitivity is very high, due to its ability to identify increased osteoblastic activity the specificity is limited due to nonmalignant conditions such as healing fractures, infections, inflammatory changes, degenerative changes, or other benign bone tumors.

Key words: Osteosarcoma, Bone Scintigraphy, SPECT/CT

Invited Lecture

HOW TO CONFIRM THE DIAGNOSIS OF CARDIAC AMYLOIDOSIS USING THE NUCLEAR MEDICINE METHOD? RELIABILITY, DILEMMAS, AND PITFALLS

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Cardiac amyloidosis (CA) can be caused by various different protein deposits in extracellular space of heart muscle, but transthyretin amyloidosis (ATTR) and immunoglobulin light chain (AL) are the most frequent pathologies. Both pathologies are life-threatening diseases and early diagnosis is important, still challenging. In addition to clinical symptoms and signs, nuclear medicine plays important role in diagnosis of ATTR type of CA. The main aim of this review is to present state-of-art molecular bases and role of nuclear medicine in ATTR-CA as an important diagnostic tool in multimodality imaging approach in diagnosis and differential diagnosis of CA. It is based on literature review and our nine years of experience in CA imaging. The summary of different gamma and positron emitted radiopharmaceuticals for CA imaging will be presented. Special focus will be on hybrid SPECT/CT imaging and quantification of radiopharmaceutical accumulation presenting possible amyloidal burden in the extracellular space of heart muscle. Causes of false positive and false negative results will be discussed and possibilities to overcome them. Our Illustrative cases will be also presented in the context of reliability, dilemmas and pitfalls in the interpretation results. Regarding new therapies, the ability to track and follow up changes in the amyloidal burden over time is of great importance. Future research could be focused on improved quantification, precision and standardization of methods through use of artificial intelligence in the detection of changes earlier in the course of treatment.

Keywords: Cardiac Amyloidosis, Scintigraphy, Pitfalls

Invited Lecture

THE ROLE OF VENTILATION/PERFUSION TOMOGRAPHY - V/P SPECT IN DETECTION OF CARDIOPULMONARY DISEASES

Amela Begić

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The objective: Pulmonary embolism (PE) can only be diagnosed with imaging techniques, which in practice include ventilation/perfusion scintigraphy (V/P scintigraphy) or multi-detector computed tomography of the pulmonary arteries (MDCT). V/P scintigraphy for the diagnosis of PE is universally available, but imaging protocols and interpretative strategies vary widely. Unfortunately, the large Prospective Investigation of Pulmonary Embolism Diagnosis (PIOPED I) showed a high rate of non-diagnostic examinations (65%) due to a non-standardized method and confusing, probabilistic interpretation criteria that were difficult for clinicians to interpret. Bajc et al. validated ventilation/ perfusion single-photon emission computed tomography (V/P SPECT) for the diagnosis of PE in pigs and demonstrated its superior value over V/P planar imaging. Clinical studies showed results similar to those validated in pigs by many authors (Bajc et al., Reinartz et al., Gutte et al., Quirice et al.). The latest study by Gruning et al. also confirmed high sensitivity of V/P SPECT at 95.7%, specificity at 98.6%, positive predictive value at 95.7%, and negative predictive value at 98.6% across about 2000 examinations. V/P SPECT images have also been shown to be superior to CT. The PIOPED II study showed that MDCT had a sensitivity of only 78% for PE and a high false-positive rate (45%) in patients with low clinical probability. The strength of V/P SPECT lies in its new interpretation criteria, which provide clinicians with a clear answer regarding PE. To be clinically useful, the interpretation of an imaging test should be affirmative or negative with respect to PE (PE: yes or no) and should not be based on probability categories. The European Nuclear Medicine Guidelines recommend V/P SPECT as the first-choice method for diagnosing and following up PE, due to its high negative predictive value, high sensitivity and specificity, feasibility in almost all patients, and low radiation exposure. Results and conclusion: V/P SPECT also allows quantification of the PE extent, which might be used to personalize treatment, such as outpatient and inpatient treatment. Furthermore, Begic et al. showed that significant resolution of mismatched perfusion defects occurred between V/P SPECT controls within the first 3 months of anticoagulation ($p < 0.001$) but not thereafter. It is therefore recommended that V/P SPECT follow-up should be considered at 3 months

after diagnosis. The authors recently reported that tailoring anticoagulant treatment is feasible by incorporating V/P SPECT in the clinical decision tree. The latest study by Begic et al. shows a high prevalence of other cardiopulmonary diseases among patients suspected of PE that might be identified by V/P SPECT. V/P SPECT additional findings can clarify patients' symptoms and might have an impact on treatment. The result of V/P SPECT findings had an influence on the treatment of patients with pneumonia, COPD, and newly diagnosed patients with left heart failure.

Keywords: Ventilation/Perfusion SPECT, Cardiopulmonary, Disease

Invited Lecture

SENSITIVITY, SPECIFICITY AND OVERALL ACCURACY OF ^{99m}Tc-MIBI SCINTIGRAPHY IN DETECTION OF THYROID MALIGNANCY

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Purpose: The purpose of this study was to estimate the diagnostic value of ^{99m}Tc-MIBI scintigraphy in patients operated due to findings on pertechnetate and MIBI scans, by comparing them with histopathological findings. Material and Methods: A total of 81 consecutive patients operated due to presence of thyroid nodules which were found "cold" on pertechnetate scan were included in the study. ^{99m}Tc-MIBI scintigraphy was performed two to five weeks following pertechnetate scan in all patients. Scans were reported as either negative or positive depending on the uptake of ^{99m}Tc-MIBI in thyroid nodules, compared with that in the normal surrounding thyroid tissue, and a score between 1 and 3 was assigned to each finding as follows: 1, absent or decreased uptake (negative); 2, equal (indeterminate); 3, higher or intense uptake (positive). Results: Histopathologic diagnosis revealed 44 patients (54%) with benign thyroid lesions and 37 (46%) with differentiated thyroid carcinomas (DTC). The sensitivity of ^{99m}Tc-MIBI scan was 89.2% (for the score 3) and specificity was found to be 81.8%. Negative predictive value of ^{99m}Tc-MIBI scan was 90%, positive predictive value 80.5% and overall accuracy 85.2%. Conclusions: Absent or decreased MIBI uptake in thyroid nodule in a high percentage excludes malignancy in thyroid nodule, while higher uptake strongly suggests the presence of a malignancy. In combination with pertechnetate scan, clinical and laboratory findings, ^{99m}Tc-MIBI scan could be helpful in preoperative assessment of thyroid nodules.

Keywords: MIBI, Cold Nodules, Thyroid Malignancy

Invited Lecture

THE ROLE OF NUCLEAR MEDICINE IMAGING IN ASSESSMENT OF PROSTATE CANCER DISSEMINATION

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Proper staging of prostate cancer at initial diagnosis but also at biochemical recurrence after previous curative-intent therapy, is important to determine prognosis and making optimal treatment strategy. The most frequent sites of distant metastases are lymph nodes outside the pelvis and bone with metastases in different visceral organs. Conventional imaging like bone scintigraphy (^{99m}Tc-phosphonate), is recommended in patients with intermediate or high-risk prostate cancer patients to evaluate the extent of extra-prostatic disease, however, these modalities have limited sensitivity and specificity, lowering their ability to accurately quantify the true extent of disease, especially at low PSA-levels or in the setting of limited volume (oligometastatic disease). Especially evaluation of response to treatment with a bone scan is also challenging because of the flare-up effect that can occur up to 12 weeks after the beginning of treatment. Bone scintigraphy can only distinguishes "progression/non-progression" or "presence of new lesion or absence" without the possibility of early identification of "response/non-response." Bone progression by bone scintigraphy is defined as the occurrence of at least two new lesions. ^{68}Ga-PSMA (especially PSMA-11) is the most widely used and prominent ^{68}Ga-labelled PSMA radioligand in clinical practice and has a high diagnostic accuracy. Although the higher sensitivity and spatial resolution of PET technology compared to single photon emission computed tomography (SPECT) technology has made PET more applicable than SPECT, but the higher cost of PET imaging makes it difficult for using it in routine clinical practice. Therefore, ^{99m}Tc-PSMA SPECT/CT may provide more options in the staging of prostate cancer, especially when ^{68}Ga-PSMA PET/CT is not yet widely available..

Keywords: Prostate Cancer, Imaging Tehniques, Nuclear Medicine

Invited Lecture

ROLE OF PET/CT IN THE MULTIDISCIPLINARY MANAGEMENT OF LUNG CANCER

Sabina Dizdarevic

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[18F]-FDG PET/CT has become a cornerstone of lung cancer management, providing complementary metabolic and anatomical information that directly informs multidisciplinary decisionmaking. Its integration into diagnostic and treatment pathways has significantly improved staging accuracy, treatment selection, and overall patient care. PET/CT enhances diagnostic confidence by characterising solitary pulmonary lesion, and structured tools such as the Herder model support risk stratification and multidisciplinary team (MDT) discussion. PET/CT also identifies nodal and distant metastases that may be underestimated on CT alone, ensuring more accurate staging. In earlystage disease, PET/CT refines operability assessments, guides nodal sampling strategies, and reduces unnecessary thoracotomies. In locally advanced disease, it informs suitability for multimodality therapy, including chemoradiotherapy and consolidation immunotherapy. PET/CT also plays a key role in evaluating treatment response, detecting progression, and identifying oligometastatic disease where local ablative therapies may be considered. FDG PET/CT is central to planning stereotactic ablative radiotherapy (SABR) for earlystage nonsmall cell lung cancer (NSLC), particularly in medically inoperable patients. The evolving role of FDG PET/CT in small cell lung cancer (SCLC) will also be discussed, including its contribution to staging, treatment planning, and prognostic assessment. Beyond staging, PET/CT supports the evaluation of synchronous malignancies, paraneoplastic processes, and palliative planning, where metabolic information can guide symptomfocused interventions. The value of PET/CT is maximised within a multidisciplinary framework, where nuclear medicine physicians, radiologists, oncologists, surgeons, and respiratory specialists interpret findings collaboratively. This integrated approach ensures that metabolic patterns are contextualised with clinical, pathological, and anatomical information, enabling more accurate and individualised decisions.

Keywords: FDG PET/CT, Lung Cancer, Multidisciplinary Team Decision-Making

Invited Lecture

PET/CT IMAGING IN NEUROENDOCRINE TUMOURS

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SSTR imaging uses radiolabelled SSA tracers derived from the synthetic octapeptide octreotide. SSTR radiotracers have the highest in vitro affinity for SSTR2, the receptor subtype most expressed in NETs. The development of ^{68}Ga-labelled SSTR PET tracers was a major advance in the evaluation of NETs. Compared with ^{111}In-DTPA-octreotide, the SSTR2 affinity of ^{68}Ga DOTATOC and ^{68}Ga DOTATATE is about 10-fold and 100-fold higher, respectively. ^{68}Ga has a convenient half-life of 68 minutes, allowing imaging to be completed within 2–3 hours of tracer administration. SSTR imaging is central to diagnosing and following up patients with NETs and should be included in staging, surgical planning, and restaging. It also helps identify patients who may be candidates for peptide receptor radionuclide therapy (PRRT). ^{18}FDG is routinely used as a PET tracer for many tumour types but has limited sensitivity in NETs because of their low metabolism. High-grade NETs are more likely to be detected by FDG-PET. A positive FDG-PET suggests a more aggressive tumour subtype. FDG-PET/CT is often useful with SSTR imaging to identify tumour heterogeneity, such as SSTR-positive/FDG-negative and SSTR-negative/FDG-positive lesions, indicating discordant disease. Dual tracer imaging results may help guide patient management. The presentation will discuss the role of PET/CT imaging in NETs, including clinical applications, normal variants, advantages, limitations, and pitfalls.

Keywords: PET/CT, Imaging, NET

Invited Lecture

PET MOLECULAR IMAGING IN ALZHEIMER'S DISEASE

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Positron Emission Tomography (PET) imaging biomarkers have become essential tools in both the understanding and diagnosis of neurodegenerative disorders. PET imaging enables the quantification of molecular targets in vivo with a high degree of sensitivity, which is instrumental in examining disease pathophysiology and monitoring progression from early, preclinical stages. Through the visualisation of specific molecular pathologies, PET biomarkers have supported a transition from symptom-based definitions to those grounded in biological evidence for neurodegenerative diseases. This advancement allows for earlier and more precise detection and diagnosis, carrying important implications for the development and assessment of novel therapies intended to modify the course of Alzheimer´s disease. This presentation will detail the standards for PET imaging in the evaluation of neurodegenerative disorders. The discussion will encompass PET molecular imaging of amyloid-β plaques and tau pathology, as well as the impact of neurodegeneration on synaptic activity across various disorders. Special focus will be placed on the methods used, interpreting images, identifying normal findings, and determining when molecular neuroimaging can best support clinical management of Alzheimer's disease.

Keywords: Positron Emission Tomography, Biomarkers, Alzheimer's Disease

Invited Lecture

[^{18}F]-FDG PET/CT IN CARCINOMA OF UNKNOWN PRIMARY

Raluca Mititelu

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Background: Carcinoma of unknown primary (CUP) is a heterogeneous group of metastatic malignancies in which the primary tumor cannot be identified despite complete and extensive diagnostic evaluation. CUP is associated with aggressive clinical behavior and poor prognosis. Although advances in histopathology, immunohistochemistry, and molecular profiling have reduced its incidence, the primary site remains undetected in a significant proportion of patients. Molecular imaging has emerged as a critical component in the diagnostic work-up of CUP, with the potential to improve tumor localization, guide management, and refine prognostic assessment. Objectives: This presentation aims to review the role of molecular imaging - particularly positron emission tomography/computed tomography (PET/CT) - in the management of patients with CUP, with emphasis on [^{18}F]-FDG PET/CT and emerging radiotracers. Methods: A narrative review of published data, including meta-analyses, retrospective studies, and guideline recommendations, was performed, focusing on the diagnostic performance and clinical impact of PET-based imaging in CUP. Selected illustrative clinical cases from our clinic were included to highlight the practical application of [^{18}F]-FDG PET/CT in different metastatic patterns. Results: [^{18}F]-FDG PET/CT demonstrates superior diagnostic performance compared with conventional imaging modalities, with reported primary tumor detection rates generally exceeding 30% and leading to changes in clinical management in approximately one-third of patients. Detection rates vary according to histological subtype, with lower sensitivity in squamous cell carcinoma compared to adenocarcinoma. PET/CT also provides valuable information on disease extent, enabling treatment stratification and prognostic evaluation. Emerging techniques, such as PET/MRI, show comparable or improved diagnostic accuracy in selected studies, although availability remains limited. Novel radiotracers further expand diagnostic possibilities: ^{68}Ga-DOTATATE and ^{18}F-DOPA may have an important role in neuroendocrine tumors of unknown primary, while and ^{68}Ga-FAPI PET/CT demonstrate promising results, particularly in FDG-negative or equivocal cases. Conclusions: CUP should be regarded as a distinct oncological entity rather than a simple metastatic stage of known primary cancers. Molecular imaging, especially PET-based techniques using a variety of radiotracers, plays a pivotal

role in the diagnostic and therapeutic management of CUP. Incorporation of advanced molecular imaging early in the diagnostic pathway can improve primary tumor detection, influence clinical decision-making, and potentially optimize patient outcomes. Further prospective studies and harmonization of international guidelines are needed to define optimal imaging strategies in this complex disease.

Keywords: [^{18}F]-FDG PET/CT, Carcinoma, Unknown Primary

Invited Lecture

^{18}F-mFBG PET IMAGING IN PATIENTS WITH NEUROBLASTOMA

Alexander V. Filimonov, Akgul A. Odzharova

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^{123}I-meta-iodobenzylguanidine (^{123}I-mIBG) is used for imaging of neuroblastomas and paragangliomas/pheochromocytomas with high specificity and sensitivity. Imaging with ^{123}I-mIBG has some limitations, such as nonspecific uptake and relatively low spatial resolution of SPECT, which can be overcome with the use of a PET agent. A new PET-tracer, ^{18}F-metafluorobenzylguanidine (^{18}F-mFBG), is a ^{18}F-labeled analog of benzylguanidine, substrate of the human norepinephrine transporter (NET-1), that can enable single-day, high-resolution quantitative imaging. Diagnostic efficacy of ^{18}F-mFBG PET/CT was comparable to that of ^{123}I-MIBG scintigraphy, and additional metastatic tumors were identified, leading to a change in therapy. The pharmacokinetics of tracer allowed imaging within 1 hour after intravenous administration. The results of this study demonstrate feasibility of ^{18}F-mFBG PET/CT for imaging of neuroendocrine tumors. Further studies are needed to confirm effectiveness, develop evaluation criteria, and explore the potential of this radiopharmaceutical for theranostic applications.

Keywords: PET/CT, ^{18}F-metafluorobenzylguanidine, Neuroendocrine Tumors

Invited Lecture

TRANSFORMING PROSTATE CANCER CARE: THE ROLE OF ^{68}Ga-PSMA PET/CT IN CLINICAL PRACTICE

Teodor Sofiyanski

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Prostate cancer remains one of the most common malignancies among men worldwide. Accurate staging and early detection of recurrence are critical for optimal patient management. Prostate-specific membrane antigen (PSMA) is a transmembrane glycoprotein that is overexpressed in prostate cancer cells and is an ideal molecular target in nuclear medicine. The advent of ^{68}Ga-PSMA PET/CT has revolutionized prostate cancer imaging. This method offers superior sensitivity and specificity compared to other imaging modalities. ^{68}Ga-PSMA PET/CT enables precise localization of primary tumors, nodal involvement, and distant metastases, even at low prostate-specific antigen (PSA) levels. This high diagnostic accuracy has a significant impact on clinical decision-making. It helps guide surgical planning, radiotherapy targeting, and systemic therapy selection. Furthermore, PSMA imaging plays a crucial role in the theranostic paradigm. It serves as a gateway to targeted radionuclide therapy using PSMA-labelled agents such as ^{177}Lu-PSMA. Its ability to identify patients suitable for PSMA-based radionuclide therapy exemplifies how diagnosis and treatment are integrated in modern nuclear medicine. In conclusion, ^{68}Ga-PSMA PET/CT is a cornerstone in prostate cancer management. It enables personalized therapy and improves clinical outcomes. Its growing clinical adoption highlights the evolving role of nuclear medicine in precision oncology.

Keywords: Prostate Cancer, ^{68}Ga-PSMA PET/CT, Theranostics

Invited Lecture

CURRENT STATUS AND FUTURE PERSPECTIVES OF PEPTIDE RECEPTOR RADIONUCLIDE THERAPY IN NET

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Theranostics of neuroendocrine tumors (NETs) is a personalized approach in which the same molecular target (SSTR) is used first for imaging and then for selective radionuclide therapy. PET/CT with ^{68}Ga DOTATATE shows high sensitivity and specificity in detecting primary NETs and metastases, especially extrahepatic lesions, and has become the standard modality for imaging SSTRpositive tumors. The therapeutic component is based on peptide receptor radionuclide therapy with ^{177}Lu DOTA-TATE and other analogs, providing targeted delivery of βradiation to tumor cells while sparing surrounding tissues. The presentation will address: 1) Indications and contraindications. Clinical selection includes welldifferentiated SSTRpositive NETs with progression on standard therapy; key limitations are severe renal and bone marrow impairment and low SSTR expression on PET; 2) Diagnostic evaluation of radionuclide therapy. PET/CT with ^{68}Ga DOTATATE before treatment is used for patient stratification and dose planning, while followup scans and CT/MRI are applied to assess response and for longterm monitoring; 3) Future directions. Topics include alphatherapy, combinations with targeted agents and immunotherapy, dose escalation and retreatment courses of PRRT, and new radioligand conjugates with improved affinity for SSTR; 4) Complications of radionuclide therapy. The focus will be on delayed hematologic toxicity, cumulative nephrotoxicity risk.

Keywords: Theranostic, PET/CT, Neuroendocrine Tumors

Invited Lecture

TANDEM RLT: REDEFINING RADIOLIGAND THERAPY BOUNDARIES

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Background: Radioligand therapy (RLT) has emerged as an effective treatment for advanced malignancies, particularly metastatic castration-resistant prostate cancer (mCRPC) and neuroendocrine tumors (NETs). Despite the success of β-emitting radioligands such as ^{177}Lu-based therapies, a subset of patients demonstrates primary resistance or eventual disease progression. Tumor heterogeneity, micrometastatic disease, and limited radiation dose delivery at the cellular level remain major challenges. Tandem RLT, combining β-, α-, and Auger-electron–emitting radionuclides, represents a novel strategy to address these limitations. Methods: This presentation reviews the biological rationale, clinical feasibility, and early outcomes of tandem and multi-tandem radioligand therapy using combinations of ^{177}Lu, ^{161}Tb, ^{225}Ac, across PSMA-, somatostatin receptor-, and fibroblast activation protein inhibitor (FAPI)–targeted platforms. The complementary physical properties of these radionuclides—ranging from millimeter-scale β-particle penetration to high-linear-energy-transfer α-particles and ultra-short-range Auger electrons—enable simultaneous targeting of bulky disease, treatment-resistant clones, and micrometastases. Results: Clinical case series demonstrate significant biochemical responses, partial radiologic responses, improved performance status, and durable symptom control in heavily pretreated patients with mCRPC, NETs, and selected solid tumors. Tandem regimens incorporating ^{161}Tb enhanced micrometastatic targeting, while α-emitters such as ^{225}Ac contributed to effective control of resistant disease. Toxicity was acceptable and manageable, with no unexpected safety signals observed. Conclusion: Tandem radioligand therapy redefines current RLT boundaries by integrating complementary radionuclide mechanisms into a single precision-medicine framework. This approach shows promise for overcoming resistance, improving disease control, and expanding theragnostic applications, warranting further prospective evaluation.

Keywords: Tandem Radioligands, Therapy, Theragnostics

Invited Lecture

ASPECTS OF THE PROBLEM OF CLINICAL TRIALS OF MODERN TARGETED RADIOPHARMACEUTICALS - RUSSIAN EXPERIENCE

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According to the results of our study, the authors' point of view on the problem of testing of radiopharmaceutical medicaments, is reflected, taking into account the active modern development of nuclear medicine. In the context, the issues of the structural characteristics of targeted radiopharmaceutical medicaments (RPM) are considered from their development to the organization of clinical trials in Russia and abroad. The characters of the fact that targeted ligands delivering active diagnostic and therapeutic isotopes to tumor cells do not have a biological effect by themselves, and the main active pharmaceutical ingredient, radionuclide, is used in the range of radiation doses allowed for diagnosis and therapy. In this context, the absence of the necessity for the first phase of clinical trials and simplification of the design of the second and the third phases is justified for diagnostic RPM. Approaches to clinical research of therapeutic RPMs are considered separately, taking into account the known pre-clinical and clinical results of their effectiveness and radiation safety. The detection effectiveness of tumors and metastases are presented using various diagnostic RFLP by SPECT/CT and PET/CT methods, at which point we pay attention to the characters of carrying out clinical trials in cancer medicine of RPM with high-energy and the most promising α-radionuclides.

Keywords: Targeted Radiopharmaceuticals; Theranostics; Nuclear Medicine

Invited Lecture

^{225}Ac-PSMA AND ^{177}Lu-PSMA: COMPARISON OF CAPABILITES AND DISADVANTAGES: CURRENT STATUS AND FUTURE PERSPECTIVES OF PEPTIDE RECEPTOR RADIONUCLIDE THERAPY

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Radioligand therapy (RLT) using ^{177}Lu-PSMA and ^{225}Ac-PSMA has demonstrated high efficacy in the treatment of patients with metastatic castration-resistant prostate cancer (mCRPC). ^{177}Lu-PSMA has been used for RLT since 2014. Numerous studies have been conducted, including the Phase III clinical trial ^{177}Lu-PSMA-617 (Pluvicto). ^{225}Ac-PSMA was introduced later (since 2016). Its efficacy has been demonstrated even in patients who experienced disease progression after ^{177}Lu-PSMA therapy. However, data on its efficacy to date are limited to Phase II clinical trials and retrospective studies. The advisability of using ^{225}Ac-PSMA as a first-line radiation therapy is a subject of debate and research. Each drug has its advantages and disadvantages. Advantages of ^{225}Ac-PSMA: Based on physical data, the alpha emitter ^{225}Ac has a more pronounced cytotoxic effect than the beta emitter ^{177}Lu. The shorter range of alpha particles causes less damage to the red bone marrow, making ^{225}Ac-PSMA less myelotoxic than ^{177}Lu-PSMA. Disadvantages of ^{225}Ac-PSMA: Severe damage to the salivary and lacrimal glands. Its high cost hinders its widespread use compared to ^{177}Lu-PSMA. The advantages of ^{177}Lu-PSMA include lower cost, greater availability, and a larger number of studies than ^{225}Ac-PSMA. Its effects on the salivary and lacrimal glands are also less pronounced. ^{225}Ac-PSMA therapy provides a more pronounced reduction in PSA levels than ^{177}Lu-PSMA. However, overall survival issues require further study. Currently, there are no comparative randomized trials analyzing the effectiveness of ^{177}Lu-PSMA and ^{225}Ac-PSMA therapy, including first-line

RLT. Such studies are urgently needed. One such study is currently underway at the Medical Radiological Research Center.

Keywords: Metastatic Castration-Resistant Prostate Cancer (mCRPC) Radioligand Therapy, ^{177}Lu-PSMA, ^{225}Ac-PSMA

Invited Lecture

NAVIGATING PITFALLS OF FAPI PET/CT INTERPRETATION AND INSIGHTS INTO FAPI THERANOSTICS

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Background: Fibroblast activation protein (FAP)–targeted PET/CT has rapidly gained attention as a promising molecular imaging modality due to its high tumor-to-background contrast across a wide range of malignancies. With increasing clinical use, however, several interpretative challenges have become apparent, particularly related to non-malignant FAP expression. This presentation aims to address the major pitfalls in FAPI PET/CT interpretation, with a specific focus on non-malignant causes of tracer uptake, and to place these challenges within the broader context of the evolving role of FAPI in theranostics. Methods: Drawing on our institutional experience at King Hussein Cancer Center (KHCC), Amman, Jordan, supported by relevant peer-reviewed publications, we will present illustrative clinical cases highlighting physiological uptake patterns and benign conditions associated with increased FAPI uptake, including inflammation, fibrosis, wound healing, degenerative musculoskeletal disease, and post-treatment changes. Practical imaging and clinical correlation strategies for distinguishing benign from malignant uptake will be emphasized. Results: Recognition of these uptake patterns enhances diagnostic confidence and prevents misinterpretation, thereby adding incremental clinical value to FAPI PET/CT rather than limiting its utility. Awareness of common pitfalls supports appropriate patient management and reinforces the complementary role of FAPI PET/CT alongside established tracers. The presentation will also provide insights into the emerging field of FAPI-based radionuclide therapy, discussing biological rationale, early clinical experience, and key challenges such as patient selection and dosimetry. Conclusion: A structured understanding of FAPI PET/CT pitfalls, informed by real-world experience and published evidence, is essential for accurate interpretation and for the responsible integration of FAPI-based theranostics into precision oncology.

Keywords: FAPI PET/CT, Pitfalls, Theranostics

Invited Lecture

FROM TRADITION TO PERSONALIZATION: POSTOPERATIVE ASSESSMENT OF PAPILLARY THYROID CANCER

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The management of papillary thyroid carcinoma (PTC) has gradually evolved from standardized postoperative practices toward more individualized, risk-adapted care. In this context, reliance on broad risk categories to guide radioactive iodine (RAI) therapy has given way to greater emphasis on refined postoperative assessment to support personalized therapeutic decision-making. Postoperative lymph node status remains a critical component of risk stratification, while lymph node burden gives important prognostic information and has a direct impact on RAI recommendations. Given the limited sensitivity of preoperative imaging, histopathological evaluation after surgery is essential for accurately defining nodal disease and refining recurrence risk. Pre-ablative serum thyroglobulin (Tg) adds valuable information as a dynamic biomarker of remnant thyroid tissue and potential microscopic disease, including occult lymph node involvement or distant metastases. When paired with anti-thyroglobulin antibody status and surgical completeness, early postoperative Tg provides important prognostic information and is potentially predictive for response to RAI therapy. Its value is greatest when considered together with postoperative imaging and other pathological findings. This perspective is reflected in recent guideline updates, which highlight the role of refined postoperative assessment and individualized risk stratification to ensure that

higher-risk patients receive appropriate RAI therapy while minimizing unnecessary treatment in those with low-risk disease.

Keywords: Papillary Thyroid Carcinoma; Postoperative Assessment; Radioactive Iodine Therapy

Invited Lecture

RADIOIODINE THERAPY IN DIFFERENTIATED THYROID CANCER: WHERE WE WERE, WHERE WE ARE, AND WHERE WE'RE GOING

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Radioactive iodine (^{131}I) therapy following total thyroidectomy has constituted the gold standard in the management of differentiated thyroid carcinoma (DTC) for over eight decades. Over time, its application has evolved from routine administration to a more selective, risk-adapted paradigm informed by tumor biology, refined patient risk stratification, and the progressive refinement of clinical practice guidelines. This review delineates the evolving landscape of ^{131}I therapy, tracing its historical underpinnings, contemporary indications, and prospective trajectories as shaped by advances in molecular medicine. We examine the transition from a uniform, standardized treatment approach to an individualized, dynamic risk-stratification model that permits ongoing reassessment and tailoring of therapeutic strategies. Significant updates in clinical practice, including the 2015 American Thyroid Association (ATA) Guidelines, the 2022 European Thyroid Association (ETA) Consensus Statement, joint nuclear medicine recommendations issued by the Society of Nuclear Medicine and Molecular Imaging (SNMMI) and the European Association of Nuclear Medicine (EANM), and 2025 American Thyroid Association Management Guidelines for Adult Patients with Differentiated Thyroid Cancer are critically appraised. Moreover, persistent controversies surrounding the management of low- and intermediate-risk patients are addressed, particularly with regard to the utility of ^{131}I whole-body scanning, activity selection, and overall treatment paradigms. The emergence of molecular theranostics heralds a new era in the management of DTC, facilitating improved patient selection and more precise therapeutic delivery. Advances in molecular profiling, imaging modalities, and targeted therapeutics support a personalized treatment framework aimed at optimizing clinical outcomes while minimizing adverse effects and enhancing long-term safety.

Keywords: Thyroid Cancer, Radioiodine Therapy, Guidelines

Invited Lecture

LYMPHOMA: THE ROLE OF IMAGING IN DIAGNOSIS, TREATMENT AND MONITORING

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Imaging plays a crucial role in lymphoma by using techniques such as MRI, CT, and PET/CT for initial detection, accurate staging, guiding biopsies, assessing treatment response (mid-treatment and end-of-treatment), and monitoring for recurrence. PET/CT provides functional-metabolic data alongside CT anatomical detail for precise management decisions and personalized therapy. Sonography is useful for examining superficial lymph nodes and guiding biopsies. MRI offers superior tissue contrast and bone marrow evaluation, sometimes outperforming PET/CT in specific areas like the bone marrow. CT provides anatomical detail of lymph nodes and organs, often combined with PET for comprehensive assessment (using Lugano classification). FDG PET/CT detects metabolically active cancer cells, essential for identifying disease extent (staging) and guiding biopsy site selection. PET/CT is widely considered the gold standard for monitoring treatment. Interim PET/CT evaluates early treatment response, predicting prognosis and guiding potential therapy changes in risk-adapted trials and end-of-treatment PET/CT: determines complete remission or residual disease, crucial for post-treatment decisions. For lymphoma monitoring and recurrence PET/CT helps detect recurrence, though its role in routine long-term surveillance is still debated. Newer techniques radiomics and AI analyze complex image patterns to find hidden markers for better diagnosis and treatment selection promising significant advancements.

Keywords: Lymphoma, Imaging, Techniques

Invited Lecture

THE ROLE OF ESOPHAGEAL SCINTIGRAPHY IN THE ASSESSMENT AND FOLLOW-UP OF OESOPHAGEAL DYSFUNCTION IN PATIENTS WITH SCLERODERMA

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Progressive systemic sclerosis (PSS) is associated with a high incidence (70-90%) of progressive oesophageal dysfunction mainly dysmotility. Standard tests such as esophageal manometry are invasive and can be distressing to the patient. Esophageal scintigraphy would be ideal, but most protocols are too time consuming for a busy clinical department. The aim of this study was to produce an optimal imaging and reporting protocol that would allow esophageal scintigraphy to become a standard clinical tool. The single-swallow esophageal scintigraphy technique with a semi-solid radioactive meal was performed in the erect posture. After completion of the study, the patient was given a drink of water to remove any residual activity in the oesophagus. This was visually confirmed on the display scope. The procedure is next repeated with the patient lying supine on the imaging table with the camera head underneath the table at an angle of 35^{o} from the left posterior projection. A summed image of the study is displayed. The operator, after adjusting the thresholds of optimum visualisation, outlines the regions of interest (ROIs) for the oesophagus, mouth and stomach. The programme then generates condensed images providing a temporal display of spatial distribution of activity in the oesophagus. Scans were graded based as grade 0 = normal; grade 1 = normal erect scan, mildly abnormal supine scan; grade 2 = mildly abnormal erect, moderately abnormal supine; grade 3 = moderately abnormal erect, severely abnormal supine; grade 4 = severely abnormal erect and supine. We imaged 301 patients using a single swallow of a radiolabeled puree meal with the patient erect and in the supine position. A condensed image was produced, which was reported semiquantitatively using a five-point grading scale (0–4), where 0 was normal and 4 represented severe dysmotility, worse when supine. 24 patients with known PSS (age range 13-69; 17 F;7 M) had follow-up scans after 3-20 months(mean=10): 246 (82%) patients in the study population had evidence of esophageal hypomotility. Gastroesophageal reflux was noted in 83 (28%) patients. The largest number of patients (33%) were found to have grade 2 abnormalities. The number of patients with reflux decreased with increasing severity of grade, from grade 2 to grade 4 (35 to 13%). A retrospective study of the symptoms of 50 of the total study population showed that increasing

severity of grade correlated with increasing mean duration of SSc. There was no significant relationship between disease subset and the presence or severity of esophageal hypomotility. 60% of patients in grades 1 and 2 (ie with observed dysmotility shown on scintigraphy) had no symptoms of dysphagia. In the more severe grades (scan grades 3 and 4), symptoms of dysphagia correlated with increase in grade. No patient was initially Grade 4 and, as would be expected, no patient's grade improved on follow-up. Conclusion: Symptoms may be unreliable in judging the presence of extent of esophageal disease in SSc. Esophageal scintigraphy is a useful noninvasive screening test for the detection of asymptomatic disease. The new erect and suping single-swallow esophageal scintigraphy employing the *Siraj Grading System* proves a sensitive, repetitive and powerful method of grading esophageal dysfunction. We conclude that oesophageal scintigraphy is a sensitive and reliable technique, both for the initial assessment and follow-up of oesophageal dysfunction in patients with PSS.

Keywords: Scintigraphy, Oesophageal Dysfunction, Scleroderma

Original Research

IMAGING OPTIMISATION PROTOCOL FOLLOWING EQUIPMENT ALTERATION

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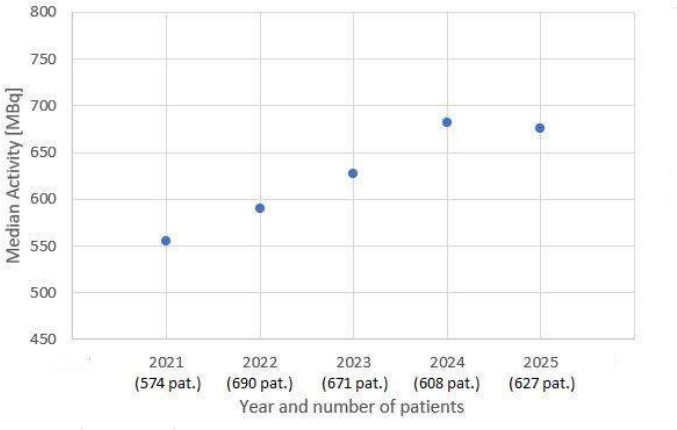
Background: Optimization of administered activity is a central goal in nuclear medicine in the context of patient dose management, through national Diagnostic reference levels (DRLs) concept. While newer gamma cameras are often associated with dose reduction, detector characteristics play an important role in protocol optimization. Methods: An evaluation of imaging protocols for WB bone scintigraphy in adult patients was performed for the period of 5 years, during which radiolabeled bisphosphonates were used and the number of patients per year did not change significantly. Gamma camera 1 (GK1), equipped with 5/8" NaI (Tl) crystal was gradually replaced with camera 2 (GK2), featuring a 3/8" crystal (system sensitivity ≥ 202 cpm/MBq (GK1) vs. 160 cpm/MBq (GK2) for LEHR collimator). Results: In 2021, when only GK1 was used, median patient administered activity was 555 MBq. In 2022 and 2023, when imaging was performed on both cameras, in order to achieve the same number of counts (> 2000 Kcts per detector) on both, activity for patients on GK2 was gradually increased, accompanied by decrease in patient table speed (10 cm/min (GK2) vs. 12 cm/min (GK1)), resulting in median values of 590 and 627 MBq, respectively. When GK1 was decommissioned, all imaging continued on GK2 (2024 and 2025), medians were 682 and 676 MBq, respectively (Graph 1). Despite the increase, administered activity remained within international guideline recommendations (500-740 MBq). DRLs in Serbia are not set, hence new activity levels could not be compared against them. Conclusion: Structured dose management and continuous monitoring are essential to balance image quality and patient safety, suggesting the need for setting national DRLs for nuclear medicine procedures.

Graph 1: Median administered activity per year for WB bone imaging



Keywords: Gamma Camera, Imaging, Optimization Protocol

Original Research

THE IMPORTANCE OF STIMULATED THYROGLOBULIN MEASUREMENT IN PREDICTING EARLY RESPONSE TO RADIOACTIVE IODINE THERAPY IN PATIENTS WITH PAPILLARY THYROID CARCINOMA

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Introduction: Postoperative risk stratification in papillary thyroid carcinoma (PTC) is limited by the lack of standardized guidelines for assessing disease status and the variability in indications for radioactive iodine (RAI) therapy. To improve postoperative decision-making, reliable biomarkers are needed, among which postoperative stimulated thyroglobulin (sTg) has shown potential in predicting early response to therapy. Materials and Methods: This retrospective cohort study included 66 patients with histologically confirmed PTC who underwent total thyroidectomy with lymph node dissection followed by RAI therapy. Postoperative sTg and anti-thyroglobulin antibodies were measured prior to RAI administration. Treatment response was assessed after 12 (±1) months and classified according to dynamic risk stratification as excellent, indeterminate, biochemically incomplete, or structurally incomplete. For the final analysis, the responses were grouped as excellent or inadequate. Results: After a median follow-up of 13 months, 54.5% of patients achieved an excellent response, while 45.5% had an inadequate response. Median postoperative sTg was significantly higher in patients with an inadequate response (19.1 ng/mL) than in those with an excellent response (2.1 ng/mL, $p < 0.01$). To determine the sTg cutoff, ROC analysis was performed only in patients negative for anti-thyroglobulin antibodies. This identified 7.7 ng/mL as a strong predictor of

inadequate response, with values above this threshold associated with a 13-fold increased risk ($p < 0.001$). Conclusion: Elevated postoperative sTg may help identify patients at higher risk of poor response to RAI therapy, supporting optimized postoperative monitoring and management.

Keywords: Papillary Thyroid Carcinoma, Radioactive Iodine Therapy, Stimulated Thyroglobulin

Original Research

^{18}F-FDG PET/CT FOR DETECTION OF METASTATIC AND RECURRENT BREAST CANCER

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Objectives: Breast cancer is the most frequent cancer diagnosed in women worldwide. Early detection, diagnosis and treatment are vital in order to improve survival rates. Imaging techniques such as ultrasound, mammography, computed tomography (CT) and magnetic resonance imaging (MRI) play an important role in the detection of local recurrence and distant metastases. Compared to conventional imaging, ^{18}F-fluorodeoxyglucose positron emission tomography/computed tomography (^{18}F-FDG PET/CT) is a molecular imaging technique that detects biochemical changes in tissue, which occurs before morphologic changes**.** Based on previous studies, ^{18}F-FDG PET/CT could be a useful imaging tool for staging recurrent and metastatic breast cancer as well as for evaluation of treatment response. Methods: 34 women with suspected recurrent breast cancer were enrolled in the study between 2017 and 2018 and accuracy of FDG-PET/CT for diagnosing recurrent and metastatic disease was analyzed. Results: FDG PET/CT was positive in 28 of 34 patients. False negative results occurred in 2 patients. Degenerative changes of the rib were the reason for one false positive result. In 3 patients PET/CT was true negative. Sensitivity, specificity, positive and negative predictive values for FDG PET/CT were 93%, 75%, 96.6% and 60% respectively. Most common localisations for distant metastasis were bone, liver and lung. Local disease was detected in 3 patients. Considering lymph nodes, the neck and mediastinum were most commonly the location of breast cancer metastases. Conclusions:

^{18}F-FDG PET/CT was highly accurate in detection of recurrent and metastatic breast cancer. Before the examination it is important to consider limitations and possibility of false positive and false negative results.

Keywords: Breast Cancer, ^{18}F-FDG PET/CT, Recurrence

Original Research

ROLE OF ^{99m}Tc-PERTECHNETATE ABDOMINAL SCINTIGRAPHY IN THE DIAGNOSIS OF MECKEL'S DIVERTICULUM IN CHILDREN: A TWO-YEAR SINGLE CENTER STUDY

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Introduction: Meckel's diverticulum represents the most common congenital anomaly of the gastrointestinal tract and is a well-known cause of gastrointestinal bleeding of uncertain origin in pediatric patients. When conventional diagnostic methods fail to identify the source of gastrointestinal bleeding, Meckel scan may have an important role in identification of possible causes, keeping in mind normal biodistribution of the radiotracer. Material and methods: Over a two-year period (from 2023 to 2025), 48 pediatric patients were referred to our department for abdominal scintigraphy due to suspected gastrointestinal bleeding. The most common indications for referral were abdominal pain, anemia, and the presence of blood in stool. The study was performed on camera Discovery NM830 (General Electric, Israel) with technetium-99m pertechnetate, as dynamic anterior imaging lasting 30 minutes, with 30 second frames. Late SPECT scans of the abdomen were obtained 30 minutes after application of radiotracer. Results: Prior to referral, 28 (58%) patients had undergone endoscopic examinations or ultrasound, which failed to identify the source of bleeding. Positive scintigraphic findings consistent with Meckel's diverticulum were identified in 3 (6.25%) patients, confirmed during surgery. Nine patients (18.75%) demonstrated increased radiotracer accumulation in the upper left abdominal quadrant. Additional SPECT 60 minutes post-injection showed no migration or change in intensity of the radiotracer so the accumulation in bowel lumen was excluded. Conclusion: A

negative scintigraphic result allows clinicians to confidently redirect further diagnostic workup, where Meckel scan has significant role in the multidisciplinary management of pediatric gastrointestinal bleeding.

Keywords: Meckel’s Diverticulum, Scintigraphy, Children

Case Report

THE ROLE OF ^{18}F-FDG PET/CT IN THE DIAGNOSIS OF PERITONITIS IN A PATIENT WITH FEVER OF UNKNOWN ORIGIN: A CASE REPORT

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Introduction: Fever of unknown origin (FUO) represents a significant diagnostic challenge, particularly in cases where conventional diagnostic methods fail to identify a clear underlying cause. In such situations, ^{18}F-fluorodeoxyglucose positron emission tomography combined with computed tomography (^{18}F-FDG PET/CT) plays an important role in the detection of inflammatory and infectious processes. Case presentation: We report a 55-year-old male patient with a two-week history of fever prior to ^{18}F-FDG PET/CT examination, with body temperatures reaching 38.5°C. Despite antibiotic therapy, no clinical improvement was observed. Laboratory findings indicated a marked inflammatory response, with elevated C-reactive protein (142.3mg/L), erythrocyte sedimentation rate (105mm/h), and fibrinogen levels (9.4g/L), accompanied by mild leukocytosis (11.0×10^9/L) and neutrophilia (7.71×10^9/L). The patient's medical history was notable for bilateral inguinal hernias. Previously performed abdominal CT and ultrasonography failed to identify a clear cause of the febrile state. ^{18}F-FDG PET/CT demonstrated focal increased ^{18}F-FDG uptake in an approximately 8 cm-long area of thickened peritoneum, located posterior to the anterior abdominal wall muscles in the right inguinal region, most consistent with an inflammatory process, suggestive of peritonitis. Conclusion: This case report highlights the value of ^{18}F-FDG PET/CT as a sensitive diagnostic modality in the evaluation of patients with FUO. ^{18}F-FDG PET/CT can enable the detection of inflammatory processes, such as peritonitis, even in the absence of pathological findings on conventional imaging modalities, thereby significantly contributing to accurate diagnosis and subsequent clinical management.

Keywords: ^{18}F-FDG PET/CT, FUO, Peritonitis

Case Report

FILGASTRIM-INDUCED DIFFUSE BONE MARROW FDG UPTAKE MIMICKING LYMPHOMA PROGRESSION: A CASE REPORT

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Introduction: Fluorodeoxyglucose positron emission tomography/computed tomography (FDG PET/CT) is widely applied in oncology for disease assessment and therapy monitoring. Tracer uptake, however, can be influenced by several medications, creating diagnostic pitfalls. Hematopoietic growth factors, such as filgrastim and pegfilgrastim, are frequently used to prevent or treat chemotherapy-induced neutropenia. These agents stimulate bone marrow activity and may cause intense, diffuse skeletal FDG uptake, potentially mimicking widespread disease involvement and complicating response interpretation. Case Report: In August 2024, a 20-year-old patient was diagnosed with primary mediastinal diffuse large B-cell lymphoma (DLBCL) after biopsy of a mediastinal mass. Initial treatment with six cycles of R-DA-EPOCH resulted in partial remission, and therapy was continued with R-DHAP. By April 2025, three cycles had been administered. In May, neutropenia developed (WBC 2.5 × 10^9/L; neutrophils 0.54 × 10^9/L), and subcutaneous filgrastim was prescribed. The patient was managed in another institution and referred to our center only for restaging FDG PET/CT. The scan had been scheduled in advance by the treating oncologist, before the onset of febrile neutropenia, and therefore coincided with the period three days after filgrastim administration. FDG PET/CT demonstrated diffuse, markedly increased uptake in both axial and appendicular skeleton, together with increased accumulation in cervical and mediastinal lymph nodes. Although the pattern initially raised concern for diffuse marrow infiltration, in the clinical context it was attributed to filgrastim-induced bone marrow activation. Conclusion: This case

emphasizes the importance of obtaining a complete medication history, including treatments administered outside the primary institution. Awareness of recent hematopoietic growth factor use is essential, as it may cause diffuse skeletal FDG uptake and lead to false-positive interpretation on FDG PET/CT.

Keywords: F-18 FDG PET/CT, Filgrastim, Lymphoma

Case Report

LATE-ONSET HEPATIC METASTASES FROM FOLLICULAR THYROID CARCINOMA: DIAGNOSTIC CHALLENGES AND THE IMPORTANCE OF LONG-TERM SURVEILLANCE

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Introduction: Follicular thyroid carcinoma (FTC) typically spreads hematogenously most commonly to the lungs and bones. Liver metastases are exceptionally rare, reported in less than 1% of cases, and usually occur in advanced disease. We report an unusual case of FTC with a prolonged atypical clinical course, including late-onset hepatic metastases. Case: A 64-year-old woman underwent right thyroid lobectomy in 1990, with histopathology reported as follicular adenoma. She remained clinically stable for more than two decades. After a spinal injury leading to persistent back pain, magnetic resonance imaging revealed bone lesions suspicious for metastases. Subsequent computed tomography (CT) and fluorodeoxyglucose positron emission tomography/CT (FDG PET/CT) suggested a benign etiology. However, serial imaging over the following years demonstrated slow but progressive skeletal disease. In 2022, progression of a left thyroid nodule with increased FDG uptake resulted in left thyroid lobectomy with jugular lymph node (LN) dissection, revealing a follicular tumor of uncertain malignant potential, while LNs showed only sinus histiocytosis. Despite surgery, serum thyroglobulin levels remained elevated. In combination with progressive skeletal disease, this led to biopsy of S3–S4 vertebral lesions in April 2025, confirming metastatic FTC. Following radioiodine therapy, whole-body scintigraphy with single-photon emission computed tomography/CT demonstrated iodine-avid lesions, including cervical LNs and bone metastases, with two hypodense iodine-avid lesions in the liver suspected to represent metastatic disease. Conclusion: This case demonstrates that even decades after initial surgery, follicular thyroid lesions may lead to unexpected distant metastases, highlighting the diagnostic challenges of these neoplasms and the importance of prolonged biochemical and imaging follow-up.

Keywords: Follicular Thyroid Carcinoma, Liver Metastases, Radioiodine Therapy

Case Report

BILATERAL BREAST METASTASES AS A LATE MANIFESTATION OF CUTANEOUS MELANOMA: CASE REPORT

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Introduction: Breast metastases are rare entities, with only 1.2–2% originating from extramammary malignancies such as melanoma, lung carcinoma, and non-Hodgkin lymphoma. Melanoma breast metastases usually occur years after primary diagnosis and are associated with poor survival. They typically appear as well-defined masses without skin or nipple changes, mimicking benign lesion. Case report: A 53-year-old woman underwent excision of a small pigmented lesion on the left foot, histologically diagnosed as superficial spreading cutaneous melanoma (Breslow II; Clark IV). Two years later, a metastatic lymph node (21 × 11 mm) was resected from the left groin. Rapid disease progression followed, with development of subcutaneous nodules on the anterior abdominal wall and right upper arm. Histopathology revealed large epithelioid cells with marked atypia and frequent mitoses. CT and abdominal ultrasound showed no visceral metastases but revealed subcutaneous nodules and enlarged axillary lymph nodes. A bone scan was performed and showed no pathological uptake. Breast ultrasound demonstrated multiple bilateral, well-defined, hypoechoic subcutaneous lesions measuring up to 7 mm, confirmed on mammography as circumscribed masses. Breast MRI showed bilateral subcutaneous metastatic deposits with low T2 signal intensity and peripheral rim enhancement. The patient received four cycles of DTIC/CDDP chemotherapy; she died eight months after the diagnosis of breast metastases. Conclusion: Breast metastases from melanoma are rare and may mimic benign lesions on imaging. In patients with a history of melanoma, new breast masses should raise suspicion for metastatic disease, as prognosis remains poor despite systemic therapy..

Keywords: Melanoma, Breast Metastases, Ultrasound

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