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PREZENTĂRI INVITATE
1. FROM STATIC TO DYNAMIC NUCLEAR IMAGING: HOW NOVEL TECHNOLOGIES AND RADIOPHARMACEUTICALS ARE CHANGING THE FIELD

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The imaging technologies currently in use for both SPECT and PET make it hard to collect dynamic images during the course of a routine clinical study. The possibility of achieving a temporal follow-up of the accumulation and clearance of the radiopharmaceutical at the target site may disclose fundamental diagnostic information that are now averaged out because of the long acquisition time.

This scenario is doomed to change after the introduction of new, ultrafast SPECT and PET scanners that can shorten the acquisition time to less than one minute while attaining a spatial resolution below the one-millimeter scale. When these new tools will become widely available, a sharp improvement of the conventional nuclear imaging approach has to be expected, particularly if combined with a new generation of target-specific diagnostic agents characterized by pharmacokinetic properties suitable for ultrafast imaging. As an example, although in the past myocardial perfusion agents showing rapid washout were abandoned despite their superior kinetic properties such as linearity with blood flow, they may now become the most suitable markers of perfusion when employed in combination with ultrafast imaging. In this perspective, it is apparent that the sharp improvement brought about by the new high-speed, high-resolution imaging modalities will also determine a radical change of the conceptual design of radiopharmaceuticals for better matching the characteristics of the new instrumentation. Presumably, this will lead to rethink the diagnostic use of old radiopharmaceuticals and to give rise to a new generation of imaging agents.

In this lecture, an overview of the new imaging technologies will be briefly outlined and the question about how they could potentially impact the development of a more genuine approach to molecular imaging with novel classes of radiopharmaceuticals will be shortly discussed.

2. WORKING WITH PROTOCOLS IN NUCLEAR MEDICINE

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Clinical imaging protocols play an important role in the provision of high-quality care in nuclear medicine. The development of protocols is intended to standardize technical factors, timing of imaging and the views obtained during imaging to provide the best information from which the scan may be reported. It is imperative that all nuclear medicine facilities have site specific protocols for every procedure performed.

A protocol is defined as a detailed plan for a medical experiment, treatment, or procedure. The goal of any protocol is to provide detailed structure for how to manage the patient and how to perform the procedure.

It is a challenge to write the best protocols, to make the most of the advantages and minimize the disadvantages. It rises a lot of questions: Why do we need protocols – legally and practically? Are they altogether a good thing? Do they change the need for staff training and experience? Who writes and who approves the protocols? What should be included in them?

When a procedure is performed in a standardized, reproducible manner, inter- and intra-operator variability is reduced, ensuring that each patient study is of optimal quality and every patient receives the same quality of service.

Protocols are also important for other reasons. They provide an outline for technologist training on performing procedures along with a mechanism to assess competency in performing procedures. A protocol provides a written record of the expected care to be provided to a patient. As long as the protocol adheres to best patient practices and complies with all federal, state, and local laws and regulations, it may provide a measure of protection in medical malpractice negligence claims.

Finally, protocols play an important role in accreditation, as the submission and evaluation of clinical protocols is an essential consideration in the accreditation process.
3. OPTIMIZATION OF PREPARATION OF GA68 RADIOPHARMACEUTICALS: PRIVATE PRACTICE EXPERIENCE

Masha Maharaj

Director, Department of Nuclear Medicine, Molecular Imaging and therapy centres of Excellence, Umhlanga Netcare Hospital, Kwa-Zulu Natal, South Africa.

The era of newer targeting tracers and radionuclides prompted a need for enhanced radiopharmaceuticals providing improved resolution, sensitivity and specificity. PET/CT hybrid modality resulted in the optimum “one-stop-shop” imaging technique for both localizing the metabolic and anatomical variations within a tumour. Gallium-68 a positron emitter radionuclide, has greatly impacted the nuclear medicine community, it is now widely used in positron emission tomography (PET) diagnosis of various malignancies especially in neuroendocrine tumors (NETs) and prostate cancer. We will discuss the optimization of preparation of Ga68 radiopharmaceuticals with reference to our centre experience.

4. ADVANCES IN MOLECULAR IMAGING

Simona Ben Haim

Israel

Molecular Imaging is the visualization, characterization and measurement of biological processes at the molecular and cellular levels in humans and other living systems and typically includes two- or three-dimensional imaging as well as quantification over time. The talk will include an overview of some of the recent developments in the field of Molecular Imaging and a discussion how these developments are driving and will drive in future towards personalized medicine and precision medicine, mainly in the field of Oncology.

5. QUANTITATIVE MYOCARDIAL BLOOD FLOW MEASUREMENTS WITH EMPHASIS ON SPECT

Simona Ben Haim

Israel

Myocardial blood flow (MBF) and myocardial flow reserve (MFR) are important physiologic parameters for the detection of hemodynamically significant coronary artery disease (CAD) and have been shown to improve diagnostic accuracy and risk stratification of myocardial perfusion imaging (MPI) beyond that provided by relative perfusion abnormalities alone. Quantitative assessment of MBF can be obtained from cardiac PET, well validated and reproducible. However, PET is infrequently used in clinical practice due to the limited availability of PET scanners, suitable radiotracers and dedicated software as compared to the widely used SPECT. MPI SPECT with conventional Anger technology has been traditionally limited to visual analysis or semi-quantitative perfusion analysis. SPECT quantification of MBF requires fast acquisition of dynamic data in 5-10 sec, as well as corrections, mainly for attenuation and scatter, which enable absolute measurement as well as a suitable radiotracer. Conventional SPECT can be used for quantitation with the microsphere method; however, results are not as accurate as PET. Dynamic SPECT images can be obtained with a rapidly rotating conventional SPECT camera, but the development of non-rotating cardiac systems has made this simpler. Studies are showing good correlation with microspheres in a porcine model, and in human’s good correlations with coronary angiography, as well as $^{15}$N-ammonia and $^{15}$O-H$_2$O. More studies are ongoing to assess the incremental diagnostic and prognostic value of SPECT MBF and MFR measurements.
Background of the study. Amyloidosis is a heterogeneous group of diseases caused by extracellular deposition of insoluble fibrils. Amyloid depositions can occur in multiple organs (heart, liver, kidney, skin, eyes, lungs, nervous system) resulting in a variety of clinical manifestations. Several types of amyloid can infiltrate the heart resulting in a restrictive cardiomyopathy, heart failure, and atrial and ventricular arrhythmias. The most clinically relevant cardiac involvement occurs in primary light-chain (AL) amyloidosis, familial transthyretin amyloidosis (mutant transthyretin, ATTRm), and senile transthyretin amyloidosis (wild-type transthyretin, ATTRwt). Endomyocardial biopsy (EMB) is the gold standard for diagnosis of cardiac amyloid, but is performed only in specialized centers. Instead of highly sensitive, EMB does not provide sufficient information about extent and progression of disease, prognostic information, nor response to treatment. The purpose of the study was to evaluate bone seeking tracer (99mTechnetium - hydroxydiphosphonate, 99mTc-HDP) scintigraphy (BSTS) for the detection of cardiac amyloidosis.

Methodology. Ten subjects (5 female/5 male) between 47-83 years, underwent 99mTc-HDP cardiac planar or whole body imaging and single photon emission computed tomography (SPECT) for detection of cardiac involvement of suspected or confirmed systemic amyloidosis.

We correlated cardiac nuclear imaging with: cardiac ultrasound, ECG, neurological exam and EMG (electromyography), FNA (fine needle aspiration) for abdominal fat pad with Congo red staining and bone marrow or renal biopsy. We calculated sensitivity (Se), specificity (Sp), positive and negative predictive values (PPV, NPV). Cardiac retention was assessed with both a semi quantitative visual score (VS) (0 = no uptake, 1 = mild uptake, 2 = moderate uptake, 3 = strong uptake) and by quantitative analysis by drawing a region of interest over the heart corrected for contralateral counts and calculating a heart-to-contralateral ratio (H/CL).

Results. We found: Se 100%, Sp 100%, PPV 100% and NPV 100% for detection of ATTR with cardiac involvement. Five of them (50%) were confirmed by biopsy for ATTRm and were positive for cardiac amyloid deposition, on scintigraphy. One of the patients (10%) (83y) had a negative biopsy for ATTRm or AL, but a positive scintigraphy test is suggestive for a senile amyloidosis (ATTRwt). Three patients (30%) with negative biopsy for ATTR were also negative on scintigraphy. Another patient (10%) with AL (62y) and suspected cardiac involvement was negative at scintigraphy. We obtained a cardiac retention assessed by VS=2 at 4 patients and VS=1 in 2 cases. H/CL score varied from 1.68 to 2.7. From 12 patients send in Nuclear Medicine Department, from Jan to May 2019 with suspicion of systemic amyloidosis, two of them (16.67%) were positive for ATTR, one for ATTRwt, the other for ATTRm.

Conclusion. EMB remains the gold standard for detection of cardiac amyloidosis. However, EMBs, does not provide sufficient information about extent and progression of disease, prognostic information, nor response to treatment. Scintigraphy with bone seeking radiotracer is a noninvasive method that may facilitate early diagnosis, distinguish various forms of cardiac amyloid and may be useful in following disease burden.
BIOMARKERS IN THYROID TUMORS

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Objective: To present a general review of the thyroid tumor biomarkers, to describe their current usage and limitations in clinical practice for the proper diagnosis and management.

Methods: Using tissue and blood samples, biological markers can be separated and be objectively measured at a cellular, biochemical or molecular level in order to identify the physiological or pathophysiological status, or to evaluate the therapeutic response of differentiated, medullary and aggressive thyroid cancers.

Results: The standard biomarkers in thyroid cancer are provided by the histological examination, besides these serum disease-specific protein biomarkers, as per example thyroglobulin and calcitonin, are used to detect and monitor the illness. Novel solutions, as the “liquid biopsy” concept, circulating tumor cells, gene transcripts and microRNA, which help identifying the disease status, are being studied and can be used as cancer biomarker assays.

Conclusions: The need to find biomarkers with high-level accuracy has involved different disciplines like endocrinology, laboratory medicine, nuclear medicine, pathology, and oncology in the multidisciplinary approach of thyroid tumors.

Key words: biomarkers, “liquid biopsy”, circulating tumor cells, gene transcripts, microRNA

8. CONTROVERSIES, CONSENSUS AND COLLABORATION IN THE USE OF I-131 THERAPY IN DIFFERENTIATED THYROID CANCER “THE MARTINIQUE PRINCIPLES”

“Prof. Dr. Ion Chiricuta” Institute of Oncology, Cluj-Napoca, Romania.

Introduction. Publication of the 2015 American Thyroid Association (ATA) management guidelines for adult patients with thyroid nodules and differentiated thyroid cancer was met with disagreement by the extended nuclear medicine community related to the diagnostic and therapeutic utilization of radioiodine (I-131). European Association of Nuclear Medicine (EANM) and Society of Nuclear Medicine and Molecular Imaging (SNMMI) declined to support the guidelines, considering this ATA, EANM, SNMMI, and the European thyroid association (ETA) worked together to define the format and scope of a meeting in Martinique. After 2 days (13-14 January 2018) of consideration, debate, and collegial exchange of concepts, the conference participants agreed on a set of nine principles: The Martinique principles.

Meeting report:

➢ Principle 1: Advancing our understanding of optimal thyroid cancer management requires a commitment by clinicians, researchers, patients and organizations to engage in proactive, purposeful, and inclusive inter-disciplinary cooperation.
➢ Principle 2: The goal of I-131 therapy should be characterized as remnant ablation, adjuvant treatment, or treatment of known disease using standardized definitions.
➢ Principle 3: Evaluation of post-operative disease status is required to optimize proper patient selection for I-131 therapy (remnant ablation, adjuvant treatment, or treatment of known disease).
- Principle 4: Post-operative disease status evaluations should be standardized and integrated into routine clinical care.
- Principle 6: The optimal administered I-131 activity for adjuvant treatment cannot be definitely determined from published literature. Evaluation of the role of adjuvant treatment by a review of the literature is difficult as most studies have examined relatively small cohorts followed for suboptimal time periods.
- Principle 7: Characteristics used to classify patients as I-131 refractory should be used to risk stratify patients with regard to the likelihood that a tumor will respond to I-131 therapy and not necessarily as definitive criteria to mandate whether or not I-131 therapy should be recommended. Common clinical scenarios that suggest a patient may have I-131 refractory thyroid cancer: 1) No radioiodine uptake is present on a diagnostic radioiodine scan 2) No radioiodine uptake is present on a radioiodine scan performed several days after I-131 therapy 3) Radioiodine uptake is only present in some but not other tumor foci 4) DTC metastasis(es) progress despite radioiodine uptake 5) DTC metastasis(es) progress despite a cumulative I-131 activity of >22.2 Gbq(600mCi).
- Principle 8: I-131 refractory criteria will continue to evolve as a) additional studies address important limitations and technical issues of confounding the current literature, b) techniques for radioiodine imaging are optimized and standardized, and c) redifferentiation therapies who improve the efficacy of I-131 therapy.
- Principle 9: Major gaps in knowledge and evidence regarding optimal use of I-131 therapy should be addressed with properly designed prospective studies.

**Conclusion:** The Martinique meeting restored trust, confidence and a sense of collegiality between individuals and organizations that are committed to optimal management for patients with thyroid disease.

### 9. MANAGEMENT OF I\(^{131}\) REFRACTORY THYROID CANCER: A MULTIMODALITY APPROACH

Partha S Choudhury.

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Differentiated Thyroid Cancer (DTC) is best treated with the use of initial thyroidectomy followed by radio-iodine therapy (RAI). In a metastatic setting RAI can also be effectively used for treatment when the sodium iodide symporter (NIS) are intact leading to cure in a significant number of patients. NIS is found to be expressed more in differentiated thyroid cancer tissue and is usually negative in poorly differentiated tissues like in oxyphilic change and anaplastic transformation. GLUT-1 expression was more observed in NIS negative cases and vice versa leading to the concept of personalized treatment by the theranostic approach. NIS expression may also be helpful in predicting response and enhance patient management. The aggressive variety of thyroid cancers generally over express other receptors like GLUT, GLUT1, hexokinase 1 or HIF-1α with or without NIS. RAI refractory DTC is best imaged by Positron Emission Tomography-Computed Tomography (PET-CT) either with \(^{18}F\) FDG or more recently with \(^{68}Ga\) labelled DOTA compounds. RAI refractory DTC needs a multimodality approach of treatment depending on the site and volume of disease or whether there are NIS expression at some sites or such expression is totally absent. Therefore the treatment can be local or systemic or a combination of both. Many genetic alterations have been seen in the molecular pathogenesis of DTC, most commonly RET/PTC translocations and BRAF V600E point mutations in PTC and RAS point mutations in FTC & poorly DTC. Elevated expression of vascular endothelial growth factor (VEGF) and its receptors (VEGFR) may play a role in thyroid carcinoma. Studies of the tumor biology of DTC has led to the development of targeted therapies based on the theranostic concepts. Currently based on the findings of multicentre, randomized, double blind placebo-controlled phase III studies, two agents, Sorafenib and Lenvatinib has been approved in US and Europe for the treatment of this group of thyroid cancer. The DECISION & SELECT trials showed that Sorafenib & Lenvatinib has significant benefit in terms of progression free survival over placebo. Patients of RAI refractory disease a negative RAI scan and a positive FDG PET-CT scan are the candidates for this treatment and FDG PET can also be used for objective response evaluation by PERCIST. So far these drugs have shown promising results in terms of disease control, regression or stable disease. It must be however remembered that these agents are associated with side effects most commonly being hand / foot skin reactions, rash, fatigue, mucusitis, hypertension diarrhoea, ECG changes and weight loss. The severity of the symptoms of side effects and the potential benefit needs to be critically evaluated before starting this form of treatment.

PTC with BRAF mutations are associated with significantly reduced expression of genes involved in the metabolism of iodine, including genes for NIS, Tg & thyroperoxidase (TPO). On the other hand, BRAF mutated tumors exhibit higher GLUT-1 receptors levels. These play an important part in the tumor dedifferentiation reducing efficacy of RAI. Another
treatment option which has been recently proposed for RAI refractory thyroid cancer is peptide receptor radionuclide therapy (PRRT) based on the theranostic concept. PRRT is a unique way of targeting somatostatin receptors over expression on tumor cells in many cancers including thyroid. At this point of time and with the available literature PRRT shows variable results in the form of partial remission or stable disease in approx. 50% of the treated patients. However, the currently available results cannot be treated as sufficient evidence for recommending this form of treatment in iodine refractory DTC. Further long-term studies will be needed before PRRT can be established as an option in the treatment of RAI refractory metastatic DTC. In this presentation the investigational and therapeutic approach in a patient of RAI refractory DTC will be discussed.

10. CZT IMAGING AND TECHNOLOGY
Alex Frenkel
Israel

A new integrated cadmium zinc telluride (CZT) nuclear-imaging detector has been designed to enable a new generation of high-resolution, low-dose nuclear-medicine cameras.

Those detectors use direct transfer of energy and location information that results in better energy and spatial resolution than conventional SPECT.

From organ dedicated imaging, the CZT technology, evolved in general purpose whole body cameras with much better performance than the conventional NaI(Tl) camera.

These cameras provide better spatial resolution and superior patient positioning options. Better energy resolution accommodates dual isotope scans and scatter rejection giving better contrast.

Increasing sensitivity of the CZT camera allowed reducing the dose injected or the time of the study.

This issue is well demonstrated in the clinical studies.

11. THE ROLE OF CHOLINE PETCT IN PROSTATE CANCER. REVIEW OF BIBLIOGRAPHY
Mariela Agolti
Argentina

Choline PET/CT imaging has been proposed for the detection of primary intraprostatic cancer (PC), for staging of the disease, and for detection of tumor recurrence in patients with biochemical relapse. Regards the detection of primary PC patients with high PSA values and repetitive negative biopsies, In 25% of patients, 18F-choline PET/CT allowed the identification of neoplastic prostatic zones, however the main article regards this, considered focal uptake and there was no important difference in SUV between hyperplasia and carcinoma, there are other articles that says it is useful although with low specificity. In my country we only have 18 FCH PET/CT and most articles refer to 11CHOLINE, so it’s important to set up that there is solid evidence regarding both protocols performed equally for early recurrent PC staging show an overall excellent concordance on a perpatient and a per-lesion basis(1) Considering initial diagnosis, there is clear evidence that prostate cancer was identified in all the patients on PET/CT. Local disease was seen in 62%; loco-regional node involvement in 21% and metastatic disease in 17%. PET/CT confirmed the therapeutic decision in 48.6% of cases and led to a therapeutic modification in 43.2% of cases or modifying the extend of radiotherapy (25%).(3) FCH-PET/CT offers more clinical utility as a first-line imaging modality than CT scan and whole-body bone scan.(4) The efficiency of FCH PET/CT in detecting both bone and lymph-node involvement of, Prostate cancer, at initial staging was found to be higher than that of conventional imaging.(2) specially in high risk patients, considering high risk(15% of the PC ) when initial PSA is > than 20 or Gleason is more or equal to 8 (AUA American Urological Association) or initial stadiification is T3 a Regards biochemical relapse, PSA absolute value, defined as a PSA >0.2 ng/ml after radical prostatectomy and as a PSA of 2 ng/ml above the nadir after RT, it is very important to distinguish between the presence of a single lesion and multiple lesions and to correctly detect the site(s) of relapse in order to establish the proper therapy. PSA kinetic parameters (PSA duplicating time and PSA velocity’s change) express the change in PSA levels over time. Many studies showed that PSA level and a short PSAdt were the only significant predictors of positive a 11C-choline PET/CT scan. PSAdt values differ depending on the site of recurrence: in those with a shorter PSAdt, the presence of a distant metastasis is more probable, while in those with a longer PSAdt the presence of local relapse should be suspected first. Routine use of choline PET/CT has been recommended for those with a PSA level >1 ng/ml [23]. PET/CT

**12.LU-PSMA PRIVATE PRACTICE CLINICAL EXPERIENCE: THE Wins AND WOES**

Masha Maharaj

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In 1853 Surgeon J. Adams described and reported the first case of prostate cancer as “a very rare disease”. Fasttrack 164 years later according to NCR 2013 (in South Africa) men have a lifetime risk of 1 in 18 (with a climbing rate as diagnosis improves and the population average age increases). The tumour is biologically and clinically heterogeneous making imaging evaluation and therapy challenging. The Cell surface protein Prostate specific membrane antigen -PSMA is significantly expressed in prostate cancer. This has provided a novel primary target for prostate carcinoma imaging and therapy. The principle of “if you can see it, you can treat it” remains true. We will be discussing Lutetium- PSMA, current literature and its applications in Prostate cancer therapy with reference to our centre experience.

**13.PSMA PRLT – AUGMENTED AND INDIVIDUALIZED TREATMENT (PRLT 2.0)**

Same Ezziddin

*Germany*

Understanding the mechanism and specific issues of PSMA-targeted PRLT, as well as potential risk factors for unfavorable course of disease under therapy, is helpful to escalate PRLT when needed. Indications for PRLT and arguments for earlier application will be covered, as well as contraindications and pseudo-contraindications. Augmentation methods for PRLT including comedication and potential maintenance therapy in PRLT responders are matters of clinical concern. Also, the toxicity profile of Lu177 and Ac225 based PSMA-targeted PRLT, covering the subject of tandem vs single isotope approach.

**Keywords:** Peptide radioligand therapy, Tandem targeted treatment, PSMA Therapy

**14.FDG PET/CT IN COLORECTAL MALIGNANT DISEASES. PRACTICAL ISSUES IN OUR CLINICAL EXPERIENCE.**

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*Central Emergency University Military Hospital Bucharest Romania*
**Purpose:** We analyze the efficiency of PET/CT in staging, restaging and therapy response assessment of colorectal oncology patients. FDG PET/CT has several applications in colorectal cancer (CRC) imaging including preoperative evaluation of apparently limited metastatic disease, detection of disease recurrence, clarification of equivocal lesions at initial staging, investigation of unexplained rising tumour markers, and incidental detection of occult primary colonic tumours. With the use of illustrative clinical examples, our study reviews the utility of FDG PET/CT in the management of CRC, discussing its role and limitations in the multimodality imaging of these patients. A variable number of patients with colorectal cancer (CRC) are likely to have a symptomatic or asymptomatic recurrence within the first 1-2 years. Conventional imaging modalities have limitations in detecting recurrent disease early. The purpose of our study was to assess the usefulness of fluorodeoxyglucose-positron emission tomography/computed tomography (FDG-PET/CT) in the detection of recurrence in patients with CRC.

**Discussions:** PET/CT was found to have limitations in detecting microscopic disease and small-sized lesions. The common cause of false-positive PET/CT results was infective and inflammatory pathology in our setup.

**Material and methods:** PET/CT showed high sensitivity, specificity, and accuracy for the detection of recurrent disease in patients, who were earlier treated for CRC. PET/CT can be considered as a useful diagnostic tool in these patients. PET/CT has become one of the most used imaging modalities to stage, follow-up and re-stage patients with colorectal cancer and liver metastases. All patients underwent whole-body contrast-enhanced 18F-FDG PET/CT and the imaging diagnosis was compared with pathological diagnosis and other complementary diagnostic imaging methods.

**Conclusions and findings:** For PET/CT images the standard uptake value (SUV) was calculated on primary tumor and regional lymph nodes as well as on contiguous tissues appeared to be involved. T and N PET/CT staging was compared to histopathologic findings. PET/CT images are diagnostic imaging tools in identifying primary tumor extent and lymph node and metastases and peritoneal nodular extension despite or with loc-regional assessment of the peritoneal disease.

**15. RADIOPROTECTIA IN CAZUL UNUI INCIDENT CU SUBSTANTE RADIOACTIVE**

Fizician medical Maria-Alina Gherman
Spitalul Universitar de Urgență Militar Central “Dr. Carol Davila”

Descoperirea radioactivitatii a adus omenirii atat beneficii, cat si dezastre, unele din ele intamplandu-se deja la scara mai mica sau mai mare. Oamenii pot fi contaminati radioactiv intern sau extern cu unul sau mai multi radionuclizi. Ca urmare a contaminarii, consecintele clinice pot varia de la sindromul radiatiei acute la dezvoltarea cancerului in timp. Radioprotectia in cazul in care oamenii au fost deja contaminati depinde foarte mult de persoanele care descopera incidentul, de personalul medical care actioneaza pentru a elimina si micsora cat mai mult doza incasata, de estimarea cantitatii de material radioactiv absorbit de organism, precum si de administrarea anumitor substante care blocheaza absorbitia acelui radionuclid, accelereaza excretia sau functioneaza ca agent chelator. Este deasemenea importanta si radioprotectia persoanelor care vine prima data in contact cu cel contaminat, cat si a personalului medical care se ocupa de acesti pacienti.
E-POSTERE
16. IDENTIFICAREA DE BIOMARKERI IMAGISTICI IN SINDROMUL CARDIORENAL PE MODEL ANIMAL PRIN $^{18}$F-FDG PET/MRI - REZULTATE PRELIMINARE-
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Introducere si obiective: Sindromul cardiorenal reprezinta o entitate clinico-patologica prevalentata, cu markeri prognostici si predictivi inca nedefiniti. Replicarea conditiilor fiziopatologice a afectiunii la animal este o arie activa de continua cercetare. In prezenta lucrare, raportam rezultatele preliminare a investigarii validitatii unui model animal pentru sindromul cardiorenal prin imagistica multimodala cu 2-deoxi-2-[fluorine-18] fluoro-D-glucoza ($^{18}$F-FDG) PET/MRI.

Materiale si Metode: Am studiat un grup de 24 de sobolani Wistar, masculi, repartizati in mod egal si aleatoriu in 3 loturi: control (L1), insuficienta cardiaca (L2), sindrom cardiorenal (L3). Insuficienta cardiaca a fost indusa prin administrare intraperitoneala de doxorubicina, iar sindromul cardiorenal prin nefrectomie subtotala la jumatate din subiectii lotului L2. Scanarile cu $^{18}$F-FDG PET/MRI au fost efectuate la debutul studiului pentru L1, dupa 6 saptamani pentru L2, iar pentru L3 dupa 18 saptamani. Pe imaginile reconstruite, regiuni de interes au fost trasate pentru parenchimul renal si miocard. Cinetica radiofarmaceuticului a fost analizata prin calcularea valorilor de captare standardizate (SUV) si examinarea curbelor pentru determinarea timpilor de eliminare la 50% (T50), respectiv la 75% (T75) din valoarea maxima a SUV.

Rezultate: La lotul L1 s-a observat o diferența semnificativ statistica la nivelul miocardului pentru markerul T75 (media T75$L_1$=1.1 vs. T75$L_2$=1.9 min, p<0.05). In schimb, subiectii din lotul L3 versus cei din L1 au prezentat un timp de eliminare prelungit atat pentru T75 cat si pentru T50 (media T75$L_2$=3.5 vs. T50$L_2$=40 min, p<0.001; media T50$L_3$=3.9 vs. T50$L_3$=40 min, p<0.001); in plus, comparativa dintre lotul L3 si L2 a demonstrat persistenta individualizarii lotului L3 (media T75$L_2$=1.9 vs. T75$L_3$=40 min, p<0.001; media T50$L_2$=5.9 vs. T50$L_3$=40 min, p<0.05)

Concluzii: Comportamentul cineticii radiofarmaceuticului la subiectii cu sindrom cardiorenal are potential discriminator pentru grupurile din cadrul studiului, astfel confirmaandu-ne ipoteza investigata. Prin urmare, vom explora mai departe identificarea de biomarkeri pentru monitorizarea afectiunii prin $^{18}$F-FDG PET.

Cuvinte cheie: cardiorenal, Wistar, PET/MRI, radiofarmaceutic

$^{18}$FDG PET/MRI BIOMARKERS EXPLORATION IN A SMALL ANIMAL MODEL OF CARDIORENAL SYNDROME -PRELIMINARY RESULTS-
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Introduction and Objectives: Cardiorenal syndrome is a prevalent clinical condition, with yet undefined prognostic or predictive biomarkers. Animal modelling of the disease and its pathophysiological underpinnings is a growing area of research. We report preliminary results in investigating the validity of a rat model for cardiorenal syndrome by multimodal imaging with 2-deoxi-2-[fluorine-18]fluoro-D-glucose ($^{18}$F-FDG) PET/MRI.

Methods and Materials: We studied a number of 24 male Wistar rats, equally and randomly divided into 3 lots: control (L1), heart failure (L2) and cardiorenal group (L3). Heart failure was induced by intraperitoneal doxorubicin administration and cardiorenal syndrome by subsequent sub-total nephrectomy in half of them. $^{18}$F-FDG PET/MRI scans (nanoScan PET/MRI, Mediso Ltd.) were acquired at week 0 for L1, at week 6 for L2 and at week 18 for L3. On the reconstructed images, regions of interest for renal and heart parenchyma were drawn. Tracer kinetics were assessed by calculating standardized uptake values (SUV) and washout times at 50% (T50) and at 75% (T75) of peak SUV.
Results: L1 and L2 displayed a statistically significant difference only in myocardial T75 (mean T75\textsubscript{L1}=1.1 vs. T75\textsubscript{L2}=1.9 min, p<0.05). In contrast, subjects from L3 vs. L1 exhibited prolonged myocardial washout times at T75 and at T50 (mean T75\textsubscript{L1}=1.1 vs. T75\textsubscript{L3}=40 min, p<0.001; mean T50\textsubscript{L1}=3.5 vs. T50\textsubscript{L3}=40 min, p<0.001); moreover, comparing L3 vs. L2 still exhibited significantly distinct temporal patterns (mean T75\textsubscript{L2}=1.9 vs. T75\textsubscript{L3}=40 min, p<0.001; mean T50\textsubscript{L2}=5.9 vs. T50\textsubscript{L3}=40 min, p<0.05).

Conclusion: The distinct dynamics of radiotracer kinetics in cardiorenal subjects has potential for discriminating between study groups, hence confirming the hypothesis under study. This outcome warrants further exploration of novel biomarkers for disease monitoring through \textsuperscript{18}F-FDG PET.

Keywords: cardiorenal, Wistar, PET/MRI, radiotracer

17. HEPATIC UPTAKE ON \textsuperscript{99m}Tc HYDROXYMETHYLENE DIPHOSPHONATE BONE SCAN IMAGING: A CASE REPORT

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Introduction. Bone scans using Tc-\textsuperscript{99m} diphosphonate compounds are the most commonly used procedures in conventional nuclear medicine in Romania. We present a case report of a 51 year old male with colorectal cancer that was referred to our center for skeletal metastatic disease evaluation, after his 4th cycle of chemotherapy for preoperative tumor cytoreduction.

Material and Methods. An intravenous injection of 666MBq \textsuperscript{99m}Tc- hydroxymethylene diphosphonate (HDP) was administered to the patient. Anterior and posterior views of the entire skeleton were acquired 2h post injection; also dorso-lumbar region static images were obtained in right anterior oblique and left posterior oblique at 30\degree/150\degree angles.

Results. After intravenous injection, \textsuperscript{99m}Tc-HDP rapidly distributes into the extra-cellular fluid and is quickly taken up into the bone. It is eliminated by the kidneys and bladder so it is normal to see residual soft tissue activity in the kidneys and bladder. The patient had several heterogeneous areas of uptake in the hepatic region that correlated with the liver metastases described on the computerized scan.

Discussion and conclusion. Soft tissue uptake must be differentiated from bone pathology. Similar cases of hepatic secondary lesions that uptake \textsuperscript{99m}Tc- diphosphonate compounds were described in the literature.

The mechanism of localization in the liver metastases is thought to be a combination of calcifications in the tumor and binding of the macromolecules to tumor cells in the metastatic areas.

The low sensitivity and specificity of bone seeking agents in this cases cannot point a correlation between the uptake of \textsuperscript{99m}Tc-HDP in the metastatic foci and the outcome of the patient. Other nuclear medicine procedures can be used to assess chemotherapy response and patient prognosis.

Key words: bone scan, hepatic uptake, \textsuperscript{99m}Tc-HDP in liver metastases

18. BONE SCINTIGRAPHY AS PRELIMINARY STEP IN IDENTIFYING SCHNITZLER’S SYNDROME VS. ERDHEIM-CHESTER DISEASE

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Introduction. A 68 years old man complained of bones pain and multiple fractures in the last 15 years, with osteoporosis and persistent leukocytosis was sent for bone scintigraphy after surgery and radiotherapy in 2018 for a right submandibular carcinoma. Material and Methods. The bone scan obtained 2h after injection of 530 MBq of 99mTc-HDP showed abnormal tracer uptake as hot spots among the body and an abnormal pattern revealed in the lower half of the bilateral femur and the upper third of the bilateral tibia. Discussions. This led us to the probability of differential diagnosis between Schnitzler's syndrome and Erdheim-Chester disease. According to Strasbourg diagnostic criteria, Schnitzler’s syndrome is a rare combination of two major criteria (monoclonal immunoglobulin M or G and chronic urticaria) with at least two (if immunoglobulin M) or three (if immunoglobulin G) minor criteria (abnormal bone structure, fever, proinflammatory state, neutrophilic urticarial dermatosis on skin biopsy). Contrastingly, Erdheim-Chester disease, an uncommon non-Langerhans cell histiocytosis, is symmetrical osteosclerosis of the long bones with corresponding and almost pathognomonic radiological and nuclear medicine correlations. Conclusion. Bone scintigraphy was the first investigation that led to a possible response for the pathological background of the patient. To confirm one of the presumptive diagnoses obtained from the scintigraphic investigation, the next step should be to screen for monoclonal immunoglobulin and also bone biopsy should be performed to exclude possible histiocytic infiltration. Key words: bone scintigraphy, Schnitzler's syndrome, Erdheim-Chester disease.

RO: BONE SCINTIGRAPHY AS PRELIMINARY STEP IN IDENTIFYING SCHNITZLER'S SYNDROME VS. ERDHEIM-CHESTER DISEASE

Introduction. Un bărbat în vârstă de 68 de ani acuză dureri osoase și fracturi multiple în ultimii 15 ani, cu osteoporoză și leucocitoză persistantă, a fost trimis pentru a fi investigat scintigrafic după ce a fost diagnosticat și operat de carcinom submandibular în 2018, urmat de radioterapie. Material and Methods Scanarea osoasă a fost obținută la 2 ore după injectarea a 530 MBq de 99mTc-HDP și a evidențiat multiple situsuri hiperfixatoare la nivelul scheletului și o intensă hiperfixare la nivelul jumătății inferioare femurale și a treimii superioare a tibiei, bilateral. Discussion. Acest lucru ne-a condus la probabilitatea unui diagnostic diferențial între sindromul Schnitzler și boala Erdheim-Chester. Conform criteriilor de diagnostică de la Strasbourg, sindromul Schnitzler este o combinație rară a două criterii majore (imunoglobulina monoclonală M sau G și urticarie cronică) cu cel puțin două criterii minore (daca imunoglobulina M este cu o valoare anormală) sau trei (imunoglobulina G) precum: structură osoasă anormală, febră, stare proinflamatorie, dermatoză urticarică neutrofilică la biopsia cutanată. În contrast, boala Erdheim-Chester reprezintă o histiocitoză non-Langerhans și se caracterizează prin osteoscleroză simetrică a oselor lungi cu confirmare radiologică sau scintigrafică. Conclusion. Scintigrafia osoasă a fost prima investigație ce a condus la un posibil răspuns pentru istoricul patologic al pacientului. Pentru a confirma unul din diagnosticele prezumtive obținute la scintigrafia oasoasă, următorul pas ar trebui să fie dozarea imunoglobulinei monoclonale și efectuarea biopsiei osoase pentru a exclude o posibilă infiltrare histiocitară. Key words: scintigrafie osoasă, sindromul Schnitzler, boala Erdheim-Chester.

19. LEZIUNE MUSCULARĂ ACTIVĂ METABOLIC LA EXAMINAREA PET-CT F18-FDG, LA O PACIENTĂ CU CANCER TIROIDIAN PAPILAR


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Introducere: Carcinomul tiroidian papilar reprezintă cea mai frecventă patologie malignă a glandei tiroide, fiind o formă de cancer tiroidian diferențiat. Este o tumoră cu prognostic bun, fiind tratată prin tiroidecтомie totală și/sau radioiodoterapie cu 131I. În cazurile cu determinăria secundare la distanță, cele mai frecvente localizări sunt plămânul, sistemul osos și cerebral. În mod excepțional, pot exista și alte localizări secundare. Prezentarea cazului: Vom prezenta cazul unei paciente în vârstă de 69 de ani, diagnosticată cu carcinom tiroidian papilar. Pacienta a fost tratată prin tiroidecтомie totală și radioiodoterapie, în prezent aflându-se sub medicație substitutivă hormonală tiroidiană.

Datorită persistentei valorilor crescute ale tiroglobulinei, în prezența unor scanări de corp între 1-131 negativă, pacienta a fost referată pentru efectuarea unei examinări PET-CT cu F18-FDG. Aceasta evidențiază prezența unei formațiuni hiperactive metabolic la nivel muscular feșier dreapta și lipsa altor leziuni secundare la distanță. Prin ecografia efectuată ulterior, se observă formățiunea descrisă la examinarea PET-CT. Aceasta este localizată feșier dreapta, la 6 centimetri de marginea superioară a șanțului interfeșier, având de asemenea calcificări intranodulare (patognomonic pentru carcinomul tiroidian diferențiat) și fiind intens vascularizată.
Având în vedere existența leziunii descrise, corelată cu valorile crescute ale tiroglobulinei și aspectul imagistic, s-a recomandat biopsia acesteia. Aspectul ecografic corelat cu nivelul tiroglobulinei și cu rezultatul biopsiei, pledează pentru originea tiroidiană a leziunii.

**Concluzie:** Corelarea datelor clinice, imagistice și de laborator este esențială în abordarea pacienților oncologici. Examinarea PET-CT s-a dovedit utilă în cazul de față, pentru evidențierea leziunilor secundare la distanță, având în vedere și localizarea neobișnuită întramusculară.

Particularitățile cazului: Leziunile secundare musculare în cadrul carcinomului tiroidian diferențiat sunt rare, dar pot fi evidențiate ocazional pe examinările imagistice și trebuie diferențiate de contaminări ale pielii.

**METABOLICALLY ACTIVE MUSCULAR LESION ON F18-FDG PET-CT EXAMINATION OF A PATIENT WITH PAPILLARY THYROID CARCINOMA**


“Prof. Dr. Ion Chiricuta” Institute of Oncology, Cluj Napoca, ROMANIA

**Introduction:** Papillary thyroid carcinoma represents the most frequent malignancy of the thyroid gland, being a differentiated form of this pathology. Treated by total thyroidectomy and/or radioiodine treatment with I-131, it is a tumor with good prognosis. If a distant metastasis occurs, the most affected organs are the lungs, skeletal system and brain as well. In exceptional cases other sites may exist.

**Case presentation:** We report a case of a 69 years old patient, who had been diagnosed with papillary thyroid carcinoma. She was undergoing a total thyroidectomy and radioiodine treatment, currently being on hormonal substitution medication.

Due to the consistent high serum thyroglobulin level paired with a negative whole body scintigraphy scan with I-131, the patient is referred to a PET-CT examination with F18-FDG. The result shows a metabolically hyperactive structure in the right gluteal region, without any other distant lesions.

A local Doppler-US examination reveals the structure described on the PET-CT presenting intense vascularisation and intranodular calcifications (pathognomonic for differentiated thyroid cancer), establishing the exact localization on the right gluteal area at 6 cm from the superior pole of the intergluteal cleft.

Considering the US and PET-CT findings, correlating with the high serum thyroglobulin level and the imagistic characteristics, a biopsy was indicated. The ultrasound aspect, the laboratory findings and the biopsy results suggest a thyroid origin of this lesion.

**Conclusion:** An appropriate treatment plan of an oncology patient is the result of integrating the clinical, imagistic and laboratory findings. In our case report the PET-CT examination had the key role in discovering the distant secondary lesion, even if the intramuscular localization is rare.

**Particularity of this case:** Secondary muscular lesions in the differentiated papillary carcinoma are rare, but they can be an occasional imagistic finding and they could be easily mistaken for skin contamination.

**20.UN SIMPLU CARCINOM TIROIDIAN PAPILAR CE S-A TRANSFORMAT INTR-O DILEMĂ TERAPEUTICĂ**


“Prof. Dr. Ion Chiricuță” Institutul Oncologic, Cluj-Napoca, ROMANIA.

**Introducere:** Fiind cea mai comună formă de cancer tiroidian diferențiat, carcinomul tiroidian papilar este aproape întotdeauna curabil. Provocarea apare atunci când există cazuri cu factori de risc importanți la care nivelul de TG ramâne crescut inclusiv după secvența chirurgicală și terapia cu iod.

**Prezentarea cazului:** Raportăm cazul unui pacient de 18 ani, care s-a prezentat într-un serviciu medical cu o masă latero-cervicală dreaptă asimptomată iar în urma examinarilor medicale specifice s-a decis efectuarea tiroidectomiei totale și limfadenectomiei selective.
AN ORDINARY THYROID CARCINOMA BECOMING A TREATMENT DILEMMA

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Introduction: As it is the most common form of well-differentiated thyroid cancer, Papillary carcinoma (PTC) is almost always curable. The challenging part consists of high risk patients with persistent increased thyroglobulin level, after total thyroidectomy and radioiodine therapy.

Case report: We report a 18-year-old patient’s case, who was admitted for an asymptomatic right latero-cervical mass and after specific exams the patient was transferred for total thyroidectomy and selective lymphadenectomy.

Histopathological analysis confirms a pT3 N1b Mx L1 V0 papillary carcinoma. The decision for radioactive iodine treatment was made given the type and size of the tumor, the perithyroid and lymphatic invasion and the elevated thyroglobulin level (171.7 ng/mL); anti-thyroglobulin antibodies were negative during the course of the disease (anti-Tg<115 UI/mL). At that moment the clinical exam and cervical ultrasound were negative.

The post-therapy I-131 WBS showed minimal radioiodine uptake in thyroid bed. The patient started thyroid suppression therapy. The next check-up was clinical and ultrasound negative, Tg positive (Tg - 126.8 ng/mL); a second radioiodine was administrated, with the WBS negative. Next 5 years the patient had radioiodine therapies (total dose of 638.5 mCi I-131) and 13 oncological check-ups (Tg level fluctuated between 126.6 ng/mL and 290.2 ng/mL), with WBS’s always negative, negative ultrasounds; He had two whole body negative CT examinations, two negative WB-MRI in 2018 and 2019 and three 18F-FDG PET/CT negative examinations during the last 3 years. There was no aggressive progression of Tg and the doubling time was of 19 months.

Because of the absence of structural disease, the treatment with TKI’s was delayed and the option of surveillance was decided. The case was upload on Endo-ERN (virtual Network of European Reference Centers) asking for more opinions about the treatment strategy.

Conclusion: In such complex cases, the cooperation between Reference Centers is crucial for adaptation of the therapeutic strategy.
21. HORSESHOE KIDNEY VISUALISATION: 99MTC-DMSA RENAL SCAN VS ULTRASONOGRAPHY

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Background and Aim: Horseshoe kidney (HSK) is a common congenital renal defect found in 0.25% of the general population. In most instances, both kidneys fuse at their lower poles with the isthmus bridging the two renal masses. HSKs usually demonstrate three anatomical anomalies: ectopic position, malrotation, and variable vasculature.

The purpose of our study was to describe the 99mTc-dimercaptosuccinic acid (DMSA) renal scan aspects and emphasize its importance in a case of HSK which was not diagnosed with ultrasonography.

Materials and Methods: We present the case of a 13-year-old girl randomly diagnosed, using ultrasonography, with a congenital right kidney hypoplasia after a suspicion of urinary tract infection. The negative uroculture dismissed the infection.

We also mention that the urea and creatinine levels were normal. The next step was to send the girl for a 99mTc-DMSA renal scan in order to obtain further informations about differential function and cortical outline status of the right kidney.

Results and Discussions:

Renal ultrasound:
- Small right kidney with a poor corticomedullary differentiation.
- Left kidney with normal dimentions and a corticomedullary interface integrity maintained.

99mTc-DMSA renal scan:

The left renal parenchyma is situated in the left renal fossa and continues at the inferior pole with a reniform parenchyma mass which passes through the medial line and occupies the right renal fossa.

This scintigraphyc aspect is specific for horseshoe kidney, bonded by an isthmic parenchyma.

Conclusion:

99mTc-DMSA renal scan is an essential tool in detection of HSK and a better comprehension of the connecting bridge of the renal parenchyma.

It is indispensable in addition to ultrasonography as it gives, with the minimum of invasivity, functional information and conclusive remarks on drainage pattern, which helps in choosing surgical/non-surgical treatment for appropriate patients.

Key words: Horseshoe Kidney, 99mTc-DMSA Renal Scan, Renal Ultrasound.

22. TRANSPLANTUL AUTOLOG DE CELULE STEM MEDULARE AMELIOREAZĂ FUNCŢIA CINETICĂ DIN ARIA INFARCTULUI MIOCARDIC LA ECG-GATED SPECT

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Introducere: Cardiomiopatia ischemică cu fracţie de ejećţie a ventriculului stâng (FEVS) scăzută post-infarct miocardic acut are o rată de mortalitate şi morbiditate crescută. Mai mult decât atât, tratamentul actual nu se adresează cauzei, ci consecinţelor infarctului miocardic. Celulele stem medulare autologe sunt o posibilă soluţie pentru cazurile de insuficienţă cardiacă post infarct miocardic aflate deja în tratament maximal conform ghidurilor.
**Material și metode:** 20 de pacienți cu infart miocardic anterior și FEVS ≤ 35% la o lună de la evenimentul ischemic acut au fost randomizați fie în grupul cu celule stem injectate intracoronarian, fie în grupul control care nu a primit tratament cu celule stem. Toți pacienții au fost tratați conform ghidurilor și nu mai aveau nicio leziune coronariană semnificativă hemodinamică. Aceștia au fost urmăriți la 1 și 3 luni de la injectarea celulelor stem cu un protocol ce a inclus examinarea clinică, evaluarea calității vieții, markeri inflamatorii, ecocardiografie și tomografie computerizată cu emisie de foton unic ghidată ECG (SPECT ECG-gated).

**Rezultate:** La includere nu au existat diferențe semnificative ale parametrilor evaluați prin SPECT ECG-gated. La 3 luni după injectarea celulelor stem s-a identificat o reducere semnificativă a scorului cinetic în teritoriul arterei descendente anterioare comparativ cu grupul control unde nu s-a observat nicio ameliorare. În grupul activ, cu celule stem, a existat și o reducere a severității și extensiei defectelor din zona arterei descendente anterioare, dar fără semnificație statistică.

**Concluzii:** Celulele stem medulare autologe ameliorează funcția cinetică a ventriculului stâng în zona afectată de infarctul miocardic așa cum se arată prin scăderea scorului cinetic la SPECT ECG-gated la 3 luni de la injectarea celulelor stem.

**Sursa de finanțare:** lucrarea a fost finanțată în cadrul unui grant al Autorității Naționale pentru Cercetare Științifică și Inovare, CNCS/CCCDI UEFISCDI, cu numărul PN-III-P2-2.1-PED-2016-1333, din PNCDI III.

**Cuvinte cheie:** celule stem, cardiomiopatie ischemică, fracție de ejeție a ventriculului stâng, scor cinetic

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**AUTOLOGOUS BONE MARROW STEM CELLS IMPROVES THE KINETIC FUNCTION OF THE INFARCTED AREA AT ECG-GATED SPECT**

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**Introduction:** Ischemic cardiomyopathy with reduced left ventricle ejection fraction (LVEF) after acute myocardial infarction has high morbidity and mortality. Furthermore, the existing treatment does not address the cause, but rather the consequences of myocardial infarction. Autologous bone marrow stem cells may be one possible therapeutics for individuals with heart failure after myocardial infarction and maximal conventional treatment.

**Material and methods:** Twenty patients remaining at one month after anterior myocardial infarction with LVEF ≤ 35% were randomized to either bone marrow stem cells intracoronary injection or to the control group, which did not receive the stem cells treatment. All patients were treated according to the standard guidelines and had no remaining significant coronary lesions. They were followed-up at 1 and 3 month after stem cells injection with a protocol including clinical evaluation, quality of life assessment, inflammatory markers, echocardiography and rest ECG-gated single photon emission computer tomography (ECG-gated SPECT).

**Results:** At inclusion there were no significant differences in the parameters measured at ECG-gated SPECT. At 3 months after stem cell injection there was a significant reduction of the left anterior descending artery (LAD) kinesis score (p=0.05) compared with the control group where there was no significant improvement. In the stem cell group, there was also a reduction in the severity and extension of defects in the LAD area, but without statistical significance.

**Conclusions:** Bone marrow stem cells improves the kinetic function of the left ventricle in the area affected by myocardial infarction as shown at ECG-gated SPECT by the kinesis score decrease at three months after stem cells injection.

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**Keywords:** stem cells, ischemic cardiomyopathy, left ventricle ejection fraction, kinetic score
23. PACIENTII CU CANCER TIROIDIAN DIFERENȚIAT TRATAȚI CU I-131: RECOMANDĂRI INDIVIDUALIZATE DE RADIOPROTECȚIE

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Introducere: Pacienții cu cancer tiroidian diferențiat care beneficiază de radioiodoterapie necesită spitalizare. Normele de securitate radiologică pentru practica de medicină nucleară emitte de către CNCAN impun ca pacienții să primească recomandări legate de măsurile de radioprotecție pe care trebuie să le respecte în perioada următoare după externare. Scopul studiului este acela de a evidenția importanța individualizării recomandărilor pe care pacienții le primesc la externare funcție de debitul măsurat.

Metode: Studiul a efectuat pe un lot de 11 pacienți cu cancer tiroidian diferențiat internați în Laboratorul de medicină nucleară a Institutului Oncologic “Prof. Dr. Ion Chiricuță” din Cluj-Napoca în decurs de 1 lună. Pacienții participanți la studiul (2 bărbați și 9 femei) au prezentat stadiul T1b până la stadiul T4c cu metastaze ganglionare sau pulmonare și cu vârsta cuprinsă între 23-80 ani. Activitatea de I-131 administrată a fost cuprinsă între 1.1GBq și 3.7 GBq, cu o valoare medie +/-SD de 2.78 GBq +/- 0.96GBq. S-au efectuat măsuratori în zile consecutive ale debitului pacienților, iar în ziua externării s-a măsurat și debitul lenjeriei utilizate de către pacienții pe perioada spitalizării.

Rezultate: Cei 11 pacienți internați au fost măsurați repetat, iar valoarea debitului înregistrat la distanța de 1m a fost cuprinsă între 77.4-17 µSv/h în prima zi postadministrație a terapiei cu I-131; pentru a ajunge la valori cuprinse între 10,4 și 1,8 µSv/h după 3 sau 4 zile de spitalizare. În ziua externării fiecărui pacient i-a fost măsurată lenjeria utilizată pe perioada internării. Valorile înregistrate au fost cuprinse între 2,34-41,7 µSv/h, cu o pondere de 54,5% sub valoarea de 10 µSv/h. Rezultatele măsurătorilor efectuate relevă lipsa unei corelații statistic semnificative cu activitatea de I-131 administrată, p=0.736.

Concluzii: Studiul efectuat a evidențiat importanța individualizării recomandărilor privind măsurile de radioprotecție în funcție de valorile debitului măsurat la externarea pacienților, nu a activității de I-131 administrate.

Cuvinte cheie: cancer tiroidian, recomandări de radioprotecție, I-131

DIFFERENTIATED THYROID CANCER PATIENTS TREATED WITH I-131: INDIVIDUALIZED RECOMMENDATION OF RADIOPROTECTION

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Introduction: Patients with differentiated thyroid cancer who receive radioiodine-therapy require hospitalization. Radiological safety standards for nuclear medicine practice issued by CNCAN require that patients receive recommendations on radiation protection measures that have to meet in the next period after discharge. The purpose of the study is to highlight the importance of the individual recommendations that patients receive to discharge depending on the measured flow.

Methods: The study was conducted on a sample of 11 patients with differentiated thyroid cancer admitted in Laboratory of Nuclear Medicine from the Institute of Oncology "Prof. Dr. Ion Chiricuta" of Cluj-Napoca within one months. The subjects (two men and nine women) had T1b stage to stage lymph node and lung metastases T4c and aged between 23-80 years. I-131 activity was between 1.1GBq administrat and 3.7 GBq, with a mean +/- SD +/- 2.78 GBq 0.96GBq. Measurements were performed on consecutive days of patient flow, and in day of discharge was measured even the flow of personal lingerie used by patients during hospitalization.

Results: The 11 patients hospitalized were measured repeatedly, and the recorded flow at 1m distance was between 77.4 to 17 µSv/h on the first day post administration therapy with I-131; to reach values between 10.4 and 1.8 µSv/h after 3 or 4 days of hospitalization. On discharge of each patient was measured personal ligerie used during hospitalization. The recorded values were between 2.34 to 41.7 µSv/h, with a weight of 54.5% below 10 µSv/h. The results of the measurements revealed the lack of statistically significant correlations with activity of I-131 administered, p = 0.736.

Conclusions: The study highlighted the importance of the individual recommendations on radiation protection based on measured flow values to discharge patients not administered activity of I-131

Keywords: thyroid cancer, radiation protection recommendations, I-131
MULTIPLE MYELOMA WITH MUSCULAR AND CUTANEOUS METASTASIS
- TRUE OR FALSE?

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Introduction: Multiple myeloma accounts for 10% of all haematological neoplasia. The course of the disease is difficult and frequently asymptomatic which leads to a very late diagnosis. Imaging identification of the aggressiveness and changing in the course of the disease is mandatory nowadays if we want to offer a personalized treatment.

Case report: We present the case of a 60y old patient with personal history of diabetes treated with oral antidiabetics, hypertension and nasal basocellular carcinoma which is diagnosed with nonsecretory type of multiple myeloma stage III ISS since October 2016. He was repeatedly treated by surgery for a L3 plasmacytoma, last surgical intervention in October 2018, with multiple relapses and evolution to extramedullary plasmacytomas, including a medullary transplant. The initial therapy conducted was 2 cycles of VAD and 5 cycles of Bortezomib-Doxorubicin Liposomal-Dexamethasone, followed by relapses and autologous transplant. In September 2018 an FDG PET/CT was performed which showed multiple bone metastasis, inguinal lymphadenopathies and muscular lesions in the anterior compartment of left thigh. Considering the progressive disease, the therapy was changed with Carfilzomib and Dexamethasone and after 5 cycles another FDG PET/CT was performed showing a significant progressive disease and new muscular lesions, cutaneous and lymphadenopathies with very high FDG uptake. The evolution under the treatment was considered very aggressive so we rise the question of new neoplastic pathology associated with multiple myeloma (cutaneous and muscular metastasis from another primary- melanoma/basocellular carcinoma already known?). We mention that after the FDG PET/CT exam the patient was refer for muscular biopsy and histopathological confirmation.
Conclusion: Despite of the convencional morfological imaging, FDG PET/CT examination is able to identify the asociation of an agressive component in the course of multiple myeloma, the changing in the activity profile by making new cellular clones with high proliferation index and the possibility of detecting new primaries.

Keywords: multiple myeloma, PET/CT, FDG, plasmacytoma

25. EVALUAREA DOZIMETRICĂ POSTRADIOIODOTERAPIE LA PACIENȚII CU HIPERTIROIDISM

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Introducere: I-131 este un izotop radioactiv, cu un timp de înjumătățire de 8,04 zile, cu dezintegrare prin emisia de radiații γ cu energia 364keV și β cu energia 606keV. Tratamentul cu I-131 este utilizat pentru tratarea hipertiroidismului.

Metode: Studiul efectuat în departamentul de Medicină Nucleară al Institutului Oncologic “Prof Dr. Ion Chiricuta” Cluj pe o perioada de 18 luni pe un lot de 21 pacienți (17 femei și 4 bărbați) cu vârsta medie de 48,3 ani. Înainte de a efectua tratamentul cu I-131 pacienții au fost evaluați prin analize de sânge, ecografie tiroidiană, uptake și scintigrafie tiroidiană cu Tc-99m Pt, cu oprirea medicării antitiroidine cu 5-7 zile înainte. Activitatea medie administrată a fost de 236,8 MBq cu o doză minimă de 181,3 MBq și o doză maximă de 228,66MBq. S-au făcut măsuratori ale debitului pacienților la distanța de 1m la interval de 2h, 22h și 72h. Fiecare pacient a pus toate obiectele personale utilizate pe perioada spitalizării în câte un sac de plastic și s-au efectuat măsurători ale debitului la peretele sacului. Radioiodoterapia s-a administrat oral, în capsule, iar valoarea debitului s-a măsurat cu un radiodebitmetru Indirad.

Rezultate: Debitului măsurat, la distanța de 1m, la interval de 2h, 22h și 72h a avut o medie de 12.35 µSv/h (SD±2,63), 8.69µSv/h (SD±1,64) respective 7.21µSv/h (SD±1,14), cu o pondere de 70% sub valoarea de 10 µSv/h la 2 ore. Valoarea medie a debitului măsurată la obiectele pacienților în toate cele 3 măsurători a fost 0,31 µSv/h (SD±0,076).

Concluzii: Rezultatele evidențiază în cazul terapiei din hipertiroidism, faptul că fixarea iodului este aproape integral la nivel tiroidian, fără eliminare cuantificabilă în saliva și transpirație. Recomandările de radioprotecție legate de deșeurile radioactive ale acestor pacienți, nu vor viza aceste aspecte.

Cuvinte cheie: hipertiroidism, debit măsurat, I-131

26. THE ROLE OF 99mTc-TEKTROTYDE SOMATOSTATIN RECEPTOR IMAGING IN THE MEDULLARY THYROID CARCINOMA PROGRESSION

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Background: Medullary thyroid carcinoma (MTC), originating from calcitonin (CT)-producing parafollicular C cells, is a rare form of thyroid cancer and it exhibits more aggressive behaviors. Somatostatin receptor subtypes 2, 3 and 5, expression, has been reported in up to 85% of MTCs. Targeting the MTC with 99mTc-Tektrotyde, using somatostatin analogs as a ligand, seems to show pathological uptakes in MTC patients. The aim of this study was to evaluate MTCs progression by analyzing the imaging data of patients with MTC.

Material & method: We studied, over a 12-month period, 10 patients, mean age 39 years (range: 17-72), histologically proven MTC, from 2 nuclear medicine centers (Clinical Center Kragujevac, Serbia and Department of Nuclear Medicine,
University Emergency Hospital Sf. Spiridon Iasi, Romania). Three patients had biochemical evidence of disease (high calcitonin values), three had stable macroscopic disease, one stable disease and 3 recurrent/progressive disease. Each patient received a 10.57 MBq/kg bw 99mTc Tektrotyd dose. Study design: Early dynamic (60 images, 1 image/second, 128x128 matrix, Zoom 1) acquisition, static (10 minutes/image, 256x256 matrix, Zoom 1), whole body (WB) and SPECT images were acquired at 10 minutes, 2, 4 and 24 hours. Uptake was quantified (counts/pixel) in order to assess quantitatively SRS images for the pathological uptakes and regions of interest (ROI) for each hot pathological area were defined.

**Results:** We quantified 68 pathological uptakes (PU), variable grades Krenning G1-4. 29.4% PU (n=20) were G4, 28% PU (n=19) G3, 32.35% PU (n=22) G2 and 6 (8.8 %) G1. From whole group of MTC patients, 11.7% PU (n=8) were G3 abdominal uptake, 80.88% PU (n=55) G3-4 cervicothoracic uptake and a single G1 lung uptake.

**Conclusion:** SRS imaging are predictors of disease progression. Persistent biochemical evidence of MTC corelated with tumoral markers elevations and SRS pathological images predict disease progression.

**Keyword:** medullary thyroid carcinoma, 99mTc-Tektrotyde

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**27.IMAGINEA ANULUI 2018 ÎN MEDICINA NUCLEARĂ**

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**Introducere.** Investigarea caracteristicilor populației examinată scintigrafic în România are ca scop consolidarea și inovarea practicii de medicină nucleară prin formarea de ghiduri pentru pacient și atragerea de noi resurse.

**Materiale și Metode.** Prezentul studiu este epidemiologic descriptiv retrospectiv și utilizează ca bază de lucrul registru de examinări al Laboratorului de Medicină Nucleară pe anul 2018. Prelucrarea datelor a fost posibilă prin intermediul limbajului statistic R și programului RStudio, iar rezultatele prezentate sub formă grafică s-au realizat cu ajutorul pachetului ggplot2.

**Rezultate.** Cele mai multe examinări au fost necesare pacienților aflați la limitele de vârstă, media fiind de 47,1 ani. Raportul dintre sexe înclină înspre genul feminin într-un quantum de 2:1 și este proporțional cu gradul de urbanizare. Femeile s-au prezentat frecvent datorită cancerului mamar sau afecțiunilor tiroidiane, iar bărbații pentru patologii renale ori adenocarcinom de prostată. Procedurile cel mai des efectuate au fost scintigrafia ososă, apoi renală și tiroidiană. Limfoscintigrafii în mare cerere le-au fost indicate mai frecvent persoanelor din mediul urbane. Există diferențe în ponderea scintigrafiilor în funcție de tipul localității de proveniență. Examinările SPECT/CT au fost necesare la 1 din 7 pacienți, majoritar pentru limfoscintigrafii și scintigrafii paratiroidiane. În 75% din scintigrafii renale dinamice este necesar furosemid. Femeile li s-au efectuat mai multe scintigrafii tiroidiene, paratiroidiene și limfoscintigrafii decât bărbaților, cărora le-au fost indicate mai multe scintigrafii renale.

**Concluzii.** Heterogenitatea practicii de medicină nucleară se oglindește în profilul de activitate al laboratorului, caracterizat de ponderea crescută a scintigrafiilor renale. Pentru definirea statutului medicinii nucleare este esențială caracterizarea populației investigată, de a cărei dinamică trebuie ținut cont în pregătirea specialiștilor și orientarea resurselor disponibile pentru uz optim.

**Cuvinte-Cheie:** Statistică, Medicină Nucleară, Scintigrafie, Demografie.

**THE IMAGE OF 2018 IN NUCLEAR MEDICINE**

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**Introduction.** Investigating the characteristics of the scintigraphically examined population in Romania aims to consolidate and innovate the practice of nuclear medicine by forming patient guidelines and attracting new resources.

**Materials and Methods.** The present retrospective descriptive epidemiological study uses the 2018 Nuclear Medicine Laboratory’s examination register as basis for work. Data processing was made possible through R statistical language and RStudio program. The graphically presented results were made with the help of ggplot2 package.

**Results.** The most examinations were required for patients having extreme ages, averaging 47.1 years. The gender ratio is tilted towards females in a 2:1 ratio and is proportional to the degree of urbanization. Women were frequently sent for breast
cancer or thyroid disease, while men for kidney pathologies or prostate adenocarcinoma. The most frequently performed procedures were bone, then renal and thyroid scintigraphies. Lymphoscintigraphies in high demand have been more commonly indicated to patients from urban environments. There were differences in the percentage of procedures depending on the type of the place of origin. SPECT/CT examinations were carried out in 1 out of 7 patients, in majority for parathyroid and lymphoscintigraphy patients. 75% of dynamic renal scintigraphies require furosemide. Women were indicated more thyroid, parathyroid and lymphoscintigraphic scans than for men, for which the most were renal scintigraphies.

**Conclusions.** The heterogeneity of nuclear medicine practice is mirrored in the laboratory's activity profile, characterized by an increased share of renal scintigraphies. In defining the status of nuclear medicine, it is essential to characterize the investigated population, the dynamics of which must be considered when training specialists and orienting the available resources for optimal use.

**Key Words:** Statistics, Nuclear Medicine, Scintigraphy, Demography.

**28.ARTEFACTELE: O PARTE ESENTIALA IN VIATA UNUI MEDIC DE MEDICINA NUCLEARA**

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**Context:** Medicina nucleară este o examinare imagistica de diagnostic care studiază distribuția unui radioizotop legat de o molecula vector cu o anumită specificitate tisulară. Prezența artefactelor ar putea conduce la dificultăți la interpretarea scintigramei. Sursele artefactelor sunt numeroase, de exemplu, pacientul, tehnica, procedura, radiofarmaceuticul, extravazarea traserului și multe altele. Scopul acestei lucrări este de a prezenta cateva cazuri de artefacte din arhiva laboratorului nostru de medicina nucleară, pentru a evita în viitor aceste situații.

**Material si metoda:** Va prezenta in contul casei artefacte din arhiva noastra din ultimii 4 ani. Le-am selectat pe cele mai interesante si reprezentative, pentru a avea o perspectiva mai exhaustiva in detectarea si rezolvarea acestor situatii.

**Rezultate:** Artefactele intalnite sunt in principal legate de scintigramele osoase si renale, dar pot fi gasite si in alte tipuri de explorari. Imaginile aditionale au rezolvat problema, la fel ca si alte solutii, daca impedimentul e persistat.

**Discuții:** Artefactele pot aparea din diferite surse, de aceea este de o importanta capital sa le recunoaste. Cum complexitatea echipamentului de imagistica se marea, si plutos de artefacte este in crestere. O buna intelegere a instrumentarului si a radiofarmaceuticului este esentiala pentru recunoastera si corectarea artefactelor. Majoritatea acestora pot fi rezolvate prin imagini aditionale sau prin adaptarea protocolului imagistic. De asemenea, corelatia cu alte tehnici imagistice pot furniza medicului informatii vitale pentru un diagnostic exact.

**Concluzii:** Artefactele pot conduce la diagnostic gresite si astfel procedurile premargoatoare acestuia pot fi influentate decisive. Similar altor tehnici imagistice, artefactele din medicina nucleara pot fi rezolvate prin imagini suplimentare, pentru o mai buna intelegere a originii si localizarii acestora, cu scopul unei abordari medicale personalizate.

**Cuvinte cheie:** artefacte, medicina nucleara, diagnostic

**ARTEFACTS: AN ESSENTIAL PART OF A NUCLEAR MEDICINE PHYSICIAN LIFE**

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**Background:** Nuclear medicine is a diagnostic imaging examination that studies the distribution of a radioisotope bound to a vector molecule that has a certain tisular specificity. The presence of artefacts could lead to difficulties in scintigram interpretation. Artefacts sources are numerous, for instance the patient, technique, procedure, radiopharmaceutical, tracer extravasation and many others. The aim of this paper is to present a few cases of artefacts from our nuclear medicine laboratory archive in order to avoid these situations in the future.
Material and Method: We present a few cases of artefacts from our archive from the last 4 years. We selected the most interesting and representative cases in order to offer a more comprehensive aspect in detecting and ultimately solving this type of situation.

Results: The artefacts we encountered are mostly related to renal and bone scans, but there were also artefacts detected on others types of scintigraphy. Additional imaging resolved the issue, so did different solutions, if the problem persisted.

Discussions: Artefacts can arise from many sources and therefore it is of utmost importance to recognize them. As the complexity of scintigraphic imaging equipment increases, so does the number and types of artifacts. A clear understanding of instrumentation and radiopharmaceuticals is essential for recognition and correction of imaging artefacts. Many artefacts can be solved by means of additional imaging or by adapting the imaging protocol. Furthermore, correlation with other imaging techniques can provide the nuclear medicine physician with information that can lead to a more accurate diagnosis.

Conclusions: Artifacts may lead to miss diagnoses and therefore diagnostic and therapeutic procedures may be influenced decisively. Nuclear medicine artifacts, like all imaging techniques, are resolved by additional imaging in order to better assess the location and origin of the artefact for a personalized management approach.

Key words: artefacts, nuclear medicine, diagnose

29. ROLUL DIAGNOSTIC AL IMAGISTICII FUNCŢIONALE PENTRU O FORMAŢIUNE SOLITARĂ ADRENALĂ ASOCIATĂ CANCERULUI DE SÂN – PREZENTARE DE CAZ

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Introducere: Carcinomul ductal invaziv (CDI) este una din cele mai frecvente cauze ale neoplaziilor sânului, cu un procentaj de aproximativ 85% din totalul acestora. Leziunile secundare frecvent întâlnite sunt localizate: pulmonar, hepatic, cerebral și osos. Metastazele solitare adrenale secundare carcinomului de sân sunt extrem de rare. A fost studiat pattern-ul metastatic al cancerului de sân, iar în acel lot de paciente nu s-a găsit nicio metastază solitară adrenală. Scopul nostru este de a prezenta cazul unei paciente cu CDI și leziune solitară adrenală.

Material și pacienți: Prezentăm cazul unei paciente în vârstă de 72 ani ce a fost diagnosticată cu carcinom ductal invaziv, netratat (G1, scor Nottingham 4). Pacienta a fost supusă investigațiilor de rutină (CT toraco-abdominal) privind excluderea leziunilor secundare, astfel rezultatul imagistic a decelat prezența unor noduli tiroidieni și o formațiune nodulară suprarenaliană stângă cu wash-out și unități Hounsfield sugestive pentru malignitate. În aceste condiții pacienta a fost internată în Clinica de Endocrinologie Iași unde s-a efectuat bilanțul hormonal suprarenalian și s-au continuat investigațiile nodulilor tiroidieni. Rezultatul bilanțului hormonal a fost normal: Cortizol seric, cortizol liber urinar, ACTH, Serotonină, 5 HIA, metanefrine urinare, în acest fel excludându-se caracterul secretor al formațiunii nodulare suprarenaline. Pentru evaluarea nodulilor tiroidieni s-a efectuat punctie aspirație cu ac în având caracter de benignitate. Acest rezultat coroborat cu rezultatele negative ale Calcitoninei și PTH au exclus o neoplazie endocrină multiplă. Pentru a confirma aceeași apartenență a carcinomului ductal invaziv cu formațiunea adrenală, am efectuat scintigramă ⁹⁹mTc – MIBI scanare corp întreg ce a arătat fixarea MIBI în cele două formații.

Concluzii: Raportăm cazul rar al unei formațiuni unice adrenale asociate carcinomului ductal invaziv în care scintigrama MIBI corp întreg ne poate confirma supoziția originii tumorale pentru cele două formațiuni, urmând a avea diagnosticul histopatologic de certitudine.

Cuvinte cheie: carcinom de sân, formațiune suprarenaliană, ⁹⁹mTc – MIBI scanare corp întreg
FUNCTIONAL IMAGING AS A DIAGNOSTIC TOOL FOR SOLITARY ADRENAL MASS AND BREAST CARCINOMA

CASE REPORT

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Introduction: Invasive ductal carcinoma (IDC) is the most common histological type of breast cancer, accounted for up to 85% of all invasive breast carcinomas. The common areas of solitary metastasis are lung, liver, brain and bone. Isolated adrenal metastases are rare in this type of carcinomas, especially when they originate from IDCs. Metastatic patterns of breast cancer were reported and no one in that study had adrenal metastasis. Our aim is to present a case report of a patient with IDC and adrenal solitary mass.

Material and patient: We report a case of a 72 year-old women with 6 year history of non-treated IDC (G1 Nottingham 4). The patient performed thoracic and abdominal computer tomography to exclude secondary lesions. Imaging results revealed heterogeneous thyroid structure with nodules and a left solitary adrenal mass (31 mm) with wash-out and Hounsfield units suggestive for malignancy. Due to the presence of thyroid nodules and left adrenal mass, she was admitted to the Endocrinology department for further investigations. Hormonal tests were normal: Cortisol (serum and urinary), ACTH, Serotonin, 5HIA, metanephrines (urinary), thus excluding secretory adrenal mass. Also normal results of thyroid fine needle aspiration biopsy and Calcitonin, PTH, excluded multiple endocrine neoplasia. To confirm the association between breast carcinoma and adrenal mass we performed 99m Tc – MIBI whole body scan which revealed that both formations uptake the radiotracer.

Conclusion: This is a report of a rare solitary adrenal mass associated with breast carcinoma. Given the rarity of solitary adrenal metastasis, the recommended treatment is still unclear, and must be personalized. Functional imaging supports our strong supposition in this particular case that solitary adrenal mass could be secondary to breast carcinoma, going to have further histological confirmation.

Key words: breast carcinoma, adrenal mass, 99m Tc – MIBI whole body scan
TEACHING FILES
FALSE POSITIVE RESULT OF BONE METASTASES IN A CASE OF PANCREATIC GLUCAGONOMA. CASE PRESENTATION

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Introduction: Glucagonoma is a rare tumor of pancreatic alpha cells, resulting in excessive glucagon production characterized by hyperglycemia through gluconeogenesis and lipolysis, and clinically by transient necrotic erythema present in 70% of patients and diabetes in approximately 80% of cases, caused by the imbalance between insulin and glucagon.

Case presentation: 46-year-old patient diagnosed with G1 glucagon-secreting pancreatic caudal neuroendocrine tumor. Personal history: two-year insulin-dependent diabetes mellitus, deep left ileo-femoral-popliteal venous thrombosis, disseminated pustular psoriasis in treatment with methylprednisolone, severe osteoporosis with spinal cord compressions, croup fractures, left trochanteric lesion induced by glucocorticoid treatment, hypoalbuminemia and transient migratory necrotic erythema under somatostatin analog therapy.

Management and Results: Following the CT examination, a net contoured solid tumor formation of 3.5/4.4 cm is described in the pancreatic caudal region with solid satellite nodules. Whole-body bone scintigraphy has raised the suspicion of bone secondary determinations (vertebral, cranial, right scapula, left femur). Immunohistochemical and cytological assays support the diagnosis of well differentiated neuroendocrine proliferation, G1, Ki67 positive 2%. PET/CT examination with F18-FDG reveals an atypical intense metabolic activity for a well-differentiated G1 neuroendocrine tumor with no active metabolic metastases.

Discussion and conclusion: The case presents an example of false positive bone scintigraphic result of glucagonoma metastasis, in the absence of a detailed history and a SPEC/CT examination, as well as the increased avidity for F18-FDG, atypical for a NET G1 tumor.

Key words: glucagonoma, scintigraphy, PET/CT, false positive
DIAGNOSTICUL DIFERENȚIAL ȘI STABILIREA CONDUITEI TERAPEUTICE PENTRU O TUMORĂ OSOASĂ SCAPULARĂ SUPRASPINOASĂ PRIN SCINTIGRAFIA OSOASĂ ÎN TREI FAZE VERSUS ALTE TEHNICI IMAGISTICE

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Pacient 41 ani, diagnostic clinic, Rx, CT, ecografie de părți moi: tumoră malignă supra-spinoasă a omoplatului stâng. Fără fenomene locale celsiene evidente.

RADIOGRAFIE: Tumoră scapulară supraspinoasă, zone de distrucție osoasă, deformări ale corticalei; aspect de sarcom osos, puțin probabil metastaza unică, exclude osteomielita.

ECOGRAFIA de părți moi: Distrucție extinsă a corticalei osoase, întreruperi periostale, aspect tumoral (sarcom?). RMN: Colecția intraarticolară scapulo-humerală importantă (abcens?). Aspect inflamator al musculaturii periarticulare. CT: Aspect de tumoră condromatoasă scapulară primitivă malignă.

REPETARE RADIOGRAFIE: Zonă osteolitică imprecis delimitată, interesând procesul coracoid, posibil sechestru osos. Nu poate diferenția abces / proces malign, eventual suprainfectat.


CONDUITA TERAPEUTICĂ: Pacientul refuză propunerea ortopedului de amputare a brațului și centurii scapulo-humerale.

Biopsie osoasă chirurgicală din zona supraspinoasă, examen morfopatologic, însămânțare pe medii de cultură. Intraoperator: aspect osos tumoral. Externare, tratament ambulatorial două săptămâni cefalosporine + ciprofloxacina.


CONCLUZIE: Scintigrafia osoasă în trei faze este foarte performantă în evaluarea diferențiată a imaginilor segmentale și corp întreg. Diagnosticul de tumoră osoasă primitivă malignă pus exclusiv prin tehnici imagistice morfologice este riscant.

Cuvinte cheie: Scintigrafie osoasă, sarcom, metastază osoasă, osteomielită, diagnostic diferențial imagistic

TUMORI PRIMARE ASOCIATE CANCERULUI TIROIDIAN

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Introducere: Incidența patologiilor neoplazice este în creștere continuă, fiind legată de expunerea individului la factori de risc predispozanți, existența unei condiționări genetice, vârsta, sexul etc. Cancerul tiroidian este cea mai frecventă patologie neoplazică endocrină al cărei tratament presupune cel mai frecvent chirurgie și radioiodoterapie. Apariția unui proces malign asociat cu neoplasia tiroidiană nu este o raritate. Rata aparținerii unei neoplasm asociat cu cancerul de tiroidă raportată literatură este de 13,1% pentru sexul masculin și de 13,7% pentru sexul feminin.

Metode: Studiul actual s-a desfășurat în Institutul Oncologic “Prof. Dr. Ion Chiricuță”, Cluj-Napoca. S-au luat în evidență pacienți cu neoplasii primari asociați cu cancerul tiroidian. S-au studiat 50 de pacienți, dintre care 32% au avut cancer mamar, 24% melanom, 26% cancer colorectal, 18% broncho-pulmonar.

Rezultate: Au fost inclusi în studiu 50 de pacienți, dintre care 32% au avut cancer mamar, 24% melanom, 26% cancer colorectal, 18% broncho-pulmonar. Majoritatea cazurilor a fost de sex feminin, tipul de asociere cel mai frecvent a fost de tip metaconon
cu un procentaj de 77% față de cel sincron 23%. O singură pacientă a fost identificată cu trei cancere primare asociate, repectiv neoplasm tiroidian, colo-rectal și melanom, la care s-a testat mutația BRAF V600E din toate tipurile de tumoră.

**Concluzii:** Sunt puține studii care abordează tema cancerelor primare asociate, deși ele sunt importante atât din punct de vedere a evaluării, supravegheii cât și a conduitei terapeutice la acești pacienți.

**Cuvinte cheie:** glanda tiroidă, cancer tiroidian, neoplasme asociate

**Referințe**


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PRINCIPAL TUMORS ASSOCIATED WITH THYROID CANCER

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Introduction: The incidence of cancer is steadily increasing worldwide, being related to the exposure of the individual to predisposing risk factors, the existence of genetic conditioning, age, gender, etc. Thyroid cancer is the most common endocrine cancer whose treatment involves usually surgery and radioiodine therapy. The occurrence of a malignant process associated with thyroid cancer is not a rarity. The rate of occurrence of a primary neoplasm associated with thyroid cancer reported in the literature is 13.1% for males and 13.7% for females.

Methods: The present study was conducted at the Institute of Oncology "Prof. Dr. Ion Chiricuță", Cluj-Napoca. We conducted a retrospective study to identify patients with thyroid cancer and an associated primary malignancy. We included in our study patients who underwent oncological control during November 2016 - April 2017 in our department for thyroid cancer, who in association presented another primary malignant tumor.

Results: 50 patients with thyroid cancer and other associated primary neoplasms were enrolled in this study. We identified 16 cases of breast cancer (32%), 12 cases of melanoma (24%), 13 cases of colorectal cancer (26%), 9 cases of bronchopulmonary neoplasm (18%). Most cases were female, the most common type of association was metachronous with 77% of the cases, while 23% were synchronous. One patient was identified with three associated primary cancers, in particular, thyroid cancer, colorectal cancer and melanoma, the BRAF V600E mutation was tested in all tumor types.

Conclusions: There are few studies addressing the issue of associated primary malignancies, although they are important both in terms of evaluation, supervision and treatment in these patients.

Key words: thyroid gland, thyroid cancer, associated primary tumors

References


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33. STRUCTURAL AND FUNCTIONAL IMAGING ASPECTS OF NEUROENDOCRINE CARCINOMA OF THE CERVIX: A CASE REPORT

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Background and Aim: Neuroendocrine carcinoma of the cervix (NECC) is an aggressive histological variant accounting for about 1–1.5% of all cervical cancers. Small cell carcinomas (NEC) is the most common type of NECC. It is more likely to invade the lymphovascular space and to spread to the regional lymph node basin at the time of diagnosis. The purpose of our study was to describe the imaging aspects in a case of NECC and to look for a theranostic approach to treat it.

Materials and Methods: We present the case of 70-year-old woman diagnosed with NECC (small cell NEC). After uterine curettage and electrical conization, followed by chemotherapy, she was sent for a ⁹⁹ᵐTc-HDP bone scan in order to obtain further informations about the nature of a lesion described on a follow up MRI on the left ischium and to look for other possible bone metastasis.

Results and Discussions:
- Anatomopathological exam: a neuroendocrine cervical small cell carcinoma (poorly differentiated).
- Immunohistochemical exam: positive Chromogranin A, Synaptophysin and Ki67.
- Abdominal and pelvic MRI: the exact topography and extension of the neoplasia. Four metastatic sites were discovered in the liver and one nodular lesion at the base of the right lung.
- Thoracic CT scan: a pulmonary nodule on the right lung.
- A follow up MRI (6 months after the first MRI): a possible metastatic lesion on the left ischium. No other aspects of active disease were discovered.
- ⁹⁹ᵐTc-HDP bone scan: A high uptake on the left ischium (corresponding to the MRI description) and an other one on the mid shaft of the tibia, which could have a metastatic etiology.

The theranostic approach with the use of somatostatin analogues was not possible in this case because of the high value of Ki67 (40-50%).

Conclusion: MRI, CT and ⁹⁹ᵐTc-HDP bone scan are essential tools in the pre and post-therapeutic assessment of NECC for local staging and to determine the extent of nodal and metastatic spread.

In our case, the patient has simultaneously liver, lung and bone metastasis which is rarely described.

Key words: Neuroendocrine carcinoma of the cervix, ⁹⁹ᵐTc-HDP bone scan, metastasis.
Background. Lung cancer is still considered the biggest cancer killer in Europe with more than 410,000 people diagnosed every year and with the highest mortality rate among all cancers. Epidermal growth factor receptor (EGFR) mutation status is the most valuable indicator for the screening of pulmonary adenocarcinoma patients. Patients who are EGFR negative have poor prognoses compared to those with the EGFR mutation since they don’t have a specific inhibitor to be the first line of treatment; additionally, patients diagnosed directly with cutaneous metastasis adds a worse prognosis. Methods. We present the case of a 65-year-old man diagnosed with EGFR negative lung adenocarcinoma randomly discovered after investigating some cutaneous nodules that have been found to be metastases. 18F fluorodeoxyglucose-positron emission tomography (18F-FDG PET/CT) has been perform to evaluate the therapeutic response.

Results. Multiple areas of hypermetabolism have been discovered at the level of anterior segment of LSL, mediastinal adenopathies, upper right renal adenopathy, masses over both adrenal glands, infrarenal right adenopathic block which extends to the spine without invading it, getting down to the right iliac crest and in the muscle of the neck, upper anterior wall of the left hemitorax and left thigh also osteolysis in the T6, T8 vertebral bodies and L1 osteocondensation with a high probability to be metastasis.

Discussions. The patient had progressive disease under chemotherapy, subsequently undergoing immune therapy with stationary state which strengthens the importance of targeted treatment and of 18F-FDG PET/CT scan to evaluate the therapeutic response.

Conclusion. Stage IV lung cancer portends an extremely poor prognosis. Standardized uptake value (SUV) measured by 18F-FDG PET/CT associate with tumor aggressiveness can provide additional prognostic information and it’s crucial for the evaluation of the therapeutic response.

Key words: lung cancer, EGFR mutation, cutaneous metastasis, PET/CT.

**Cuvinte cheie:** dilatare ischemică tranzitorie de efort, ischemie miocardica, gated SPECT

Referințe:

**LEFT VENTRICULAR TRANSIENT ISCHAEMIC DILATION: A CASE REPORT**

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Transient ischaemic dilation (TID) is a phenomenon induced by the presence of extensive subendocardial ischaemia, generating an increase in the left ventricular cavity on the post-exercise images, compared to rest images. The scintigraphic aspect is specific to multivessel disease or main trunk stenosis with hemodynamic significance. We present the case of a 66-year-old female diabetic, no typical chest pain, with a history of double aortic coronary bypass. Gated SPECT revealed transient exercise-induced dilation, with a TID index of 1.31, normal values of end-systolic volumes at stress and rest and
significant abnormalities of ventricular performance at stress. Perfusion images showed rest abnormalities and extensive stress ischaemia. The scintigraphic findings were validated by invasive exploration: multivessel pathology, involvement of left main coronary and venous graft occlusion. Percutaneous coronary intervention (PCI) was performed, with good clinical outcome. Scintigraphic examination is useful in establishing the eligibility for invasive exploration and in guiding the revascularization therapy.

**Key words:** transient ischaemic dilation, miocardial ischemia, gated SPECT

**References:**


PET / CT WITH F18-FDG EXAMINATION VERSUS SOMATOSTATIN RECEPTOR SCINTIGRAPHY IN A PATIENT WITH NEUROENDOCRINE ILEAL G2 TUMOR

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Introduction: Neuroendocrine tumors are tumors developed from multipotent stem cells migrating from the neural crest. These tumors develop from enterocromaphin cells located in neuroendocrine tissue spread throughout the body. Their morphological classification proposed by WHO is based on the Ki67 proliferation index in G1 tumors (≤2% - highly differentiated), G2 tumors (3-20% - moderate differentiated) and G3 tumors (≥20% - low differentiated). The gold standard method for identifying an occult primary neuroendocrine is neuroendocrine scintigraphy or specific PET/CT examinations with somatostatin analogs radiotracers that attach themselves to somatostatin receptors (Ga68-DOTATE and 111In-Pentetreotide or 99mTc-Tektrotyd).

Diagnosis and Results: We present the case of a patient with non-specific gastrointestinal symptoms diagnosed following a routine ultrasound with liver tumor formations; the bioptic examination performed revealed hepatic metastasis of neuroendocrine carcinoma G2.

For the identification of primary tumor, because somatostatin analogs are not available, a F18-FDG PET / CT test is indicated which revealed metabolic inactive to F18-FDG metastasis of the liver, and moderately metabolic active retroperitoneal ganglionic metastasis. The exact location of the primary tumor was not identified. The scintigraphic examination revealed: an intense accumulation of the specific radiotracer in the ileal primary tumor and secondary giant lymph node of the left common iliac.

Conclusions: The case represents an example of a false negative result of an occult primary G2 neuroendocrine tumor on the F18-FDG PET/CT examination but was identified following a scintigraphic examination with somatostatin analogs radiotracers (99mTc-Tektrotyd) highlighting the limits of both methods.

Key words: neuroendocrine tumor, PET / CT, neuroendocrine scintigraphy, false negative.

37. DUPLICAȚIA RENALĂ: 99mTc –DTPA ȘI 99mTc-DMSA ÎȘI UNESC FORȚELE PENTRU A DETERMINA FUNCTIA ȘI VIABILITATEA

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Introducere: Anomaliile renale congénitale reprezintă cea mai comună malformație, însumând aproximativ o treime din totalul anomaliilor fetale. Incidența duplicației renale este de aproximativ 1%. Scintigrafia renală este frecvent utilizată pentru evaluarea funcției fiecărei rînchi, iar în completarea sa poate fi efectuată scintigrama renală statică pentru a identifica viabilitatea și cicatricile renale. Particularitatea cazului este determinarea funcției și viabilității folosind două proceduri scintigrafice distincte, în cazul unei duplicații renale cu istoric de infecții renale repetitive.

Metodă: Pacienta în vârstă de 2 ani a fost diagnosticată postnatal consecutiv infectiilor urinar repetate, prin URO-CT, cu duplicație reno-pielo-ureterală bilaterală, hidronefroză a unității superioare a rinichiului stâng și ureterocel drept. În prima zi a fost realizată nefrograma cu 99mTc-DTPA imediat după injectarea i.v. a radiofarmaceuticului, urmată de administrarea Furosemidului în minutul 1, iar în ziua următoare a fost efectuată o renogramă cu 99mTc-DMSA.

Rezultate: Nefrograma a decelat o funcție aparent normală pentru rinichiul stâng după administrarea diureticului, cu mențiunea unei funcții mai reduse a polului renal superior comparativ cu cel inferior. În cazul rinichiului drept s-a evidențiat o obstrucție mecanică incompletată, care ulterior a fost cuantificată. Scintigrama renală relevat dimensiuni scintigrafice diferite ale rinichiului drept comparativ cu cel stâng.

Discuții: Renograma și nefrograma sunt investigații complementare folosite pentru a evalua o malformație renală complexă din perspective diferite. Nefrograma cu 99mTc-DTPA determină funcția fiecărei unități a rinichiului afectat în cadrul
DUPLICATE KIDNEY: 99mTc-DTPA AND 99mTc-DMSA JOIN FORCES FOR FUNCTION AND VIABILITY

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Background: Congenital renal anomalies are the most common malformation types, representing almost a third of fetal anomalies. Duplex kidneys have an incidence of approximately 1%. Dynamic renal scintigraphy is used to determine the functionality of each kidney. In addition to the nephrogram, static renal scintigraphy can be done to assess viability and scarring. The particularity of our case is determining the functionality and viability using two distinctive scintigraphic procedures in a case of bilateral duplicated kidney and repetitive urinary tract infections.

Method: Our 2 years old patient was diagnosed postnatally by URO-CT, subsequent to repetitive urinary tract infections, with bilateral renopieloureteral duplication, left superior unit hydronephrosis and right ureterocele. In the first day it was performed a nephrogram with 99mTc-DTPA immediately after the iv injection of the radiopharmaceutical and Furosemide administration in the first minute. In the next day a renal scan with 99mTc-DMSA was added.

Results: The nephrogram revealed an apparent normal function for the left kidney after the diuretic with the upper pole functioning less then the inferior pole. The right kidney revealed an incomplete mechanical obstruction that was later quantified. The renogram unveiled modified scintigraphic dimensions of the right kidney compared to the left.

Discussions: The renogram and nephrogram are complementary investigations used to approach a complex renal malformation from different points of view. 99mTc-DTPA dynamic renal scan is able to determine the functionality of each unit of the affected kidney in the context of bilateral renal duplication, owing to it’s specific uptake mechanism (glomerular filtration). 99mTc-DMSA can evaluate the viability and post-infection scarring, due to its cortical uptake.

Conclusion: In our particular case, dynamic and static renal scintigraphy can determine the functionality and viability of each kidney for a personalized management and treatment approach.

Key words: bilateral duplicated kidney, furosemide test, nefrogram, renogram

38. THE ROLE OF F₁₈-FDG PET/CT BRAIN SCANNING IN PATIENTS WITH ONCOLOGICAL PATHOLOGY FOR ASSESSMENT OF PITUITARY METABOLISM: PRIMARY TUMORS, METASTASIS OR PHYSIOLOGICAL UPTAKE AND SUBSEQUENT MANAGEMENT

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Introduction: The F₁₈-FDG PET/CT scanning protocol for most oncological pathologies includes assessment from the base of the skull up to mid-femoral bones. This article highlights the importance of including brain scan in oncological patients for the evaluation of pituitary metabolism and possible incidentalomas.
Materials and Method: The article includes 4 cases with different oncological pathologies: thyroid folliculo-papillary carcinoma, typical pulmonary neuroendocrine tumor, small cell lung carcinoma and parotid adenocarcinoma. Included in the multidisciplinary therapeutic management for their pathologies, patients were evaluated with F18-FDG PET/CT scans, which included the cerebral region. Although the assessment of cerebral metabolism is difficult to assess properly due to increased glucose consumption, the pituitary gland can have varying degrees of radiopharmaceutical uptake.

Results: The study includes 4 patients with different cancers, known or not with pituitary abnormalities. Following the F18-FDG PET/CT evaluation, the pituitary metabolic status is particular for each patient.

We would also like to mention that the incidence of pituitary findings identified on F18-FDG PET/CT scans performed in our medical department is 0.04% out of over 8000 scans.

Conclusions: Given the particularities of hybrid imaging in pituitary metabolism assessment, we consider that brain scans should be performed in all F18-FDG PET/CT scanning protocols, while taking into account the possible findings: primary tumors, metastases, functioning/non-functioning adenoma, normal functioning pituitary gland with increased metabolic activity - artifact. In order to identify the causes of abnormal findings we recommend further tests including contrast enhanced MRI for pituitary gland and endocrine and metabolic evaluation.