ABSTRACTS

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ABSTRACTS

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Plenary Session I

1. Prospectus of Fluorine -18 labeled Radiopharmaceuticals beyond ^{18}F[FDG] in Diagnostic Molecular Imaging.

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ABSTRACT

Molecular imaging is the visualization, characterization, and measurement of biological processes at the molecular and cellular levels in a living system. At present, Positron Emission Tomography-Computed Tomography (PET/CT) is one the most rapidly growing areas of medical imaging, with many applications in the clinical management of patients with cancer. The 110 min half-life of fluorine-18 has firmly established itself as the radionuclide of choice for imaging applications since it allows for longer data acquisition for dynamic imaging studies and high-count rates for metabolite analyses which are required for quantitative PET imaging studies.

The use of [^{18}F]FDG for PET imaging has considerably improved diagnosis and patient management in oncology, cardiology and neurology. Despite of its high specificity and sensitivity, it is also evident that FDG is not a "specific" radiotracer for imaging malignant disease. Highly "tumor-specific" PET radiopharmaceuticals are essential to meet the growing demand of radioisotope-based molecular imaging technology. The uptake of FDG by tumor tissue depends on plasma glucose levels. The absolute tumor uptake of FDG may not necessarily reflect tumor aggressiveness and the rate of tumor proliferation, which lead to false-positive and false-negative imaging data. In case neurology, psychiatry and brain tumors, the high background uptake of [^{18}F]FDG hampers resolution of PET-CT imaging. The higher accumulation of FDG in the Inflammatory cells than tumor cells often lead to the failure of discriminating between malignancy and infection/inflammation.

A numerous more specific ^{18}F labelled radiotracers have been developed and applied in neuroscience and oncology. The advances in radiotracer chemistry, especially the nucleophilic substitution reaction, have played the crucial role in synthesizing various ^{18}F-labeled radiotracers for PET. The aim of this report is to provide an overview of some recent advances in the development of non-[^{18}F]FDG PET radiopharmaceuticals and their current clinical applications in neuroscience and oncology as well as some future prospectus.

Keywords: Fluorine -18 labeled radiopharmaceuticals non-[^{18}F]FDG radiopharmaceuticals, [^{18}F]FDG, oncology, cardiology, neurology and inflammatory PET-CT imaging.

2. Melanoma and the role of PET-CT

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ABSTRACT

Introduction: Melanoma is a malignancy derived from the malignant transformation of melanocytes the pigment containing cells, predominantly in skin. In 2022, there were an estimated 330,000 new cases of melanoma diagnosed worldwide, and almost 60,000 people died from the disease. The incidence of melanoma appears to be on a steady rise throughout the world. The International Agency for Research on Cancer (IARC) predicts that the number of new cases of melanoma will increase by more than 50% from 2020 to 2040.

Positron Emission Tomography with Computed Tomography (PET/CT) is a valuable imaging method for the evaluation of malignant diseases both in diagnosis and prognosis of therapy. As melanoma lesions are mostly FDG-avid, whole-body PET/CT imaging modality is very useful. In the presentation, it is intended to share the clinical experience in our hospital.

Methods and Materials: Five-year (Feb 2020 – Jan 2025) data of histologically proven melanoma cases attended at the department of Nuclear Medicine and Molecular Imaging, Evercare Hospital Dhaka are taken into account. 15 patients (F9, M6) with the age range of 23-70 years having a mean of 49.5 years had a total of 20 WB PET-CT scans.

Results: Out of the 15 patients, 11 had cutaneous, 3 had rectum & anal canal (mucosal) and one had eye (choroidal) involvement. One was a cutaneous carcinoma-in-situ. Eight had distant metastases. The findings and outcome are evaluated and discussed in the presentation.

Conclusion: Melanoma is a deadly cancer with high metastatic potential. Accurate staging at initial diagnosis and monitoring for new or progressive disease are essential to guide management decisions. Recent advances of new targeted PET imaging agents that may provide further information on disease progression, response to therapy, and extent of disease, will pave a better path of how the disease is imaged and treated.

Keywords: Melanoma, PET/CT, targeted PET imaging, FDG

3. Prof. Dr. Kamaluddin Ahmed Oration

The Impact of Thyroid Hormone in Initiation, Maintenance and Outcome of Pregnancy, Physiopathology and Management

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ABSTRACT:

Procreation is a fundamental process to sustain life in the earth. Mother is honored to have the right of pregnancy only. It is female reproductive system and female hormones that play prime role in gestational process. Mother's ovary produces ovum, fertilized ovum implants in the uterine endometrium and finally developed as a full fetus with complex process. The Thyroid Hormones (TH) play vital role in initiation, maintenance and outcome of Pregnancy

in its every step, and give vigour and high IQ. TH transported to the cell, the genomic or non-genomic effects directly influences gene transcription and involves rapid cellular changes. It modulates mitochondria for the process of development and growth of fetus. For the production of TH iodine is an essential component along with healthy thyroid cells. Iodine intake should be sufficient to produce sufficient TH as its demand increased in pregnancy by two-fold. Even in iodine-sufficient European countries pregnant women may be at risk of ID. The prevalence of overt and subclinical hypothyroidism (SCH) in the general population is about 0.5–1% and 5.3–9.5%, respectively. Maternal hypothyroidism has increased risk of infertility or subfertility, anovulation, menstrual irregularity, abortion, preterm delivery, low birth weight, fetal distress, intrauterine growth restriction, impaired neuropsychological development. Overt hypothyroidism is also having the risk of hypertension, preeclampsia and abruptio placentae.

In Grave's disease (GD) or auto-immune thyroid disease TH production is altered and as result pregnancy process may be hampered. Prevalence of hyperthyroidism in women is 1.3%, associated with increase antibodies against the TSH receptor. About 5.8% and 2.1% of women with hyperthyroidism have primary and secondary infertility respectively, menstrual irregularity, increased follicular atresia, and ovarian cysts disease. Hyperthyroidism has effect on the fetus as fetal goiter, intrauterine growth restriction, small for gestational age, stillbirth and thyroid dysfunction etc.

Treatment of thyroid disorders (TD) during pregnancy slightly differ from pre-pregnancy. It is safer both for mother and fetus if TD could be diagnosed and managed before pregnancy. TSH greater than 10.0 mU/L should start treatment even when FT_3/FT_4 are within ranges. If hypothyroidism has been diagnosed before pregnancy, adjustment the dose to reach TSH level not >2.5 mIU/liter, dose usually incremented by 4 to 6 weeks gestation and may require 30% or more increment. The serum FT_4 value to be in the upper normal range. Overt case diagnosed in pregnancy, TSH should be normalized rapidly by giving high dose. Euthyroid with antibody positive to be monitored TSH regularly, TSH >2.5 mU/L, treatment to be started.

Transient hyperthyroidism may be with hyperemesis gravidarum and gestational transient thyrotoxicity, likely resulting from the stimulatory effect of HCGn. Subnormal serum TSH concentration is detected during early gestation, hyperthyroidism must be distinguished from both normal physiology of pregnancy and GD. Propylthiouracil (PTU) recommended as the first-line drug during the 1st trimester of pregnancy. As methimazole (MMI) have side effect in 1st trimester in organogenesis. MMI may also be prescribed if PTU is not available or if intolerable or has adverse response to PTU. MMI 10 mg is equivalent100-150 mg PTU. The maternal FT4 be maintained at or just above the upper limit. Subtotal thyroidectomy may be advised during 2nd trimester pregnancy for Graves' disease. If Radioiodine is given in non-pregnant, at least 6 months to be waited for next pregnancy. Graves' disease, or toxic thyroid nodules the ATD therapy should be initiated before pregnancy if diagnosed. For Assisted Reproductive Technology (ART), selected patient Thyroxin to be given when TSH >4. If TPO-Ab positive T_4 could be started when TSH level >2.5.

Postpartum thyroiditis (PT) occurs within 1 year after delivery in women who were previously euthyroid, GD can be a disease of new onset, relapse, or continuation of an ongoing disease. Incidence of PT is 5% -10% and is higher with autoimmune disorders. Differentiation between postpartum thyroiditis and GD in the puerperium is important. In this situation measuring TSH Ab levels and thyroid doppler can help differentiate the two. Thyroiditis should not be treated with ATDs.

Patients should be managed by symptomatic treatment only; steroid may require in some cases. The lowest possible dose of ATDs (preferably MMI) to prescribed for GD in a lactating mother, keeping TSH high normal level.

It is suggested pregnant, especially age over 30, also have history of family thyroid diseases, autoimmune diseases, head and neck irradiation, TPO antibodies positive, sterility, subfertility, repeated abortion or miscarriage and mother of Iodine deficiency zone to be screen for thyroid disorder. Thyroid disorders should be in mind when we are dealing with an expecting pregnancy or pregnant mother for healthy pregnancy and fetus

Keywords: Thyroid Hormones (TH), subclinical hypothyroidism (SCH), Grave's disease (GD), Postpartum thyroiditis (PT), Assisted Reproductive Technology (ART). TSH

Plenary Session II

1. Initial therapy to follow-up: A survivorship care plan for Differentiated Thyroid Carcinoma

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ABSTRACT

Context: Under the critical appraisal globally now-a-days, clinical management of differentiated thyroid cancer represents a paradigm shift of precision oncology, with personalized, risk-adapted therapeutic strategies.

Objective: To present a survivorship care plan with pragmatic multi-disciplinary collaboration that tailor the intensity of therapy and follow-ups that begins as soon as suspicious nodule is detected and continues through final follow-up.

Design: This brief presentation is based on the consensus, evidence-based recommendations from the literatures, thyroid cancer management guidelines of different professional societies, published staging systems identified through a PubMed search which included terms such as risk stratification, staging, clinical outcomes, radio iodine therapy and differentiated thyroid carcinoma; with institutional clinical experiences at Dhaka, Cumilla, Rajshahi, Gopalgonj, Dinajpur and Chittagong.

Main outcome measures:

a) Tools for pre-diagnostic screening of thyroid cancer: Diagnostic USG neck (ACR-TIRADS) followed by FNAC (Bethesda- six categories).

b) Tools for risk stratification:

i Risk of mortality/survival -to predict the risk of DTC mortality following the initial treatment using the AJCC-UJCC tumour/node/metastasis-TNM staging system (8th edition, 2017.

ii. Risk of recurrence - according to a small set of clinical, histopathological and peri-operative data with surgical note (ATA 2015, ETA 2022), to classify initial risk of recurrence in three categories - low/intermediate/high.

iii. Dynamic risk stratification - to re-define the initial risk of recurrence during follow-up in light of patient's 'response-to -treatment' in four groups - Excellent Response (ER-NED), Biochemical Incomplete Response (BIR), Intermediate Response (IR), Structural Incomplete Response (SIR).

iv. Influence of histological type - risk of recurrence & DTC-related mortality depend in the part of tumour biology guided by WHO endocrine tumour classification system 4th/5th edition 2017.

v. Molecular profile - Molecular Profile of the tumour provides prognostic and therapeutic information and helps to identify high risk tumours that might require more intensive follow up.

vi. Post-operative 131-I WBS with SPECT-CT.

vii. Redifferentiating agents - Some DTCs are radioiodine refractory owing to defect in iodine metabolism.

c) Goals & protocol for post-surgical radioiodine therapy- the goal of the radioiodine therapy is outlined on integration of the above clinical, laboratory and imaging informations with recommended standardized definitions as follows: Remnant ablation, adjuvant treatment and treatment of known disease (ATA/ETA/SNMMI/EANM/NCCN-2024).

d) Tools for follow-ups: Estimation of serum thyroglobulins, anti-thyroglobulin antibodies, neck ultrasonography and cytology, whole body radioactive iodine scan, cross sectional imaging (SPECT-CT, PET-CT).

Conclusion: Thorough risk stratification at peri-diagnostic period and during follow-ups at multiple levels enables a more personalized, case-to-case approach in DTC patient management and provides a real-time, dynamic, iterative, ongoing survival care at any point in the course of the patient's disease.

Keywords: Differentiated Thyroid Carcinoma, Radio iodine therapy, SPECT-CT, PET-CT, Whole body scan (WBS).

2. A Structured Approach to Quality Report Writing in FDG PET-CT Imaging

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ABSTRACT:

A PET-CT report is a formal written communication between Nuclear Medicine Specialists/Radiologists and referring physicians. It documents the procedure performed, the study's findings, interpretations, and recommendations, and serves as a critical medico-legal document in the patient's medical record. PET-CT is considered the gold standard for staging and restaging oncologic diseases, and its findings can significantly influence management decisions, with one-third of cases potentially altering clinical management strategies.

Since the introduction of PET-CT and hybrid imaging in medical diagnostics over the past three decades, various reporting formats have emerged. Reporting styles often depend on the organizational structure of the imaging departments. Institutions with separate Radiology and Nuclear Medicine departments typically generate two separate reports, or a third report combining the separate PET and CT findings. This system can lead to inefficiencies in interpretation and confusion for referring physicians when the PET and CT reports do not align. An improved approach involves dual-trained and credentialed professionals interpreting both PET and CT components, resulting in a unified, comprehensive report.

This report aims to outline the key elements of a structured PET-CT report for oncologic cases. It will emphasize the importance of including clinical history, procedural details, findings, comparisons or correlations, and a conclusive impression.

Keywords: PET-CT Report, Hybrid imaging, Conclusive impression, Credentialed professionals.

Proffered Paper Session I

1. Myocardial ^{18}F-FDG Uptake After Chemotherapy in Patients with Lymphoma: Early Metabolic Index of Cardiotoxicity

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ABSTRACT

Background: Chemotherapy and radiotherapy induced Cardiotoxicity encompasses various forms of injury to the cardiovascular system, that trigger an increased production of reactive oxygen and nitrogen species, lipid per oxidation and inflammation. This leads to cardiomyocyte apoptosis and interstitial fibrosis, increasing the risk for impaired coronary endothelial function, left ventricular dysfunction and heart failure. This study aimed to identify potential early signs of metabolic myocardial injury by assessing changes in cardiac^{18}F-FDG uptake by PET-CT scan in patients with lymphoma before and after chemotherapy.

Methods: Fifty lymphoma patients data were retrospectively analyzed who underwent ^{18}F-FDG PET-CT scan in the Institute of Nuclear Medicine & Allied Sciences, Dhaka. PET-CT scan was conducted following the standard protocol. Left ventricular myocardial maximum standardized uptake value (SUVmax) was measured at baseline (before chemotherapy) and 6 weeks after completion of chemotherapy. Body weight, fasting blood sugar, post-injection time, and the injected dose of ^{18}F-FDG between the scans were recorded properly.

Results: We observed an increased uptake ^{18}F-FDG uptake in left ventricular myocardium. The mean SUVmax in the left ventricular myocardium was 3.5±2 at baseline and six weeks after completion of chemotherapy the mean SUVmax was 6.5±4. The difference of myocardial metabolic activity was found to be statistically highly significant ($p < 0.001$).

Conclusion: This study showed a clear spectrum of increasing myocardial ^{18}F-FDG uptake in patients with lymphoma before and after chemotherapy. Different literature review results also comparable with these findings and suggests that^{18}F-FDG PET-CT is a sensitive and reliable imaging test to detect early metabolic sign of Cardiotoxicity.

Keywords: Cardiotoxicity, Chemotherapy, Lymphoma

2. Trends of Malignancies Among Geriatric Population: A Year-Long Retrospective Analysis in PET/CT Division of NINMAS

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ABSTRACT

Introduction: The global population is ageing rapidly, with individuals aged 65 years and older comprising over 9% of the total population—approximately 760 million people. Notably, nearly 60% of cancers are diagnosed in this age group. Positron Emission Tomography-Computed Tomography (PET/CT) plays a pivotal role in the diagnosis, staging, and management of malignancies, particularly in geriatric patients. This study aimed to analyze the prevalence and distribution of cancers in patients aged 65 years and older referred to the PET/CT division at NINMAS over one year.

Patients and Methods: This retrospective observational study included data from January 2024 to December 2024. PET/CT data of patients aged ≥65 years were categorized by cancer type, and the proportional distribution of malignancies was analyzed. Demographic trends, including age and gender-specific patterns, were also evaluated.

Results: Among 166 cases (15.79% of total referrals), the mean age was 70.45 ± 4.67 years, with a male-to-female ratio of 2.01:1. Lymphoma was the most prevalent malignancy (22.28%), followed by gastrointestinal cancers (16.86%), breast cancer (13.85%), lung cancer (8.43%), and cancers of the female reproductive system (8.43%). Prostate cancer (7.83%), head and neck cancers

(7.22%), renal carcinoma (4.81%), cancers of unknown primary origin (3.01%), and urothelial cancer (2.40%) were less common. Gender-specific trends showed lymphoma predominantly in males (81.08%) and breast cancer in females (91.3%).

Conclusion: This study highlights the significant burden of malignancies among the geriatric population, with lymphoma and gastrointestinal cancers being the most common. PET/CT remains a critical diagnostic tool for optimizing cancer management in this demographic.

Keywords: PET-CT, Geriatric, Malignancies, Lymphoma, Cancer

3. Brief Overview on Addressing Pitfalls In F-18 FDG Imaging: Interpretation Challenges, Confidence Enhancement and Diagnostic Strategies

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ABSTRACT

F-18 FDG PET/CT, a cornerstone in nuclear medicine is a highly sensitive imaging tool for detecting and monitoring various malignant condition including neurological and cardiovascular diseases. However, its ability to detect metabolic activity can also identify benign conditions that mimic cancer, presenting several challenges. These challenges in accurate diagnosis can be attributed by a combination of biological, technical, and analytical factors. This abstract discusses the difficulties encountered in interpreting F-18 FDG imaging and presents strategies to enhance diagnostic confidence among young nuclear medicine professionals in our country. A key issue in FDG imaging is the variability in FDG uptake, which can be influenced by factors like tissue characteristics, glucose metabolism, and patient conditions such as diabetes or inflammation, as well as non-tumor-related uptakes (e.g., in brown adipose tissue, infections, or physiological processes) that may result in false positives. Additionally, the use of standardized uptake value (SUV) thresholds must be approached with caution, as there is no universal standard, and SUV values are affected by variables like patient physiology, scan timing, and tumor type. A comprehensive understanding of both normal variants and pathological conditions that cause FDG uptake is essential to avoid misinterpretations. Another important aspect is the integration of clinical context and patient history during interpretation. Combining imaging results with histopathological findings, biopsy data, and clinical symptoms provides a comprehensive perspective, enhancing diagnostic accuracy. In conclusion, although F-18 FDG imaging is a crucial diagnostic tool, careful attention to potential pitfalls in its interpretation, along with the use of complementary technologies and clinical data, is necessary to enhance diagnostic accuracy and improve patient outcomes.

4. Clinical Utility of FDG PET/CT Imaging for Evaluation of Non-Small Cell Lung Cancer- A 5 Years' Prospective Analytical Study

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ABSTRACT

Background: Most patients with lung cancer are diagnosed with advanced disease stage, which is clinically aggressive and has high metastatic potential. FDG- PET is widely used in lung cancer staging at diagnosis, response evaluation after systemic treatment, re-staging after neo-adjuvant treatment and surveillance.

Objective: To determine the diagnostic & prognostic value of 18 F-FDG PET/CT in lung carcinoma patients.

Methodology and Findings: Total 450 pathologically confirmed non-small cell lung carcinoma patients without prior surgery and treatment were included in this study, conducted for 5 years in two centers of Dhaka city. Semi-quantitative estimation of FDG uptake was performed by calculating SUV_{max} value, corrected for dose administered and body weight.

Results: This study showed male predominance, 75% patients were male, 25% were female. 58% patients had adenocarcinoma and 30% had squamous cell carcinoma. Smoking was found to be an important contributing factor in male patients. 55% patients showed primary malignant lesion in right lung. 45% patients had stage IV and 25% patients had stage III disease during initial PET-CT scan. Among adenocarcinoma patients, patients having stage III & IV revealed elevated CEA level than stage I & II**.** Patients having stage IV disease showed nodal, hepatic, adrenal, cerebral and skeletal metastases. The SUV max value was higher in patients with squamous cell carcinoma than adenocarcinoma. Among adenocarcinoma patients, 70% patients had EGFR wild type and 30% patients had EGFR mutated type. Baseline FDG PET-CT has revealed 98% sensitivity, 94% specificity and 98% accuracy in detecting stage IV disease.

Conclusion: FDG PET-CT a useful adjunct in pre-treatment staging of NSCLC. It is an excellent tool for response evaluation, restaging after neo-adjuvant treatment, detecting tumour recurrence and guiding radiation therapy planning.

5. Comparative Analysis Between F-18 PSMA-1007 And F-18 FDG PET/CT scan in Metastatic Prostate Carcinoma: A Case Report

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ABSTRACT

Background: Prostate cancer is the second leading cause of cancer-related mortality in males and presents a poor prognosis when metastasis occurs. Accurate staging and disease extent evaluation are critical for management, where molecular imaging plays a pivotal role. F-18 PSMA-1007 PET/CT is highly specific for prostate cancer detection, but F-18 FDG PET/CT may provide additional diagnostic insights in aggressive or dedifferentiated cases due to increased glucose metabolism and upregulation of glucose transporter 1.

Case report*:* We report the case of a 78-year-old male diagnosed with prostate adenocarcinoma (Gleason score 7, grade group 3) five years prior, with an initial presentation of hematuria. The patient underwent transurethral resection of the prostate but was lost to follow-up and received no adjuvant therapy. Recent evaluation revealed an elevated serum PSA level (52.06 ng/mL), and F-18 PSMA-1007 PET/CT demonstrated local recurrence with metastases to the lungs, liver, skeletal system, and lymph nodes. A complementary F-18 FDG PET/CT was performed, revealing greater uptake in

metastatic lesions, with higher FDG uptake (SUVmax) compared to PSMA uptake and superior delineation of hepatic metastases compared to PSMA imaging, which was confounded by physiological hepatic uptake.

Conclusion: These comparative imaging findings highlight the potential utility of F-18 FDG PET/CT in cases of atypical, aggressive, and dedifferentiated prostate cancer, providing complementary diagnostic insights beyond F-18 PSMA-1007 PET/CT.

6. FDG PET-CT in Brain Malignancies: Exploring Metabolic Patterns and Anatomical Features in a Single-Center Study

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ABSTRACT

Objective: To evaluate the patterns and metabolic characteristics of brain malignancies using FDG PET-CT with a focus on their diagnostic and clinical relevance.

Methods: This retrospective study analyzed FDG PET-CT scans from 2,879 patients between September 2018 and December 2023 at the Institute of Nuclear Medical Physics, Savar. Parameters assessed included lesion metabolic activity (SUVmax), anatomical distribution, CT patterns, and correlation with histopathological findings.

Results: Among the 2,879 patients evaluated, 17 (0.6%) were diagnosed with malignant brain lesions. Of these, 5 cases (29.4%) were primary brain malignancies, including 3 gliomas (17.6%) and 2 primary central nervous system (CNS) lymphomas (11.8%). The remaining 12 cases (70.6%) were metastatic brain lesions, originating from various primary sites. Specifically, 4 (23.5%) were secondary to breast carcinoma, 3 (17.6%) from lung carcinoma, 3 (17.6%) from carcinoma of unknown origin, 1 (5.9%) from prostate carcinoma, and 1 (5.9%) from tongue carcinoma. High-grade gliomas exhibited elevated SUVmax values on PET imaging, indicative of their aggressive metabolic activity. Metastatic brain lesions predominantly localized to the cerebral cortex and displayed variable CT appearance encompassing both hypodense and hyperdense patterns.

Conclusion: FDG PET-CT effectively delineated tumor margins and identified multifocal diseases, providing valuable insights for comprehensive evaluation that aid in treatment planning. While MRI is essential for anatomical details, it cannot replace the functional and metabolic information offered by FDG PET-CT. Further studies are needed to assess its role in treatment response and prognosis.

7. Rapid Extensive Metastatic Spread in Advanced Renal Cell Carcinoma: Insights from FDG PET-CT Imaging

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ABSTRACT

Background: Renal cell carcinoma (RCC), particularly the clear cell subtype, is a highly aggressive malignancy with a strong propensity for metastatic dissemination, especially in advanced

stages. Despite radical interventions such as nephrectomy, RCC frequently exhibits systemic spread. FDG PET-CT plays a pivotal role in the accurate staging and detection of metastatic disease, providing a comprehensive evaluation of disease burden.

Case Summary: We present the case of a 63-year-old male with a history of diabetes and hypertension, diagnosed with Grade IV clear cell RCC with brain metastasis. The patient underwent radical nephrectomy, craniotomy, radiotherapy, and immunotherapy. An FDG PET-CT scan performed six months earlier, following the completion of immunotherapy, showed no evidence of recurrence or metastasis. However, the patient subsequently developed shortness of breath and coughing, prompting a repeat FDG PET-CT scan. The repeat scan revealed widespread multisystem metastases disease, including cervical and mediastinal lymphadenopathy, extensive bilateral pulmonary metastases, bilateral pleural effusions, hypermetabolic soft tissue lesions involving the left shoulder joint and right gluteal muscle (indicating muscular metastases), and skeletal metastasis in the right 8th rib.

Conclusion: This case underscores the aggressive nature of advanced RCC and its potential for extensive metastatic involvement, even after intensive multimodal treatment. FDG PET-CT proved invaluable in detecting multisystem metastases, highlighting its critical role in the comprehensive evaluation, staging, and management of advanced RCC.

8. How A Single Lymph Node Raised the Deauville Five-Point Scale from Score 2 to Score 5: Case Report of a Lymphoma Patient

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ABSTRACT

Introduction: PET-CT with ^{18}F-FDG is a standard staging procedure for lymphoma subtypes. The Deauville 5PS scale (Deauville 5PS) is an internationally-recommended scale for initial staging and treatment response in lymphoma, comparing reference organs (mediastinum, liver, lymph nodes and other lymphoid organs) and adjusting for lymph node changes. How a single lymph node changed the Deauville scoring is reported in this context.

Case report: A recently diagnosed Non-Hodgkin's lymphoma patient of 76-yearsunderwent ^{18}F-FDG PET-CT, nine weeks after receiving 6 cycles of chemotherapy. Previous abdominal CT scan showed multiple enlarged discrete and matted lymphnodes in the pre-aortic and para-aortic regions. Current PET-CT revealed mediastinal SUV_{max} of 2.0 and liver parenchymal SUV_{max} of about 3.1. However, an enhancing, necrotic lymph node was found in the retrocaval region measuring about 2.5 X 2.6X 3.4cm, with SUV_{max} of 30.4. Whereas, another right level II lymph node had a SUV_{max} of 1.7 only. Without the retrocaval lymph node the DS would have been 2/5, but the single retrocaval lymph node made the score 5/5. Besides these, cirrhosis of liver with fatty infiltration were noted.

Conclusion: The case study highlighted the strengths and weaknesses of the Deauville five-point scale, which significantly impacts the management of lymphoma.

Keywords: The Deauville five-point scale, Lymphoma, PET-CT

Proffered Paper Session II

1. Severe Skeletal Manifestations of Parathyroid Adenoma in A Young Woman: A Rare Case of Extensive Brown Tumors and Fractures

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ABSTRACT

Background: Primary hyperparathyroidism (PHPT) is an uncommon endocrine disorder in young individuals, and skeletal complications secondary to parathyroid adenoma are exceedingly rare. We present a case of with extensive brown tumors and multiple pathological fractures caused by PHPT due to a parathyroid adenoma.

Case Report: The patient was admitted to Mymensingh Medical College Hospital (MMCH) with complaints of swelling and severe pain in her right thigh following a minor fall. She also experienced generalized bone pain, progressive muscle weakness, and fatigue over the preceding two years, rendering her unable to rise from a seated position without assistance. Laboratory tests revealed elevated serum parathyroid hormone (PTH) levels (613 pg/mL), hypercalcemia (11.6 mg/dL), and raised alkaline phosphatase (ALP) levels (1037 IU/L). SPECT/CT parathyroid scintigraphy using Tc-99m MIBI demonstrated a left inferior parathyroid adenoma, while imaging studies, including MRI and contrast-enhanced CT, identified extensive brown tumors and pathological fractures in multiple sites. A DEXA scan confirmed severe osteoporosis. Surgical excision of the adenoma was performed, and histopathological examination confirmed the diagnosis of parathyroid adenoma.

Conclusion: This case highlights the importance of considering PHPT in young patients with multiple brown tumors and pathological fractures. Tc-99m MIBI parathyroid scintigraphy is a highly sensitive tool for preoperative localization, facilitating timely surgical intervention. Early recognition and treatment are critical to prevent further complications and improve patient outcomes.

Keywords: Primary hyperparathyroidism, Parathyroid adenoma, Brown tumor, Pathological fracture, Osteoporosis, Tc-99m MIBI scintigraphy

2. Transforming Skeletal Metastasis Diagnosis: Precision with Hybrid SPECT-CT for Suspicious or Equivocal Uptake on Planar Bone Scans

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ABSTRACT

Introduction: Conventional 99mTc-MDP whole-body planar bone scans remain the standard for detecting skeletal metastases but often lack specificity, making it difficult to distinguish metastatic from benign lesions. Integrating single-photon emission computed tomography (SPECT) with computed tomography (CT), SPECT-CT enhances functional and anatomical imaging, allowing lesion characterization and anatomic diagnostic accuracy. This study explores the role of SPECT-CT in evaluating skeletal metastases in patients with solitary or equivocal findings on planar bone scans.

Methods: Fifty patients (54% female, 46% male; aged 32–90 years) with solitary or equivocal uptake on planar bone scan underwent regional SPECT-CT on a Siemens Symbia SPECT CT system. Primary cancers included prostate (36%), breast (30%), lung (10%), cervix (6%), renal (6%), colon (4%), thyroid (4%), esophagus (2%), and ovary (2%).

Results: SPECT-CT identified skeletal metastases in 50% of cases, while the other 50% had benign or non-metastatic findings. Among metastases, SPECT-CT revealed purely osteoblastic (52%), mixed osteoblastic/lytic (28%), osteolytic (12%), and osteoblastic with degenerative changes (8%) cases. Four osteoblastic lesions showed functional changes without CT alterations, indicating functional changes precede anatomical ones. In non-metastatic cases, SPECT-CT confirmed degenerative changes in most cases, with fractures (4%), and vertebral hemangioma (2%). It also improved precision by detecting MDP-avid extraosseous uptake, including osteolytic soft tissue lesions, calcified hepatic, and lung metastases.

Conclusion: SPECT-CT improves diagnostic accuracy and offers a more patient-friendly, one-stop imaging experience. Although it involves additional radiation exposure and may require histological confirmation in certain cases, its diagnostic benefits and cost-effectiveness make it an indispensable tool for enhancing patient outcomes.

Keywords: Skeletal Metastases, SPECT CT, Planar Bone Scan

3. Renal Calyx to Parenchymal Ratio - A Good Predictor of Outcome of Pyeloplasty for Uretero-Pelvic Junction Obstruction: Comparing Scintigraphic Parameters vs Sonographic Parameter.

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ABSTRACT

Background: Calyx-to-parenchymal ratio (CPR) is a surgeon-independent parameter that may serve as a reliable predictor of surgical outcomes in pyeloplasty for ureteropelvic junction obstruction (UPJO). While anteroposterior pelvic diameter (APD) has traditionally been used, its utility is limited due to excision during reduction pyeloplasty. This study compares the accuracy of CPR and APD in assessing pyeloplasty outcomes.

Objectives: To evaluate the effectiveness of CPR, APD, and scintigraphic parameters (differential renal function [DRF], glomerular filtration rate [GFR]) in predicting surgical outcomes after pyeloplasty in children with unilateral UPJO.

Materials and Methods: This prospective study was conducted at the Department of Pediatric Surgery, CMCH, on 20 children with unilateral UPJO undergoing pyeloplasty. Data collection included APD and CPR from ultrasound, as well as DRF and GFR from renograms. Evaluations were performed preoperatively, and at the 3rd and 6th months postoperatively. Surgical success was analyzed based on changes in these parameters.

Results: Among the 20 patients (n=20) included in the study, left-sided UPJO was more prevalent, with a higher occurrence in males. The mean age of the patients was 4.5 years. Postoperative CPR changes (ΔCPR and %ΔCPR) were the most sensitive predictors of successful pyeloplasty, with sensitivities of 85.7% and 21.4%, respectively. APD changes (ΔAPD and %ΔAPD) demonstrated lower sensitivities (42.9% and 78.6%). Renographic parameters (ΔDRF and %ΔDRF) were less sensitive (both 57.1%). CPR changes were unaffected by calyceal depth or parenchymal growth, confirming its surgeon-independent reliability. Improved renographic drainage patterns further validated postoperative outcomes.

Conclusion: CPR is a robust, non-invasive parameter that outperforms APD and renographic measures in predicting surgical outcomes after

pyeloplasty. It provides a reliable alternative to scintigraphy for postoperative monitoring, reducing the need for invasive imaging and enhancing follow-up efficiency.

4. Unusual Suprasternal Swelling of a Neglected Case of Differentiated Thyroid Carcinoma-Not the End of the Story

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ABSTRACT

Background: The incidence of thyroid carcinoma has been increasing in recent years. The most common sites of metastasis in differentiated thyroid cancer (DTC) are the cervical lymph nodes, although distant metastases may occur in the lungs and bones, but skull metastasis is relatively rare. Simultaneous metastases to the skull, lungs, and bones from thyroid carcinoma represent an exceptionally rare clinical scenario.

Case report: A 50-year-old woman with previously diagnosed and surgically treated differentiated thyroid carcinoma presented with a visible and palpable swelling above the sternal notch and on the forehead, one year after total thyroidectomy, which were confirmed as metastases from the follicular variant of papillary thyroid carcinoma by cytology. The patient's family neglected post-thyroidectomy radioiodine ablation and follow-up. High-resolution ultrasound revealed normal-sized, non-uniform thyroid lobes with a solid, complex nodule in the left lobe, suggesting recurrence of DTC. There were bilateral extensive lung metastases, a lytic lesion in the left frontal bone, and additional metastases to the vertebrae and the shaft of the left femur in 99mTc-MDP skeletal scintigraphy. Significant thyroid tissue was evident in ^{99}mTc thyroid scintigraphy, suggesting recurrence/residual thyroid tissue. A multidisciplinary team is presently planning for metastatectomy, completion thyroidectomy, followed by radioiodine ablation therapy in the Nuclear Medicine department.

Conclusion: Delayed treatment and noncompliance in thyroid carcinoma patients significantly worsen disease progression. A plan includes surgical procedures, evaluation, and I-131 therapy, emphasizing early intervention and regular monitoring.

Keywords: Suprasternal swelling, metastases, Differentiated thyroid carcinoma, radioiodine ablation.

5. Pediatric Recurrent Ureterolithiasis and Parathyroid Adenoma: A Diagnostic Success with ^{99m}Tc-MIBI SPECT-CT

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ABSTRACT

Background: Ureterolithiasis is increasingly common among young individuals and accounts for a rising percentage of hospitalizations. The condition is primarily caused by the deposition of mineral salts, most often calcium-based, in the urinary tract.

Hypercalcemia and hypercalciuria are key risk factors, often linked to primary hyperparathyroidism caused by parathyroid adenoma. Early and accurate diagnosis of parathyroid adenoma can be achieved using biochemical evaluation, ultrasound (USG) of the neck, and Tc-99m-MIBI SPECT-CT imaging. This case report highlights the utility of Tc-99m-MIBI SPECT-CT in diagnosing a parathyroid adenoma in a pediatric patient with recurrent ureterolithiasis.

Case Report: A 12-year-old boy presented with severe lower abdominal pain and was diagnosed with right-sided ureterolithiasis via abdominal ultrasonography. He had a history of left-sided ureterolithiasis nine months earlier, which was managed with medical expulsive therapy. Due to the recurrence, a detailed evaluation was initiated. Biochemical analysis revealed hypercalcemia and elevated parathyroid hormone levels, consistent with primary hyperparathyroidism. Neck ultrasonography showed a hypoechoic lesion near the left lower thyroid margin, suggestive of a parathyroid adenoma. Tc-99m-MIBI parathyroid SPECT-CT confirmed a left inferior parathyroid adenoma, establishing the cause of the recurrent ureterolithiasis.

Conclusion: This case emphasizes the importance of evaluating recurrent urinary calculi for underlying endocrine disorders such as primary hyperparathyroidism. Tc-99m-MIBI SPECT-CT is a valuable diagnostic tool for localizing parathyroid adenomas, enabling timely intervention and preventing further complications. Increased awareness among clinicians can improve the management of such cases, especially in pediatric patients presenting with recurrent urinary stones.

6. Comprehensive Evaluation of a Rare Pediatric Case of Klippel-Trenaunay Syndrome: Diagnostic and Imaging Insights

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ABSTRACT

Introduction*:* Klippel-Trenaunay Syndrome (KTS) is a rare congenital disorder with an incidence of 3-5 per 100,000, characterized by capillary and venous malformations and limb overgrowth. Typically diagnosed in early childhood, KTS affects males and females equally, with a predilection for the lower limbs. Clinical manifestations include port-wine stains, varicose veins, and limb hypertrophy, which can lead to complications such as lymphedema and recurrent infections. Diagnosis relies on physical examinations, imaging, and genetic analysis, with mutations in the *PIK3CA* gene being a key factor.

Case Report*:* A 2-year-old boy presented with a lateral marginal vein in the right lower limb, multiple port-wine stains, varicose veins, lymphedema, and limb length discrepancywas referred for 99mTc-Nano Colloid lymphoscintigraphy of both lower limbs. Subcutaneous radiotracer injections were followed by dynamic and static imaging. Lymphoscintigraphy demonstrated grade-4 lymphatic obstruction in the right lower limb, with absent tracer uptake in the popliteal and inguinal lymph nodes and no dermal backflow. Normal lymphatic function was observed in the left lower limb. These findings confirmed a diagnosis of Klippel-Trenaunay Syndrome (KTS). Other relevant investigation included duplex ultrasound which revealed incompetence of the right sapheno-femoral junction, venous reflux, and multiple superficial dilated veins. Retrograde flow in the lateral marginal vein (vein of Servelle) indicated valvular insufficiency, without thrombosis. Blood tests showed lymphocytosis with relative neutropenia and normal CRP level.

Conclusion*:* Despite the absence of genetic confirmation, the clinical presentation and lymphoscintigraphy findings strongly support KTS. This case highlights the diagnostic utility of

lymphoscintigraphy in evaluating KTS and guiding therapeutic decisions.

Keywords: Klippel-Trenaunay Syndrome (KTS), 99mTc-Nano-Colloid Lymphoscintigraphy, Lymphedema, Vascular Malformation,Limb Hypertrophy, Genetic Disorder, PIK3CA Gene.

7. ^{99m}Tc-SPECT MPI for Myocardial Viability Assessment in Ischemic Cardiomyopathy: A Case Report

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ABSTRACT

Background: Ischemic cardiomyopathy (ICM), caused by chronic coronary artery disease (CAD), leads to myocardial dysfunction and heart failure. Assessing myocardial viability is essential to identify patients who may benefit from revascularization. Imaging modalities like echocardiography, cardiac MRI,cardiac PET, 99mTc-labeled single-photon emission computed tomography (SPECT) myocardial perfusion imaging (MPI) are used for this purpose . This case report highlights the role of 99mTc-SPECT MPI in evaluating myocardial perfusion, viability and guiding treatment strategies in a patient with advanced ischemic cardiomyopathy.

Case report: A 50-year-old male with a history of chronic CAD and heart failure presented with persistent angina despite optimal medical therapy. Echocardiography revealed a left ventricular ejection fraction (LVEF) of 29% and regional wall motion abnormalities. Coronary angiography demonstrated total occlusion of the proximal left anterior descending (LAD) and right coronary arteries (RCA) and moderate stenosis (20–30%) in the left circumflex artery (LCX). 99mTc-SPECT MPI with 99mTc-sestamibi identified areas of reduced myocardial perfusion in multiple regions. Preserved tracer uptake in some segments suggested viable, hibernating myocardium, while non-viable regions exhibited no tracer activity. Based on these findings, coronary revascularization was recommended to improve myocardial perfusion and function.

Conclusion: 99mTc-SPECT MPI is a valuable tool for assessing myocardial viability in ischemic cardiomyopathy, providing critical insights into myocardial perfusion and viability which influenced the decision to pursue revascularization in managing ischemic heart failure and improving patient outcomes.

8. Role of Tc-99m RBC Scan for Confirmatory Diagnosis of Hepatic Hemangioma- a Case Series

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ABSTRACT

Background: Hepatic hemangioma is the most common benign liver tumor, constituting approximately 5% of all benign hepatic tumors. These are congenital vascular malformations that enlarge with liver growth. Hemangiomas larger than 4 cm are classified as giant hepatic cavernous hemangiomas. This case series illustrates the diagnostic utility of Tc-99m RBC scintigraphy in three patients with suspected giant hepatic cavernous hemangiomas.

Case Series: Three patients presented with hepatic

masses and were referred to NINMAS for Tc-99m RBC scintigraphy.

1. ***Case 1:*** A 50-year-old female with multiple iso- to hypodense lesions in the right hepatic lobe identified on abdominal CT.

2. ***Case 2:*** A 45-year-old male with ultrasound findings of multiple focal hepatic lesions suggestive of fatty infiltration, and CT showing ill-defined hypodense areas in both hepatic lobes.

3. ***Case 3:*** A 50-year-old male with ultrasound findings of a large heterogeneous soft tissue mass in segment VII of the liver, with no flow detected on color Doppler imaging.

Tc-99m RBC scintigraphy in all cases demonstrated the characteristic imaging pattern of giant cavernous hemangiomas, including decreased perfusion on early dynamic images and a progressive increase in activity on delayed blood pool images, with a central photopenic area visible over time.

Conclusion: Tc-99m RBC scintigraphy is a highly sensitive and specific imaging modality for diagnosing hepatic hemangiomas. It provides distinctive imaging characteristics, allowing differentiation from other hepatic lesions, and should be considered the diagnostic method of choice for hepatic hemangiomas.

Keywords**:** Tc-99m RBC scintigraphy, Hepatic hemangioma, Congenital vascular malformation, Benign liver tumor

Proffered Paper Session III

1. Assessing the Cytogenetic Impact of I-131 Therapy in Thyroid Cancer Patients

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ABSTRACT

Introduction: Thyroid cancer, a prevalent endocrine malignancy, is frequently treated with radioactive iodine (I-131) therapy. While effective in eliminating residual thyroid tissue and metastases, I-131 exposure, a source of ionizing radiation, carries the risk of inducing genetic damage and subsequent carcinogenesis. Cytogenetic bio-dosimetry, a technique that analyzes chromosomal aberrations, offers a valuable tool to assess the biological impact of ionizing radiation. By analyzing chromosomal abnormalities, such as dicentric and ring chromosomes, we can gain insights into the DNA damage caused by I-131 therapy.

Methods: This study examines the cytogenetic effects of I-131 therapy in 35 thyroid cancer patients. Blood samples were collected before and 21–35 days post-therapy. Chromosomal aberrations, including dicentric and ring chromosomes, were analyzed in lymphocyte cultures. Preliminary data from 12 patients (ages 12–44) who received 29–150 mCi of I-131 revealed early findings.

Results: A significant 10–20-fold increase in dicentric chromosome frequency was observed post-I-131 therapy compared to the reference value (0–2 dicentrics per 1000 metaphase cells), indicating potential DNA damage. No ring chromosomes were detected. Variability in chromosomal aberrations suggests individual susceptibility influenced by factors such as age, environment, lifestyle, I-131 dose, and cancer stage.

Conclusion: The elevated frequency of dicentric chromosomes post-I-131 therapy highlights the risk of genetic damage. Further research is needed to explore individual susceptibility factors and

long-term effects, including secondary malignancies. Long-term follow-up is essential for optimizing I-131 dosimetry, monitoring late effects, and providing timely interventions.

2. Thyroid Hormone Abnormalities in Young Women: Links to BMI, Menstrual Issues, and Subfertility - An Observation at INMAS, Mitford

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ABSTRACT

Background: Thyroid hormones play a crucial role in regulating menstrual status, body mass index (BMI), and fertility. This study aimed to evaluate the relationship between thyroid hormones, menstruation, BMI, and fertility in young female patients attending INMAS, Dhaka.

Patients and Methods: This study was conducted from June 2024 to November 2024, enrolling 707 young female patients seeking thyroid hormone evaluation at the outpatient department (OPD) of INMAS, Mitford, Dhaka. Thyroid hormone levels were measured using CLIA methods, while medical history and BMI were recorded. Data were analyzed using SPSS 2022.

Results: The mean age of the participants was 27.1 ± 4.9 years, with a mean BMI of 22.9 ± 7.4. Approximately 63.08% of patients with thyroid hormone abnormalities had menstrual irregularities, including 25.6% hypothyroid, 15.6% hyperthyroid, 14% subclinical hypothyroid, and 7.8% subclinical hyperthyroid patients. Additionally, 18.8% of patients with thyroid dysfunction reported primary subfertility, with varying prevalence: 31.4% in hypothyroid, 19.1% in hyperthyroid, 13.9% in subclinical hypothyroid, and 4.1% in subclinical hyperthyroid patients. A significant association was observed between BMI and thyroid abnormalities, with thyroid dysfunction being more common in overweight patients (38.7% in hypothyroid) compared to those with normal BMI (24.2%) ($P < 0.05$).

Conclusion: Thyroid hormone abnormalities significantly affect menstruation, fertility, and BMI among young females, highlighting the importance of thyroid function in reproductive health.

Keywords: Thyroid hormone, Menstruation, BMI, Fertility

3. Targeted Therapy with Tyrosine Kinase Inhibitors (TKIs) in Radioiodine-Refractory Thyroid Cancer: A Promising Approach for Rising Tg Levels

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ABSTRACT

Background: Radioiodine-refractory (RAIR) papillary thyroid carcinoma (PTC) presents a therapeutic challenge as conventional radioiodine therapy (RAIT) often fails to control disease progression. Tyrosine kinase inhibitors (TKIs) such as Lenvatinib have emerged as effective alternatives for managing RAIR cases with elevated thyroglobulin (Tg) levels and metastatic disease. This

report highlights a case of RAIR PTC treated with TKIs alongside RAIT.

Case Report: A 61-year-old female with multifocal PTC involving the laryngeal wall, trachea, and lymph nodes underwent total thyroidectomy, neck dissection, and total laryngectomy, followed by RAIT with 150 mCi of I-131. Post-therapy scans (PTS) showed no residual thyroid tissue (RTC), but Tg levels were elevated (24.42 and 99.59 ng/mL). Subsequent follow-ups revealed a significant rise in Tg levels (>500 ng/mL). PET-CT identified metastatic cervical and paratracheal lymph nodes and multiple lung nodules. Despite two additional RAITs (150 mCi and 175 mCi), PTS showed no RTC or metastatic uptake, while disease progression was noted on PET-CT. The patient also developed hemoptysis. Lenvatinib was initiated at 8 mg daily, later increased to 10 mg. Over five months, hemoptysis resolved, and CT scans showed reduced lung nodules and nodal masses. Side effects included fatigue, joint pain, and skin pigmentation.

Conclusion: In RAIR thyroid cancer, alternative treatments like Lenvatinib has emerged as one of the promising treatments which can effectively manage disease progression and improve patient outcomes, in cases with high Tg levels and metastatic disease. This case underscores the importance of TKIs as a valuable therapeutic option in RAIR PTC.

4. Carotid Intima Medial Thickness in Radioiodine Treated Thyroid Carcinoma vs Thyrotoxicosis Patients: Is There Any Increased Risk of Atherosclerosis?

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ABSTRACT

Introduction: Prolonged iatrogenic hyperthyroxinemia as well as therapeutic radiation exposure in thyroid carcinoma patients often raise concern regarding potential risk of metabolic and cardiovascular damage. This study is therefore, planned to evaluate carotid intima medial thickness (CIMT) of radioiodine treated DTC and hyperthyroidism patients, as a way of predicting cardiovascular risk.

Materials and Methods: The cross-sectional study was conducted at the Institute of Nuclear Medicine & Allied Sciences (INMAS), Mitford, Dhaka from March to September 2024. Three categories of patients were selected from the regular patient pool of the institute. First group was patients who received radioiodine therapy after total thyroidectomy for DTC. Second group comprised of hyperthyroid patients receiving radioiodine therapy and the third was age matched control group with no known thyroid disorder. Patients with diabetes, hypertension and dyslipidemia were excluded. Serum TSH level was documented, and ultrasound of neck region was done taking note of mean carotid IMT and presence of any plaque.

Results: Total 80 patients were included in the study, subdivided into thyroid carcinoma (30), hyperthyroidism (30) and control (20) groups. Their age ranged between 19 – 80 years (mean ± SD 40.5 ± 13.4 years) with female preponderance (86.3%). CIMT was significantly high in hyperthyroidism group compared to Ca. thyroid and control group (p>0.00). There was also significantly more incidence of carotid plaque formation (p=0.00). But interestingly, there was no statistically significant increase of CIMT or plaque formation in thyroid carcinoma patients (p >0.69).

Conclusion: In this short scale frame study our observation is that DTC patients following radioiodine ablation are not subject to accelerated or abnormal atherosclerosis as evidenced by their CIMT.

***Keywords*:** Carotid Intima Medial Thickness, Radioiodine therapy, Thyroid carcinoma, Thyrotoxicosis.

5. The Eminence of Nuclear Medicine Imaging Over Other Prognostic Markers in the Management of Diffuse Sclerosing Variant Papillary Thyroid Cancer: A Case of Discordance in Follow-up

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ABSTRACT

Introduction: The diffuse sclerosing variant (DSV) of papillary thyroid carcinoma (PTC) is an uncommon subtype characterized by distinct morphological features and aggressive behavior. Compared to conventional PTC, DSV is associated with higher rates of locoregional and distant metastases, necessitating meticulous follow-up. Despite undetectable thyroglobulin (Tg), anti-Tg antibodies, or negative neck ultrasound findings, a diagnostic whole-body scan (WBS) remains crucial for monitoring intermediate- to high-risk cases.

***Case Report**:* A 22-year-old woman presented in late 2023 with dysphagia, odynophagia, and anterior neck swelling. Neck ultrasound revealed a "snowstorm appearance" of the right thyroid lobe due to widespread microcalcifications and bilateral cervical lymphadenopathy (levels III, IV). Total thyroidectomy with bilateral lymph node dissection confirmed DSV-PTC on histopathology. Pre-ablative work-up showed elevated Tg levels and mildly enlarged metastatic nodes. The patient received 150 mCi of radioiodine-131 (RAI) in early 2024, with the post-therapy scan identifying four foci of neck uptake. Follow-up assessments showed persistently low Tg and anti-Tg antibody levels, and negative neck ultrasounds, suggesting an excellent response. However, a diagnostic WBS performed 12 months post-RAI revealed radiotracer uptake in the neck, indicating local recurrence despite negative biochemical and ultrasound findings. The patient is undergoing evaluation for further RAI therapy.

Conclusion: This case highlights the superior sensitivity of diagnostic WBS in detecting DSV-PTC recurrence over biochemical and imaging modalities. Comprehensive, multimodal follow-up is critical for early detection of recurrence in DSV-PTC, emphasizing the need for vigilant long-term monitoring in these high-risk patients.

6. Bone Mineral Density in Symptomatic Patients Receiving Suppressive Doses of Thyroxine for Differentiated Thyroid Carcinoma at INMAS, Rajshahi

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ABSTRACT

Background: Differentiated thyroid carcinoma (DTC) patients often require suppressive doses of levothyroxine following radioactive iodine therapy. Prolonged elevated thyroid hormone levels can accelerate bone resorption, increasing the risk of osteoporosis, particularly in postmenopausal women due to estrogen deficiency.

Objectives: This study aimed to evaluate the prevalence of osteoporosis and osteopenia in DTC patients undergoing thyrotropin suppression therapy using dual-energy X-ray absorptiometry (DEXA) to measure bone mineral density (BMD) in the lumbar spine and hips.

Materials and Methods: Eighty-nine cancer-free DTC patients who had completed ablation therapy and exhibited symptoms suggestive of osteoporosis (e.g., back pain, hip pain, stooped posture) were included. BMD was assessed using the Medilink Medix DR DEXA system.

Results: The study cohort included 27 males (30.33%) and 62 females (69.66%), of whom 17 (27.42%) were postmenopausal. Osteoporosis (T-score ≤ -2.5) was identified in 12 patients (13.48%) at the lumbar spine and 7 (7.86%) at both the femur and lumbar spine. Osteopenia (T-score between -1 and -2.5) was found in 24 (26.97%) patients. Among 19 osteoporosis cases, 3 (15.79%) were male, and 16 (84.21%) were female, with higher prevalence in females (25.81%) compared to males (11.11%).

Conclusion: DEXA plays a critical role in identifying BMD changes in DTC patients on suppressive thyroxine therapy. Early detection of osteoporosis or osteopenia enables timely intervention, reducing fracture risks and improving overall patient outcomes.

Keywords: Bone Mineral Density, Differentiated Thyroid Carcinoma, Dual-energy X-ray Absorptiometry, Osteoporosis, Osteopenia.

7. Diagnostic Dilemma Between Early Hashimoto's Thyroiditis vs Graves' Disease in ^{99m}Tc-Pertechnetate Scintigraphy: Overcoming the Challenge

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ABSTRACT

Introduction: Differentiating Early Hashimoto's Thyroiditis (EHT) from Graves' Disease (GD) is a diagnostic challenge, particularly when thyroid scintigraphy reveals overlapping findings. Both conditions may show a diffuse increased uptake on imaging, complicating the diagnosis.

Objectives: This study aims to investigate the diagnostic dilemma in differentiating EHT from GD based on thyroid scintigraphy, highlighting the overlap in imaging patterns. It also proposes an integrated diagnostic approach combining clinical, laboratory, and imaging evaluations.

Patients and Methods: A total of 60 patients were included in this observational study conducted from January to December 2024 at INMAS, Jashore. All patients underwent thyroid scintigraphy using 99m Tc-pertechnetate with a Mediso Dual Head Gamma Camera. Clinical histories are taken properly and sonological evaluations were performed using the Canon Aplio series ultrasound system (Model: CUS-AA000). Serological testing for thyroid function and antibody profiles was conducted using chemiluminescence and radioimmunoassay techniques.

Results: Among the 60 patients, 56 (93.67%) were diagnosed with GD based on diffuse thyroid uptake, clinical history, sonological findings, and serological results. Four patients (6.67%) presented with similar scintigraphic patterns but were diagnosed with EHT after further evaluation, including FNAC report, thyroid function tests and elevated Anti-TPO antibodies.

Conclusions: Accurate differentiation between EHT and GD requires a multifaceted diagnostic approach integrating clinical history, thyroid function tests, antibody profiles, imaging studies, and FNAC when

necessary. This approach ensures accurate diagnosis and appropriate treatment, minimizing complications.

Keywords: Early Hashimoto's Thyroiditis, Graves' Disease, Thyroid Scintigraphy, Autoimmune Thyroid Disorders

8. Thyroid Agenesis Uncovered: A Case of Persistent Hypothyroidism in An Adolescent

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ABSTRACT

Introduction: Congenital hypothyroidism (CH) is a significant public health issue due to its potential to impair neurocognitive development if untreated. Neonatal screening programs have drastically reduced undiagnosed cases; however, atypical presentations and delayed symptom onset can pose diagnostic challenges. This case report addresses the diagnostic complexities of thyroid agenesis in adolescents with a history of CH and persistent hypothyroidism.

Case summary: A 20-year-old female with CH, treated with levothyroxine since infancy, presented with progressive forgetfulness, fatigue, and weight gain. Laboratory investigations revealed elevated thyroid-stimulating hormone (TSH) levels (79.3 µIU/mL) and reduced free thyroxine (FT4) levels (3.01 pmol/L), suggesting poorly controlled hypothyroidism. Advanced imaging, including high-resolution ultrasound and thyroid scintigraphy with Tc-99m and I-131, confirmed the absence of thyroid tissue, diagnosing thyroid agenesis.

Discussion: This case underscores the necessity of sustained clinical vigilance and regular thyroid function monitoring in individuals with CH, even under long-term therapy. Thyroid agenesis can remain undetected without comprehensive imaging studies, particularly in adolescents presenting with persistent hypothyroid symptoms. Early identification and intervention are essential to optimize management and prevent complications.

Conclusion: Thyroid agenesis should be considered in cases of persistent hypothyroidism despite standard CH treatment. Regular monitoring and advanced imaging play a critical role in timely diagnosis and effective management.

Keywords: Congenital hypothyroidism, thyroid agenesis, persistent hypothyroidism, adolescent hypothyroidism, levothyroxine.

Proffered Paper Session IV

1. Investigation of the Radionuclides Induced in the Concrete Materials Exposed to Neutron at F-18 Production in Cyclotron

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ABSTRACT

The present study focuses on the investigation of radionuclides induced within concrete materials used as vault room shielding at the F-18 production in cyclotron. The research has been conducted in the IBA 18/9 MeV cyclotron at the National Institute of Nuclear Medicine and Allied Sciences (NINMAS).

The objective of this work is to characterize the radionuclides that are generated within the concrete materials during the F-18 production process. A High Purity Germanium (HPGe) detector has been utilized for measuring and identifying the radionuclides. The detector offers high resolution and sensitivity, enabling accurate detection and quantification of the radionuclides present. By analyzing the gamma-ray spectra, the specific radionuclides induced can be determined as a non-destructive method. The research involved experimental measurements conducted in the vault room shielding of the IBA Cyclone 18/9 MeV cyclotron where the concrete samples have been irradiated with neutron radiation generated during the F-18 production. Subsequently, the activated concrete samples have been carefully collected and their gamma-ray spectra have been analyzed using the HPGe detector. The results of this investigation have been provided valuable insights into the types and concentrations of radionuclides induced within the concrete materials. It has been found that Ta-182 is the major radionuclide and Co-60, Ba-133, Mn-54 are produced in the inner front surface with activity inside the wall. Most commonly 6 major radionuclides (others two Cs-134 and Ra-226) have been found in the first 7.2 cm thickness of the emulating wall or concrete samples. Understanding these radionuclides is crucial for evaluating the potential radiation hazards associated with the production facility. Moreover, the findings will contribute to optimize the design and composition of concrete materials used for vault room shielding, aiming to enhance their effectiveness in attenuating neutron radiation. This research will serve as a reference for future studies concerning radionuclide-induced activation of materials within cyclotron facilities, fostering advancements in radiopharmaceutical production and radiation safety practices.

***Keywords**:* HPGe Detector, Sensitivity, Gamma-ray spectra, Radiation Hazards, Neutron.

2. In-house Development of A Semi-Automated Dispensing System for [^{18}F]FDG at the Cyclotron Facility of National Institute of Nuclear Medicine and Allied Sciences and Optimizing Its Sterile and Aseptic Dispensing Condition

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ABSTRACT:

The requirement of an effective and smooth dispensing system is very much essential for the accurate and efficient distribution of [^{18}F] Fluorodeoxyglucose ([^{18}F]FDG) to positron emission tomography-computed tomography (PET-CT) facilities. This study presents the development and implementation of a semi-automated dispensing system specifically designed for the bulk distribution of [^{18}F]FDG with a strong focus on maintaining sterile and aseptic dispensing conditions. The dispensing system was designed to improve control, reliability, and operational flexibility while providing significant cost savings and faster turnaround times compared to existing systems. Performance tests, including sterility assessments and bacterial endotoxin (LAL) tests, were conducted to validate the system's effectiveness. The results demonstrated improvements in dose accuracy, sterility, and overall operational efficiency. The advancements in the newly developed semi-auto dispensing system are

aimed to enhance patient care and resource utilization in PET-CT molecular imaging facilities, offering a viable solution for improving bulk radiopharmaceutical distribution from the cyclotron-based production site to remote PET-CT centers

Keywords: Dispensing System, [^{18}F] Fluorodeoxyglucose ([^{18}F]FDG), Cyclotron, SPECT & PET Radiopharmaceuticals

3. Therapeutic Radionuclides for Cancer Treatment: Future Prospects of Ac-225 Alpha Emitter Production with 18/9 MeV Cyclotron at NINMAS

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ABSTRACT

The use of Actinium-225 (Ac-225) as an alpha-emitting radionuclide in targeted alpha therapy (TAT) has shown exceptional promise in treating malignancies such as leukaemia, prostate cancer, lymphoma, and neuroendocrine tumors. Its high linear energy transfer and limited penetration depth enable precise cancer cell destruction with minimal impact on healthy tissues, distinguishing it from other isotopes.

The 18/9 MeV IBA cyclotron at NINMAS, BAEC, currently utilized for F-18 production, offers unique potential for Ac-225 production via the ^{226}Ra(p,2n)^{225}Acnuclear reaction. The cyclotron's optimal energy range, high beam intensity, and flexible targetry make it well suited for proton irradiation of radium-226. Advances in target preparation, cooling mechanisms, and post-irradiation radiochemical separation are essential to ensure high yield, radiochemical purity, and safety compliance. Overcoming challenges such as efficient radium target recycling, isotope separation, and economic scalability requires innovative solutions. Case studies from international facilities highlight the potential of automated radiochemical processes and enhanced cooling systems to maximize production efficiency. Regulatory approval frameworks and cost-effective distribution strategies are equally critical.

Future research directions include initiating clinical trials for Ac-225-based therapies within two years, upgrading cyclotron components within three years, and launching educational campaigns to raise awareness about Ac-225 applications. International collaborations are imperative to share expertise, optimize technology, and scale up production capacity.

Strategic efforts to advance Ac-225 production at NINMAS have the potential to position Bangladesh as a leader in alpha emitter production, paving the way for breakthroughs in nuclear medicine and revolutionary cancer treatment modalities.

Keywords*:* TAT, Radium-226, Actinium-225, Alpha emitter

4. Enhancing Medical Imaging Reporting Through Virtual Reality (VR)

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ABSTRACT

Virtual reality (VR) has emerged as a transformative tool in medical imaging, enabling immersive interaction with complex datasets. This study explores the feasibility of using VR to report PET-CT (Positron Emission Tomography and Computed Tomography) and other DICOM (Digital Imaging and Communications in Medicine)-based tests through the Medical holodeck platform.

Using Oculus Quest 2, various PET-CT and DICOM images were visualized and analyzed within the Medical holodeck environment. The study assessed the ease of navigation, image manipulation, and potential for integrating clinical annotations.

The integration of VR in medical imaging proved to be a profoundly engaging experience, transforming the way complex imaging data is interpreted. The immersive environment of Medical holodeck enabled users to interact with PET-CT images in a manner that felt intuitive and insightful, fostering a deeper understanding of spatial relationships and pathologies. This innovative approach not only enhanced diagnostic precision but also instilled a sense of possibility and excitement about the future of medical technology. By bringing imaging data to life, VR bridges the gap between technology and human insight, offering a glimpse into a future where diagnostics are not just about interpretation but about truly seeing and understanding. This study paves the way for further exploration into VR's role in clinical and educational applications, inspiring a vision of healthcare that is immersive, collaborative, and profoundly impactful.

Keywords: Virtual reality, DICOM, Medical imaging.

5. Emerging Nanomaterials-Based Drug Delivery Systems for Cancer Theragnostic: A Nuclear Medicine Perspective

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ABSTRACT

Current cancer theranostics, including chemotherapy, radiation therapy, and diagnostic techniques in nuclear medicine (e.g., SPECT and PET), often rely on traditional drugs in their native form. These conventional approaches face significant limitations, with only a small fraction of administered drugs reaching tumor cells, resulting in poor targeting, inadequate drug release profiles, and adverse side effects. For example, one of the most commonly used drugs in nuclear medicine for diagnostics, fluorodeoxyglucose, shows limited sensitivity and poor specificity.

In response to these challenges, nanomaterial-based drug delivery systems (NDS) have emerged as promising alternatives, leveraging various nanocarriers such as liposomes, polymers, gold, and magnetic nanoparticles to enhance targeted drug delivery, imaging, and therapeutic efficacy. In nuclear medicine, the integration of these nanocarriers into radiopharmaceuticals has the potential to enhance molecular imaging and cancer therapeutics.

Our study focuses on recent advancements in NDS for cancer theranostics. We explore the mechanisms underlying current cancer treatments and how

nanomaterial-based drugs can effectively transport therapeutic and diagnostic agents to cancerous tissues by overcoming biological barriers, thereby achieving targeted delivery. This study also reviews recently developed nanomaterial-based drugs in cancer therapy. Overall, this research highlights the transformative potential of nanotechnology in improving drug delivery systems and addresses critical challenges that must be overcome for successful clinical implementation of NDS.

Furthermore, we identify collaborative opportunities between pharmaceutical companies and researchers to innovate novel nuclear medicines for cancer therapies and diagnostics in Bangladesh, which could enhance treatment outcomes, reduce costs, and facilitate opportunities for further research in this field.

6. Factors Influencing ^{18}F-FDG Yields at NINMAS: A Comprehensive Analysis of 100 Production Batches

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ABSTRACT

Stable yield of [^{18}F]-2-fluoro-2-deoxyglucose ([^{18}F]-FDG) production is vital to guarantee timely PET imaging and uninterrupted supply to other PET centers. This study aimed to analyze % of radiochemical yield data from 100 batches of ^{18}F-FDG produced by an 18/9 MeV IBA cyclone facility to determine the significant contributors of yield fluctuation.

In cyclotron water ($H_2{}^{18}O$) is irradiated in a 2.5 mL Niobium [^{18}F]Conical-8 target with an 18 MeV proton beam, varying the beam currents and irradiation times based on required activity. The produced [^{18}F]-fluoride is then transported to a collecting vial in a shielded hot cell for radiopharmaceutical production. Subsequently, [^{18}F]-FDG is synthesized via a nucleophilic substitution reaction using Mannose Triflate as a precursor in Synthera® modules at the facility.

Data from 100 batches, produced between January 27, 2021, and February 23, 2022, showed slight fluctuations in yield across batches. The mean decay-corrected yield was (57.51 ± 10.84%), higher than the mean non-decay-corrected yield of (48.01 ± 8.27%) of these 100 batches.

The analysis revealed that precursor purity, the production of impurities in the [^{18}F]-fluoride solution (due to the (p,α) nuclear reaction), and transport capillary efficiency were significant contributors to yield variability. The results highlight the potential for improving both consistency and efficiency in the production of radiopharmaceuticals by implementing specific optimizations.

Keywords: Percentage of Yield, Synthera® Module, [^{18}F]-Fluorodeoxyglucose.

7. Assessment Of the Impact and Cost-Effectiveness of The Congenital Hypothyroidism Screening Program in Bangladesh by The Bangladesh Atomic Energy Commission

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ABSTRACT

The global healthcare landscape increasingly prioritizes cost-effective and evidence-based interventions, particularly in resource-limited settings such as Bangladesh. This study evaluates the Congenital Hypothyroidism (CH) screening program implemented by the Bangladesh Atomic Energy Commission (BAEC) from July 2018 to June 2022, focusing on its health outcomes, economic impact, and challenges. Over the program duration, approximately 500,000 dried blood spot (DBS) samples were collected across all 64 districts of Bangladesh. These samples were analyzed at the National Institute of Nuclear Medicine and Allied Sciences (NINMAS) for CH diagnosis through quantitative measurement of Thyroid-Stimulating Hormone (TSH) from Dried Blood Spot (DBS). A thorough economic analysis assessed the direct and indirect costs of screening, diagnosis, and treatment, alongside the Disability-Adjusted Life Year (DALY) metric to quantify health benefits. Despite nationwide implementation, the program achieved only 5% coverage of the estimated annual live births, highlighting a significant gap in service reach. Of the 620 initially suspected positive cases, confirmatory testing validated 274 cases of CH, suggesting an incidence rate higher than previously reported for Bangladesh. The economic evaluation revealed a benefit-cost ratio of 2.68 to 3.62 over the study years, underlining the program's cost-effectiveness. The increasing trend in this ratio indicates improved economic efficiency as the program matured. The findings advocate for strengthened public health policies, increased public awareness, and investment in research to scale the program effectively. Addressing these gaps will amplify the program's potential to improve neonatal health outcomes and reduce the long-term economic burden associated with untreated CH.

Keywords: Congenital Hypothyroidism, DBS, DALY, Cost-effectiveness.

8. Study of R100, R90, R80, R50, and Rp with the Increase of Field Size in Small Field of Electron Beams and Photon Contamination Analysis in The Tail Region of The PDDs Of a Medical LINAC

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ABSTRACT

Dosimetry in small fields is frequently used now-a-days in radiotherapy (intensity modulated radiotherapy, volumetric arc radiotherapy, stereotactic radiosurgery) purposes. In this work, we focus on the study of high-energy electron beams in

small fields and hence on measuring the quality correction factors and quality assurance for accelerated electrons delivered from a medical linear accelerator (LINAC). Taking the TRS-398 protocol as the standard one, Varian Clinac IX SN6298 was used for both 6 and 12 MeV electron beams in 1 × 1 cm2 to 5 × 5 cm2 small field sizes. Eventually, the percentage of depth dose (PDD) and beam profile were determined in water phantom. From the PDD curves, different percent doses and Bremsstrahlung tail areas were measured experimentally. For the medical linear accelerator, R100, R90, R80, R50, and Rp all increased as field size (s) increased. This was true for both 6 MeV and 12 MeV electron beams in the CC13 chamber. Bremsstrahlung tail area increases with increasing energy. Which can cause changes in the dose distribution in the penumbra region. Beam profiles revealed that dose was scattered more in small fields than in intermediate sizes. And all the beam symmetries are less than 2%. Small-field dosimetry is challenging due to interactions between the radiation beam, detector, and surrounding materials. PDD and beam profile curve measurements are critical but sensitive to variations, leading to uncertainties. In electron beam dosimetry, the Bremsstrahlung tail can also contribute to uncertainty. Careful technique, detector selection, and data analysis, along with quality assurance and control measures, can improve the accuracy and precision of small dosimetry and lead to better cancer treatment outcomes.

Keywords: Medical LINAC, Small Field Dosimetry, PDD, Bremsstrahlung tail

9. Optimization of Radioimmunoassay Protocol for INMAS, Suhrawardy Using Taguchi Method

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ABSTRACT

Objective: Radioimmunoassay (RIA) is an essential technique that offers excellent sensitivity for quantifying hormones and other biomolecules. Optimization of assays to maximize accuracy while minimizing time and radiation exposure is somewhat challenging since the assays depend on so many factors. It is very tedious to optimize each factor separately by doing a full factorial analysis. An L9 Taguchi array was used to identify favorable levels of four critical factors: sample volume, labeled antibody volume, incubation time, and wash times for RIA of TSH.

Methods: An L9 orthogonal array was designed to evaluate three levels of each factor: sample volume (100, 200 & 300 µL), labeled antibody volume (50, 100 & 150 µL), incubation time (0.5, 1.5 & 2.5 hours), and wash numbers (2, 3 & 4 times). Nine combinations of experimental conditions were performed, with accuracy, total assay time, and radiation exposure recorded as outputs. Accuracy was quantified by comparing the obtained TSH value of three pooled serums against the TSH value estimated by the industry-standard chemiluminescence immunoassay (CLIA) system. Finally, all three parameters of interest were ranked, and a weighted total rank was calculated.

Results: The antibody and sample volumes were the most dominant factors for accuracy. Reducing incubation time was the only choice for reducing assay time. Antibody volume had the most influence on radiation exposure.

Conclusion: Taguchi orthogonal array is an efficient tool for optimizing RIA in nuclear medicine centers, reducing report delay and operator exposure, and improving diagnostic accuracy.

Keywords: Radioimmunoassay, immunoassay, Taguchi method, process optimization, factorial analysis

Poster Presentation Session

Screen 1

1. Evaluation The Pattern of DMSA Renal Scan Findings in Patients Attending at INMAS, Sylhet

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ABSTRACT

Objective: The DMSA renal scan is a critical diagnostic modality for evaluating renal pathologies. This study aimed to analyze the patterns of findings from DMSA renal scans performed at INMAS, Sylhet, for a variety of clinical indications.

Patients and Methods: This prospective study included 87 patients (174 kidneys) who underwent DMSA renal scans between July 2022 and June 2023. Among the participants, 41 (47.13%) were male, and 46 (52.87%) were female, with ages ranging from 8 months to 65 years (mean age: 29 years). The primary clinical indications included hydronephrosis (18 kidneys; 20.69%), pyelonephritis (10 kidneys; 11.49%), non-visualized kidneys (30 kidneys; 34.49%), ectopic kidneys (8 kidneys; 9.2%), malrotated kidneys (4 kidneys; 4.6%), and multicystic kidneys (6 kidneys; 6.90%). Scans were conducted using a dual-head SIEMENS Symbia Intevo Bold system (planar mode) following standard protocols.

Results: Among the 174 kidneys assessed, 70 (40.23%) demonstrated normal findings, while 104 (59.77%) exhibited abnormalities. The abnormal findings included cortical non-functional kidneys (12 kidneys; 6.9%), non-visualized kidneys (44 kidneys; 25.29%), ectopic kidneys (10 kidneys; 5.7%), crossed fused ectopia (4 kidneys; 2.3%), horseshoe kidneys (8 kidneys; 4.6%), compensatory hypertrophy (1 kidney; 0.5%), smaller kidneys (17 kidneys; 9.7%), and cortical scarring (8 kidneys; 4.6%).

Conclusion: DMSA renal scans play a pivotal role in the evaluation of renal pathologies, providing clinicians with accurate diagnostic information that aids in effective patient management. The findings underscore the utility of this imaging technique in addressing diverse renal conditions.

2. Dough Nut Sign: An Unusual Scintigraphic Pattern Observed in Bone Scan Findings

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ABSTRACT

Background: Bone scintigraphy is a potential diagnostic modality in nuclear medicine for detecting skeletal metastases. Increased osteoblastic activity typically indicates metastatic deposits. The “doughnut sign,” characterized by a peripheral rim of increased radiotracer uptake surrounding a central photon-deficient area, is a rare scintigraphic finding. It has been observed in benign conditions such as aneurysmal bone cysts, giant cell tumors, and simple bone cysts, as well as in malignant lesions with concurrent osteoblastic and osteolytic activity.

Material and Method: This prospective observational study was conducted at NINMAS from January 2022 to July 2024. A total of 4885 patients with histopathologically confirmed carcinomas underwent bone scintigraphy for metastatic evaluation. Whole-body imaging was performed two hours after intravenous administration of 99m Tc-MDP, followed by spot imaging of focal lesions.

Results: The doughnut sign was identified in 29 patients (0.006%). The cohort ranged in age from 2 to 76 years, with a male-to-female ratio of 1:3. The axial skeleton, predominantly the skull (23 cases), was the most common site of involvement, with fewer cases observed in the appendicular skeleton (6 cases). Breast carcinoma was the most frequent underlying malignancy, followed by lung cancer, thyroid cancer, and Langerhans cell histiocytosis. Additionally, 23 patients demonstrated metastatic lesions at other skeletal sites.

Conclusion: The doughnut sign is an infrequent but significant finding in bone scintigraphy, primarily associated with breast carcinoma. Its presence reflects mixed osteoblastic and osteolytic activity and warrants careful evaluation to ensure diagnostic accuracy.

Keywords: Doughnut sign, bone scintigraphy, metastatic lesion, 99m Tc-MDP, osteoblastic activity

3. Papillary Microcarcinoma with Positive LDS without the Rise OF Thyroglobulin: A Case Report

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ABSTRACT

Background: Papillary thyroid microcarcinomas (PTMCs) are small (<10 mm) papillary thyroid cancers. The majority of these are not palpable and clinically unapparent. They are usually found incidentally and rarely behave as cancers. Most PTMCs have an excellent prognosis, but a few present with recurrence.

Case report: Our patient is a 45-year-old menopausal woman who received 50 mCi I-131 radio ablation after total thyroidectomy due to papillary microcarcinoma in left lobe. On first and second follow up visits, she had normal serum FT3 and FT4 levels but suppressed serum TSH level. Thyroglobulin (Tg) and anti-thyroglobulin (ATg) were also low. USG neck showed no definite abnormality in thyroid bed. Consecutive first & second large dose scans (LDS) at the end of first & second year after the therapy were positive, revealing focal area of radiotracer concentration in thyroid bed. Now, patient is waiting for second therapy of I-131 75 mCi.

Conclusion: Even though papillary microcarcinoma has been considered to be less aggressive, still it needs careful work up for better patient surveillance.

4. Incidental Identification of Chilaiditi Sign During FDG PET-CT in a Patient with Advanced Squamous Cell Carcinoma

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ABSTRACT

Background: FDG PET-CT is a versatile imaging modality extensively used for detecting malignancies, evaluating treatment response, and identifying anatomical abnormalities.

Incidental findings, such as anatomical variations or non-malignant conditions, are frequently observed during routine imaging. Although unrelated to the primary indication, these findings may provide critical clinical insights or help prevent diagnostic errors. One such incidental finding, the Chilaiditi sign, can present a diagnostic challenge if not properly recognized.

Case Summary: We report the case of a 52-year-old male with no history of diabetes or hypertension who underwent an FDG PET-CT scan as part of an evaluation for metastatic squamous cell carcinoma of the right submandibular gland. The imaging revealed multiple metabolically active bilateral cervical lymph nodes, consistent with metastatic disease. Additionally, the PET-CT scan incidentally demonstrated the presence of a colonic interposition between the liver and the right hemidiaphragm, a configuration known as the Chilaiditi sign. This anatomical variant was characterized by the interposition of the colon without any associated hypermetabolic activity. The patient was asymptomatic, with no clinical manifestations attributable to the Chilaiditi sign.

Conclusion: The Chilaiditi sign is a benign anatomical variant that must be recognized on imaging to prevent misdiagnosis and unnecessary interventions because it is usually asymptomatic. This case highlights the importance of evaluating incidental PET-CT findings to ensure diagnostic accuracy and appropriate management.

5. Diagnostic Challenge in FDG PET-CT: Pulmonary Consolidation Masking as Malignant Lesion-A Case Report

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ABSTRACT

Background: Differentiating infectious from malignant lesions on ^{18}F-FDG PET-CT is crucial for effective cancer management, as misinterpretation can lead to incorrect diagnoses and treatments. Although highly sensitive for detecting active lesions, PET-CT lacks specificity, necessitating thorough clinical correlation and follow-up to avoid misdiagnosis.

Case report: A 34-year-old male with a known history of rectal cancer presented with only symptoms of cough and chest pain, prompting further investigation. To evaluate treatment response following chemotherapy and to investigate these symptoms further the patient underwent an ^{18}F-FDG PET-CT scan, which identified a large soft-tissue density lesion in the right lung. This lesion raised concerns for metastatic disease or a potential secondary malignancy, necessitating additional diagnostic assessments. Other relevant investigation like complete blood count (CBC),C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) indicated elevated inflammatory markers, suggesting an infectious process rather than malignancy. Based on these findings, empiric antibiotic therapy was initiated to address the suspected infection. After a month, a post therapeutic follow-up ^{18}F-FDG PET-CT scan was performed showing complete resolution of the pulmonary lesion. This outcome confirmed that the lesion was a consolidation caused by infection, ruling out the initial suspicion of a metastatic or malignant process.

Conclusion: This case demonstrated the challenge of distinguishing malignancy from infection on ^{18}F-FDG PET-CT and highlighted the importance of clinical correlation and follow-up imaging. It confirmed the utility of PET-CT in monitoring treatment and emphasized the need for improved diagnostic specificity.

Keywords: ^{18}F-FDG PET-CT, Infectious, Malignant, Rectal cancer.

6. Patterns of Metastases of Non–Small Cell Lung Cancer (NSCLC): Single Institute Experience

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ABSTRACT

Introduction: Lung cancer remains the leading cause of cancer related mortality in both men and women. Non–small cell lung cancer (NSCLC) accounts for about 85% of lung cancers. Nuclear Medicine provides hybrid state of the art imaging with ^{18}F- fluorodeoxyglucose (FDG) Positron Emission Tomography-Computed Tomography (PET-CT), which significantly impacted the management of this disease. Different histological types of lung cancer show significant differences in oncological behavior.

Objectives: To find the distribution and metastatic patterns of squamous and adenocarcinoma of NSCLC.

Methods: Data from all PET-CT performed at the INMAS, Suhrawardy from May to December, 2024 were reviewed and information on individual's age, sex, histological type of primary lung cancer, presence and location of metastases were recorded.

Results: The most frequent histological type in both sexes was adenocarcinoma 83%. More than 93% of individuals with lung cancer metastases were older than 50 years with four-fold male predominance. Hematogenous metastases were mostly found in brain, liver adrenal gland, bone. Though PET CT has limitations on detecting brain metastases. Metastases in adrenal gland mostly derived from adenocarcinoma. Metastases in bone derived mostly from squamous adenocarcinoma. Liver metastases found in both type of NSCLC but mostly on Squamous cell carcinoma. Kidney metastases is rare but found in squamous cell carcinoma.

Conclusion: Understanding the distribution of metastases in different histological types of lung cancer is crucial for planning therapeutic algorithms and understanding clinical presentation and suspicion of occult lung cancer.

Keywords: Non–small cell lung cancer, squamous cell carcinoma, adenocarcinoma, metastases

7. Enhanced Detection of Skeletal Metastases: Tc-99m MDP Planar Imaging Combined with SPECT-CT Single Centre Experience

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ABSTRACT

Background: Bone scintigraphy is a cost-effective imaging technique for detecting bone lesions and skeletal metastases. SPECT-CT, a hybrid modality, enhances anatomical localization and diagnostic accuracy, particularly for equivocal lesions.

Methods: Thirty-five cancer patients (including cases of breast, prostate, and lung cancer) referred for whole-body bone scans between January 2024 and December 2024 were included in this study. Planar imaging and SPECT-CT were performed in the same clinical setting using a Siemens Symbia Intevo 16-slice dual-head SPECT-CT scanner. Data were analyzed statistically.

***Results**:* Among the 35 patients, planar bone imaging identified benign, equivocal, and malignant lesions in 22.9%, 17.1%, and 60.0% of cases, respectively. In comparison, SPECT-CT detected benign, equivocal, and malignant lesions in 25.7%, 5.7%, and 68.6% of cases, respectively. Furthermore, in 24 patients with skeletal metastases, the number of metastatic lesions identified was higher with SPECT-CT combined with planar imaging than with planar imaging alone.

***Conclusion**:* Targeted or whole-body SPECT-CT in conjunction with planar bone imaging enhances the accuracy of detecting skeletal metastases. It also reduces the occurrence of equivocal or indeterminate findings, which often necessitate additional radiological investigations to exclude malignancy.

***Keywords**:* Planar bone scan, Tc-99m MDP, SPECT-CT, skeletal metastasis

Screen 2

1. Surprising Finding of Non-Small Cell Lung Cancer as A Metachronous Malignancy On F-18 FDG PET-CT During Follow-Up of Pharyngeal Carcinoma

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ABSTRACT

Introduction: Head and neck squamous cell carcinoma (HNSCC), the ninth most common malignancy in the world is associated with a high risk of second primary malignancies (SPMs), particularly lung cancer. Early detection of metachronous malignancies is essential for guiding management and improving prognosis. This case highlights the detection of non-small cell lung cancer (NSCLC) as a second primary malignancy detected in follow up whole-body 18F-FDG PET-CT scan who was previously treated as a diagnosed case of pharyngeal carcinoma.

Case Report: A 68-year-old male with a long term smoking history presented with dysphagia for two months. Biopsy of the posterior pharyngeal wall confirmed well-differentiated squamous cell carcinoma. The patient underwent neoadjuvant chemotherapy and radiotherapy. Six months later, he experienced significant weight loss and persistent dysphagia, prompting further evaluation and was referred to NINMAS for whole body18F FDG PET-CT scan to assess the disease recurrence and metastases. PET scan revealed no hypermetabolic activity in the pharyngeal region however, a hypermetabolic mass in posterior segment of the upper lobe of the right lung, suggesting a second primary malignancy. A CT-guided FNAC of the pulmonary lesion confirmed invasive adenocarcinoma. The patient underwent concurrent chemoradiotherapy and right lobectomy. Six months postoperatively, follow-up PET-CT showed no abnormal FDG uptake or residual mass at the site of the operation or in the posterior pharyngeal wall.

Conclusion: Whole-body 18F-FDG PET-CT is a highly effective tool for the early detection of second primary malignancies in the lung, even in the absence of symptoms. This case highlights its role in identifying metachronous NSCLC, enabling timely intervention and improving patient outcomes and survival.

Keywords: Lung Cance, Malignancy, FDG, PET-CT, Pharyngeal Carcinoma

2. Pattern of 99mTc DTPA Renogram In Bilateral Nephrolithiasis with Cystinuria: A Rare Case Report

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ABSTRACT

Background: Cystinuria is a rare autosomal recessive metabolic disorder caused by defective reabsorption of cystine and dibasic amino acids (lysine, ornithine, and arginine) in the renal proximal tubules. It accounts for 6–8% of pediatric urolithiasis and often presents with recurrent nephrolithiasis. In many cases, stones are detected during adolescence, with increased risk of hypertension, recurrent obstructive stones, and chronic kidney disease (CKD).

Case Summary: We present a case of bilateral nephrolithiasis in a 9-year-old female with early-onset cystinuria. She was referred to the Institute of Nuclear Medicine and Allied Sciences (INMAS), Mohakhali, in November 2024 for renal function evaluation using a 99mTc DTPA renogram. She reported a two-year history of recurrent fever and loin pain. Her maternal grandfather had recurrent nephrolithiasis. Investigations revealed bilateral staghorn calculi on imaging. Intravenous urography demonstrated normal excretory function in both kidneys. Serum creatinine, calcium, and parathyroid hormone levels were within normal limits. Urine microscopy showed pus cells and RBCs, with no bacterial growth on culture. Urinary cystine levels were elevated. Ultrasound showed bilateral staghorn calculi with mild hydronephrosis in the left kidney. The DTPA renogram indicated pelvicalyceal dilatation without obstruction and mild parenchymal impairment in the left kidney, with normal function in the right kidney. The patient underwent left open pyelolithotomy with DJ stent placement.

Conclusion: Cystinuria often leads to recurrent, obstructive stone formation, predisposing patients to CKD and end-stage renal disease. Early diagnosis is crucial to avoid repeated interventions and improve quality of life. 99mTc DTPA renography aids in assessing renal function and guiding clinical decisions.

3. Unveiling Localized Ewing Sarcoma: The Role of ^{99}mTc-MDP Bone Scintigraphy in a Pediatric Case

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ABSTRACT

Background: Ewing sarcoma is a highly aggressive malignancy that predominantly affects children and young adults, with a propensity for bone and soft tissue involvement. Accurate staging and monitoring of skeletal metastases are essential for treatment plans. The reported case was histologically confirmed Ewing sarcoma who underwent a ^{99}m Tc- methylene diphosphonate (MDP) bone scan at INMAS, Suhrawardy.

Case report: A boy of 5 years presented with localized pain and gradual swelling of the right distal thigh for 3 months. Physical examination revealed a firm to hard, solid area in the right distal thigh having raised local temperature and tenderness. MRI of the right knee joint showed a large mass (13.6 x 3.6 x 7.2 cm) at the posterior aspect of the right lower thigh and posterior periarticular soft tissue. ^{99}mTc-MDP bone scintigraphy showed

increased radiotracer uptake confined to the primary lesion, consistent with localized disease and no evidence of distant metastasis. Core biopsy from right distal thigh reported malignant small round cell tumor, consistent with embryonal rhabdomyosarcoma.

Conclusion: MDP bone scans are valuable in detecting distant skeletal involvement in Ewing sarcoma, especially in resource-limited settings where advanced imaging modalities may not be accessible. The study emphasizes the clinical importance of MDP bone scans in identifying non-metastatic diseases and monitoring therapeutic response, recommending their integration with other imaging techniques for accurate diagnosis and patient management.

Keywords: Ewing's sarcoma, bone scintigraphy, small round cell tumor, embryonal rhabdomyosarcoma.

4. Bridging Diagnostic Gaps IN Hematological Malignancies: The Vital Role of PET-CT – A Case Report

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ABSTRACT

Introduction: Positron Emission Tomography-Computed Tomography (PET-CT) has transformed the landscape of hematological cancer detection by uncovering metabolically active lesions that remain undetectable with conventional imaging. This advanced modality is pivotal in disease evaluation, staging and treatment guidance, particularly in cases where biopsy or standard imaging proves inconclusive.

Case Report: A 35-year-old male presented with high-grade fever, night sweats, weight loss (13 kg) and loss of appetite over 1.5 months. Laboratory results revealed severe anemia (Hb 9.0 g/dL), leukopenia ($3.6x10^9$/L) and elevated LDH (498 U/L), raising suspicion of hematological malignancy. CT imaging identified small lymph nodes in the pre-tracheal, para-tracheal, and para-aortic regions (largest: 21x10 mm). FNAC was inconclusive due to small node size and bone marrow aspiration suggested acute lymphoblastic leukemia (ALL), while trephine biopsy indicated non-Hodgkin's lymphoma (NHL). As immunohistochemistry (IHC) reports were pending (>21 days), a PET-CT was urgently performed. PET-CT revealed extensive FDG uptake (SUVmax: 19.3) in the axial and appendicular skeleton, diffuse FDG-avid lymphadenopathy (SUVmax: 7.37) in cervical, mediastinal, axillary, and abdomino-pelvic regions, splenomegaly with mild FDG uptake, and hepatomegaly. Findings strongly suggested lymphoma, prompting immediate chemotherapy initiation. Fever subsided post-treatment (after 2 cycle of chemotherapy); however, the final IHC report indicated Acute B-lymphoblastic lymphoma/leukemia, but remained inconclusive.

Conclusion: This case highlights PET-CT's transformative role in the timely detection and staging of hematological malignancies. When traditional imaging and biopsy fail, PET-CT delivers vital diagnostic insights, enabling comprehensive disease assessment and facilitating targeted therapeutic decisions.

***Keywords*:** Metabolic Imaging, FDG PET-CT, Leukemia, Lymphoma.

5. Inter-Relationship Between Axillary Lymph Node and Skeletal Metastases in Invasive Ductal Carcinoma of Breast- a Single Institute Based Observational Study

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ABSTRACT

Background: Invasive Ductal Carcinoma (IDC) is the commonest malignancy in women, and about 20-30% of early–stage disease develops metastasis. Axillary Lymph Node (ALN) and skeletal system are two frequent sites of metastatic breast cancer. Many patients are referred to nuclear medicine centers for bone scintigraphy, as it is a highly sensitive method for detection of skeletal secondary deposits. With this background, the current study was conducted to observe the inter-relationship between skeletal and ALN metastases in IDC breast referred to INMAS, Satkhira.

Patients & Method: The study was conducted at INMAS, Satkhira from November 2023 – November 2024. This retrospective study included 32 histologically proven IDC breast cases. Bone scintigraphy was done with a Siemens Dual Head SPECT Gamma Camera 3-4 hours after IV injection of 20 mCiTechnitium-99m MDP.

Results: Out of 32 cases, first group included 19 (59.4%) patients who presented with ALN metastases and second group included 13 (40.6%) cases without ALN metastases. In the ALN positive group, about 42% cases had bone metastases. The commonest site of involvement was ribs (26.3%), followed by dorsal vertebrae (21.1%), skull and scapula (15.8%), and long bones (10.5%). On the other hand, the ALN negative group revealed skeletal metastases in only about 15% cases. Here, most frequently affected site was dorsal vertebrae (26.3%), followed by ribs & lumbar spine (21.1%) & other sites (9.1%) such as skull, scapula, sternum. None of them had any involvement of long bones.

Conclusion: This study focused on the inter-relationship & pattern of skeletal metastases in IDC breast with ALN metastases. Skeletal metastases were more frequently observed in cases with ALN metastases, and showing predilection towards axial skeleton.

Key words: Bone scintigraphy, breast carcinoma, ALN metastases.

6. Herlyn-Werner-Wunderlich Syndrome: Case-Based Diagnostic and Functional Insights Using DTPA Renogram

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ABSTRACT

***Background*:** Herlyn-Werner-Wunderlich syndrome (HWWS) is a rare congenital anomaly caused by mesonephric duct-induced malformation of the Müllerian and renal systems. It is defined by the triad of uterine didelphys, an obstructed hemiaminal septum (resulting in hematocolpos or hematometra), and unilateral renal agenesis. This report presents two cases of HWWS to evaluate the role of diethylenetriamine penta acetic acid (DTPA) renogram in assessing the function of the solitary kidney and identifying risks of renal impairment.

Case 1*:* A 37-year-old woman with left renal agenesis and uterine didelphys presented with

intermittent abdominal pain, and hematometra. HWWS was confirmed by transvaginal ultrasound.

Case 2: A 15-year-old girl presented with periodic pelvic pain and dysuria. Ultrasound revealed left kidney agenesis, uterine didelphys with hematometra (left cornu). DMSA scan confirmed the absence of left kidney.

Both cases were referred for DTPA renogram to assess renal function. Both cases confirmed solitary kidney with no evidence of renal tissue or tracer uptake in the region of the absent kidney or ectopic locations. The first patient had normal renal excretion, whereas the second exhibited functional obstruction in the solitary kidney.

Conclusion*:* These cases highlight the critical role of DTPA renogram in evaluating renal function and monitoring for potential complications. Comprehensive renal and gynecological assessment is essential for optimizing management and preventing long-term morbidity in affected individuals.

Keywords: Herlyn-werner-Wunderlich syndrome (HWWS), DTPA renogram, Mullerian duct, mesonephric duct, renal function, Hydronephrosis

7. Additive Value of SPECT CT in the Characterization of Skeletal Lesions – A Brief Report

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ABSTRACT

Planar whole body bone scintigraphy using intravenous Tc-99m-MDP for metastatic work up is one of the most commonly performed nuclear medicine procedure. Users of this modality sometimes experience dilemma due to presence of coexisting degenerative conditions and normal variants. Addition of SPECT CT may bring change in that experience. This presentation includes degenerative changes, normal variants, extra-skeletal lesion and metastatic lesions at several locations as well as of several types that were better characterized using SPECT CT.

Screen 3

1. Additive Value of SPECT CT in the Characterization of Thyroid Nodules - Interesting Images from Two Cases

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ABSTRACT

SPECT CT is well known for its ability to localize any lesion. Planar thyroid scintigraphy using intravenous Tc-99m-pertechnate is a modality that often put its users in dilemma due to presence of multiple nodules of varying amplitude function. This presentation includes images from two cases, one is a cold nodule and the other is a hot nodule. In these presented cases the nodules were classified accurately by SPECT CT which was not initially possible by the planar scan alone.

2. Unusual Biochemical Challenges in Papillary Thyroid Carcinoma: Elevated Thyroglobulin and TSH Levels: A Case Report

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ABSTRACT

***Background**:* Differentiated thyroid carcinoma (DTC), including papillary and follicular types, accounts for over 90% of primary thyroid malignancies. While 5 year survival rates exceed 95%, 20–30% of cases show incomplete structural & biochemical response to treatment due to tumor de-differentiation. Thyroglobulin Elevated Negative Iodine Scan (TENIS) syndrome complicates management, with elevated serum thyroglobulin and negative iodine scans. Resistance to thyroid hormone (RTH), caused by mutations in the thyroid hormone receptor beta (THRB) gene, raises TSH level which is a rare but complex condition that may coexist.

Case Report: A 40-year-old female presented with a swelling in the anterior neck and underwent right hemithyroidectomy, with histopathology confirming papillary thyroid carcinoma. Following completion thyroidectomy and two courses of radioiodine ablation, metastatic cervical lymphadenopathy developed, necessitating selective neck dissection followed by 3rd course of radioiodine ablation (total cumulative dose: 750 mCi). Despite these interventions, the patient demonstrated biochemical evidence of persistent disease with elevated serum thyroglobulin level, currently 22.2 ng/ml which was >300 ng/ml before radioiodine therapy. She also required unusually high doses of levothyroxine (800 micrograms daily) for TSH suppression due to apparent RTH. Post-therapy scans revealed no iodine-avid tissue or skeletal metastases. The final diagnosis was refractory DTC with concurrent TENIS syndrome and RTH. The patient is under close monitoring.

***Conclusion**:* This case underscores the importance of recognizing rare conditions such as TENIS syndrome and RTH in patients with refractory DTC. Integrating a multidisciplinary approach and evaluating differential diagnoses are crucial for optimal management of such complex cases.

***Keywords**:* Differentiated thyroid carcinoma, Thyroglobulin Elevated Negative Iodine Scan, Resistance to thyroid hormone, Radioiodine refractory, Papillary thyroid carcinoma.

3. Short Term Outcome of Well -Differentiated Thyroid Carcinoma Patients Treated with Radioactive Iodine in Southern West Zone of Bangladesh-Early Experience of A Single Institution Analysis

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ABSTRACT

Background: Thyroid cancer is the most common endocrine malignancy, constituting over 90% of cases. It is unique among carcinomas due to its diagnostic approach, postoperative radioactive iodine (RAI) therapy, and excellent prognosis.

Materials and Methods: This analysis was conducted on 25 patients with well-differentiated thyroid carcinoma (DTC) over one year. All patients underwent RAI therapy, and thyroid-stimulating hormone (TSH), thyroglobulin (Tg), and anti-thyroglobulin antibodies (Anti-Tg) were monitored for six months post-treatment.

Results: Of the 25 patients, 24 (96%) were female, and 1 (4%) was male, with a mean age of 35 ± 9 years (range: 16–55 years). Papillary thyroid carcinoma (PTC) was identified in 22 patients (88%), and follicular thyroid carcinoma (FTC) in 3 patients (12%).

Lymph node metastases were present in 10 patients (40%). Of these, 9 were treated with 150 mCi of RAI, while 1 received 40 mCi initially, followed by 150 mCi after six months. The remaining 15 patients without metastases were treated with 75 mCi.

Post-therapy whole-body scans (WBS) showed pulmonary metastases in 2 patients, both treated with 150 mCi. A second dose of 150 mCi was administered after six months, which reduced pulmonary activity on scintigraphy and decreased Tg levels. At six months, all patients showed decreased Tg and Anti-Tg levels. Patients were advised to undergo a diagnostic whole dose scan (WDS) one-year post-therapy.

Conclusion: DTC demonstrates excellent outcomes even in cases with lymph node or distant metastases. Regular follow-up and lifelong surveillance are essential to maintaining favorable outcomes.

4. Scintigraphic Pseudo-Graves' appearance of Hashimoto's Hypothyroidism: A case report

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ABSTRACT

Introduction: Hashimoto's thyroiditis (HT) and Graves' disease (GD) are two distinct autoimmune entities with different pathophysiology and treatment. A reported case of a patient with Hashimoto's hypothyroidism was found to have pseudo-Graves' disease (GD) in Tc-99m pertechnetate scintigraphy of the thyroid gland.

Case Report: A 38-year-old male with rapid thyroid swelling, weakness, body ache, and constipation, was referred for a 99m-Tc thyroid scan. Laboratory tests revealed overt hypothyroidism (FT4 = 6.65 pmol/L, TSH = 30.75 μIU/ml) with high anti-TPO Ab (>900 IU/ml) and normal TRAb (0.87 IU/ml). Thyroid ultrasonography showed a moderately enlarged thyroid gland with diffusely heterogeneous parenchymal echotexture, containing hypoechoic micronodules with surrounding echogenic septation, which is diagnostic of Hashimoto's thyroiditis. But interestingly, Tc-99m thyroid scintigraphy revealed increased radiotracer uptake in the thyroid gland, similar to that of Graves' disease. Finally, the patient was diagnosed as having Hashimoto's hypothyroidism with scintigraphic pseudo-Graves' appearance.

Conclusion: Thyroid scintigraphy detects diffuse abnormalities or focal lesions affecting thyroid parenchymal uptake. As Hashimoto's hypothyroidism can create diagnostic dilemmas with diffuse uptake patterns, prior knowledge can reduce unnecessary intervention.

Keywords: Hashimoto's thyroiditis, Graves' disease, Thyroid swelling, Thyroid scan.

5. Outcome of ^{99m}Tc-DTPA Renogram among the Pediatric Patients Attending INMAS, Satkhira

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ABSTRACT

Introduction: Diethylenetriamine pentaacetate (DTPA) renogram is a valuable diagnostic tool that provides

crucial functional insights for the early detection and monitoring of renal diseases. As ultrasonography (USG) continues to be a primary method for diagnosing renal abnormalities, the number of pediatric patients undergoing DTPA renograms is steadily increasing.

Objectives: The primary aim of this study was to evaluate the renal function of each kidney separately and analyze the patterns of renogram findings in pediatric patients under 18 years of age.

Patients and Methods: This study analyzed 30 pediatric patients (16 boys and 14 girls) aged 2 months to 18 years, referred for DTPA renograms to the Institute of Nuclear Medicine and Allied Sciences (INMAS), Satkhira, from March to December 2024. Imaging was performed using a Siemens Symbia Intevo Bold dual-headed gamma camera. Region of Interest (ROI) analysis was conducted to measure glomerular filtration rate (GFR), renal perfusion, split function, and other renal parameters.

Results: Ultrasonography (USG) revealed unilateral hydronephrosis in 90% of patients, bilateral hydronephrosis in 6.7%, and hypoplastic kidneys in 3.3%. The DTPA renogram results showed unilateral renal obstruction in 56.7%, bilateral obstruction in 13.3%, and no obstruction in 30%. Additionally, 30% of patients exhibited unilateral nephropathy, while 73.3% showed no evidence of nephropathy. Unilateral reduced renal perfusion was observed in 33.3% of cases. Only one case (3.3%) was diagnosed with a hypoplastic kidney. 66.7% of USG findings were consistent with DTPA renogram results.

Conclusion: The ability 99mTc-DTPA renogram to detect functional abnormalities enhances the diagnostic accuracy, reducing the need for invasive procedures. This study underscores the importance of DTPA renography as a key tool in pediatric urology, enabling early intervention and more effective management of renal diseases.

Keywords: DTPA, Renogram, Pediatric Patients

6. Bilateral Breast Carcinoma with Widespread Metastasis: Insights from FDG PET-CT Imaging

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ABSTRACT

Background: Breast carcinoma is one of the most common malignancies in women. However, bilateral synchronous breast carcinoma, where tumors occur in both breasts simultaneously, is a rare condition, accounting for approximately 1–2% of all breast cancer cases worldwide. This condition is associated with a higher risk of metastasis and presents unique challenges in diagnosis and management. FDG PET-CT is a vital imaging modality for evaluating the extent of disease, identifying both primary and metastatic lesions, and guiding therapeutic strategies.

Case Summary: We report the case of a 51-year-old female, non-diabetic and normotensive, with biopsy-confirmed invasive ductal carcinoma of the right breast and a suspected malignancy in the left breast. FDG PET-CT revealed a heterogeneous hypermetabolic thick-walled mass in the right breast with a hypodense cystic component and calcifications and another hypermetabolic soft tissue mass in the right breast. A mildly hypermetabolic suspected soft tissue mass was noted in the left breast, suspicious of malignancy. Metastatic disease was identified, including multiple right sub-pectoral and right axillary lymph nodes, a subcutaneous metastatic nodule near the right arm, skeletal metastasis in the sacrum, metastatic mass lesions in

the right anterior medial chest wall and a metastatic subpleural nodule in the right lung. A subsequent biopsy of the left breast confirmed invasive ductal carcinoma.

***Conclusion*:** This case illustrates the extensive metastatic burden in a patient with bilateral synchronous invasive ductal carcinoma, as detected by FDG PET-CT. The findings underscore the critical role of comprehensive imaging in the staging and management of breast carcinoma, particularly in cases with suspected bilateral involvement and widespread metastases.

7. Assessment of Sarcopenia and Sarcopenic Obesity by DXA Scan: New Insights

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ABSTRACT

Sarcopenia means a progressive muscle loss with advancing age, affects daily life activities and is prevalent in individuals aged 60-70 and over 80 years. Skeletal Muscle Index less than 7.0 kg/m2 (in men) or 5.4 kg/m2 (in women) is defined as sarcopenia in Asians. Sarcopenic obesity, a phenotype characterized by excessive body fat, reduced muscle mass, and strength, is a common health issue affecting individuals with overweight and obesity, particularly those with a BMI of 30 or higher. Risk factors for obesity and sarcopenia, such as inflammation, insulin resistance, oxidative stress, and sedentary lifestyle, may explain their common co-occurrence.

The EWGSOP recommends using Whole-body dual-energy X-ray absorptiometry (DXA) as a gold standard technique for analyzing body composition, including lean mass, bone mineral content, fat mass index, and body fat percentage, at both individual and whole body levels.

Lean/height^2 (kg/m^2) represents the appendicular lean mass index (ALMI), commonly used for diagnosing sarcopenia. Sarcopenia affects muscle quantity and quality, with skeletal muscle index (SMI) calculated using DXA. It should be accompanied by qualitative assessments of physical performance, such as gait speed and grip strength.

AS there are DXA scan facilities available and FMI can be measured easily, easy identification of suspected sarcopenia is convenient. Our goal is to maximize the utilization of existing BMD facilities, showcasing their potential in clinical sectors and raising awareness about their low-cost, accurate, and widely available technique.

Keywords: sarcopenia, sarcopenic obesity, Dexa bone mineral densitometry study.

Screen 4

1. Leveraging Anterior and Posterior Views for Metastasis Classification Using Attention-Based Deep Learning

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ABSTRACT

This study presents a novel approach to classifying bone metastasis status in patients using Bone Scintigraphy images. The dataset, collected from the Institute of Nuclear Medicine and Allied Sciences, Rajshahi, comprises 500 distinct patients, with each patient having two Gamma camera-acquired images: anterior and posterior views. The binary classification task identifies images as either "Metastasis" or "Non-Metastasis". A key contribution of this research lies in the development of a deep learning architecture designed to effectively leverage both imaging perspectives simultaneously. The dataset underwent rigorous preprocessing to ensure it was optimized for model training and evaluation. The proposed model incorporates an attention mechanism to enhance feature extraction and integrate information from anterior and posterior images as inputs for each patient. This multi-input design allows the network to comprehensively analyze complementary information from both views. Experimental results demonstrate that the proposed architecture outperforms several recent studies addressing similar classification tasks. This advancement highlights its potential for application in medical diagnostics, particularly in facilitating more accurate and efficient metastasis detection. The findings underscore the utility of deep learning in improving biomedical image analysis and its promising implications for clinical practice.

***Keywords**:* Bone Metastasis, Deep Learning.

2. Longitudinal Analysis of Energy Resolution Degradation in PET-CT: A Five-Year Quality Assurance Study

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ABSTRACT

Background: The energy resolution of PET scanners directly impacts image quality by rejecting scattered photons. Over time, factors like crystal aging, photodetector wear, and environmental conditions can degrade energy resolution. Understanding these changes is essential for maintaining performance and planning maintenance.

Objective: This study evaluates changes in energy resolution over five years of quality assurance (QA) testing on a Philips PET-CT scanner (Model: Ingenuity TF HM 7) at the National Institute of Nuclear Medicine and Allied Sciences (NINMAS).

Abstract: This study examines energy resolution degradation in a Philips Ingenuity TF PET-CT scanner at NINMAS. The system, equipped with LYSO crystals, showed energy resolution declining from 12.1% FWHM to 13.5% FWHM over five years, representing an 11.6% relative degradation. Despite the decline, the resolution remained within manufacturer-specified limits (15% FWHM). The energy resolution was 11.7% during installation but is now 11.09%, within the expected range of 10-12%. Results highlight the importance of regular QA and maintenance to sustain scanner performance and image quality.

Methods: Five years of QA data were retrospectively analyzed using standard energy calibration with a ^{22}Na source. Trends were assessed for changes over time, deviations from specifications, and correlations with scan frequency and maintenance.

Results: Energy resolution gradually declined, accelerating in years four and five due to increased usage and aging of detector material. A significant correlation ($p < 0.05$) was observed between degradation and cumulative scan numbers.

Conclusion: This study emphasizes proactive QA and periodic recalibration to extend scanner lifespan and ensure consistent imaging quality. It provides insights for institutions seeking to optimize PET-CT operations.

Keywords: PET-CT, energy resolution, quality assurance, longitudinal study, scanner performance, LYSO crystal aging.

3. Enhanced Feature Identification in Medical Imaging Using Contrast Enhancement, Edge Detection, and Texture Analysis Techniques

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ABSTRACT

Medical imaging plays a crucial role in diagnosis and treatment planning, but low contrast and subtle differences in tissue intensities often pose challenges for accurate interpretation. This work presents an integrated image processing pipeline to enhance feature identification in DICOM (Digital Imaging and Communications in Medicine) medical images. The process begins with contrast enhancement using CLAHE (Contrast Limited Adaptive Histogram Equalization) in the LAB color space, effectively improving visibility in low-contrast regions. Edge detection uses the Canny algorithm to highlight structural boundaries, while Otsu's thresholding is employed for binary segmentation to isolate regions of interest. Contours are identified and overlaid on the enhanced image, providing visual context for key anatomical features. Additionally, texture analysis is performed using Local Binary Patterns (LBP), enabling the identification of fine-grained patterns such as nodules or fibrosis. The pipeline offers a comprehensive approach for preprocessing and feature extraction, providing clinicians and researchers with tools to enhance image interpretability and support diagnostic decision-making. This framework demonstrates the potential for application in diverse medical imaging modalities, paving the way for improved automated analysis and clinical insights.

Keywords*:* Image processing, Histogram Equalization, Edge detection, Feature Extraction.

4. Radiation Safety Assessment: a Six-Month Workplace Monitoring Study at INMAS Mohakhali

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ABSTRACT

Purpose: The study focused on the assessment of radiation safety and continuously monitor the radiological well-being of INMAS, Mohakhali. Our goal is to affirm the institution's commitment to maintaining a safe and compliant environment for both the patients and radiation workers while adhering to globally recognized safety standards.

Materials and Methods: Over a six-month period, radiation exposure was carefully measured, with data collected three times daily using a range of precision instruments: digital survey meters, pocket dosimeters, and ionization chambers. We conducted continuous radiation surveys across diverse regions—supervised, controlled, and public areas, along with therapy patient rooms, hot labs, and PET CT rooms and so on. Special attention was given to the use of key radiopharmaceuticals, including Tc-99m, I-131, and FDG-18, to assess their impact on the environment.

Results: The study revealed that radiation levels in critical areas such as therapy patient rooms, public areas, hot labs, PET-CT rooms, and SPECT-CT rooms remained well within the permissible limits, validating the efficacy of the safety measures in place. Throughout the duration of the study, radiation exposure was consistently maintained at levels well below the safety thresholds set by national and international guidelines.

Conclusion: This study confirms INMAS, Mohakhali's adherence to IAEA guidelines and Nuclear Safety and Radiation Control (NRSC) radiation limits, ensuring a safe environment for patients and radiation workers. It highlights the importance of continuous monitoring, regulatory compliance, and long-term vigilance in maintaining radiological safety, affirming the institution's commitment to protecting human resources from the necessary nuisance namely radiation.

Keywords: Radiation safety, Nuclear Safety and Radiation Control (NRSC), IAEA guidelines.

5. Enhancing PET-CT Image Accuracy: The Role of Pre-Scan Training and Breathing Protocols in Minimizing Respiratory Motion Artifacts

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ABSTRACT

Introduction: PET-CT is an advanced diagnostic tool that combines metabolic data and anatomical data to produce a detailed 3D image of the body. But misregistration of PET and CT images causes artifacts that compromise the diagnostic accuracy by obscuring pathology or mimicking false positive or false negative findings. Various types of artifacts, including those associated with radiotracers, patients, and machines, pose challenges while imaging. Among them, patient-related artifacts mainly include unusual movements and respiratory motions. This study aims to share the preliminary experience of reducing the misregistration artefacts among two groups of PET-CT patients.

Patients and methods: Total 100 patients requested for whole body PET-CT were divided into two groups. The first group (group A) was requested to follow preinstalled breath-hold instructions generated from the PET-CT scanner. The second group (group B) was given proper instruction on breathing protocol (shallow breathing and breath-hold) with pre-scan training and counselling. After-scan images were interpreted by two individual PET-CT specialists.

Result: Images of group B patients were more accurate where organs like heart, diaphragm, kidney and bladder appeared to be more sensitive to breathing motions. Pre-scan training and counselling were found to be effective to decrease patient discomfort and anxiety, resulting in a reduction of misregistration artifact. Ultimately enabling the physicians to interpret scanned PET-CT images with more confidence and ease.

Conclusion: The optimal respiratory artifact reduction technique depends on the complexity and robustness of the clinical setup, with each technique having advantages and disadvantages.

Keywords: PET-CT, misregistration artefacts, respiratory motions, attenuation correction

6. Workflow of Radiomics Analysis – A Brief Report

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ABSTRACT

Analysis of DICOM image to extract radiomics feature yields large number of quantitative variables. As a practitioner of nuclear imaging, we have used nuclear imaging DICOM data for extraction of radiomic features. Further analysis of those data was performed using R.

This report is a pictorial summary of the steps in the analyses.

7. Optimizing the Acquisition Protocol of I-131 Post Therapy Scan – A Brief Report

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ABSTRACT

Post radioiodine therapy scan after administration of I-131 in patients with differentiated thyroid cancer can be challenging due to factors like variation of administered dose, degree of biological retention of radioiodine and variation of time span from the day of therapy to the day of scan. The scan protocol generally includes whole body planar sweep image and three-region spot images and sometimes SPECT CT. This report includes technical challenges experienced during those acquisition and coping measures against those issues. Since the post therapy scan is important for short- and long-term clinical decision making, imaging team should thrive to make a good quality image by all means.

8. Maintenance and Troubleshooting of the 18 MeV Cyclotron at the National Institute of Nuclear Medicine & Allied Sciences (NINMAS), Dhaka

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ABSTRACT

A malfunction in a cyclotron operating at 18/9 MeV was investigated after the Low-Level Radio Frequency (LLRF) system displayed a fault signal, leading to operational failure. Initial diagnostics identified a damaged fuse in the internal power supply of the LLRF module. However, replacing the fuse resulted in repeated failures, indicating a deeper underlying issue. A systematic inspection of the module's printed circuit boards (PCBs) was undertaken to identify potential faults. During the investigation, a faulty capacitor on one of the PCBs was identified as the primary cause of the issue. The defective capacitor was replaced, and the LLRF system was restored to proper functionality, enabling the cyclotron to resume normal operations.

This maintenance effort underscores the critical importance of detailed diagnostic procedures in addressing complex faults within advanced high-energy

systems like cyclotrons. Identifying and rectifying component-level issues, such as faulty capacitors, require collaboration between technical experts and methodical testing of system components. The case further highlights the necessity for ongoing maintenance and rapid response to technical issues to ensure uninterrupted operation of sophisticated medical and research equipment.

Keywords: Low-Level Radio Frequency (LLRF), PCB diagnostics, faulty capacitor, high-energy equipment.

9. **Optimizing FDG Production and Synthesis with Cyclone 18/9 MeV IBA Cyclotron for Improved Image Quality**

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ABSTRACT

This is a pioneer approach to correlate image quality (PET Image) with production parameters (cyclotron production variables) followed by the synthesis and radio-pharmaceutical purities. The Post-Doctoral Fellowship was formulated to get optimal parameters for production, synthesis and thus find the application impact on molecular imaging. In molecular imaging, there is established correlation between resolution and sensitivity; thus as, if resolution goes high then sensitivity goes down and vise-versa. On the other hand, parameters for cyclotron production enhance the highest yield of production with impurities which may effect on molecular imaging. So, the research questionnaire is to get optimal parameters and thus get betterment on image quality. This study was carried out with more than 200 batches of production of FDG, followed by molecular imaging and been assessed the optimization of production, synthesis, radio-pharmaceutical purities and image quality at NINMAS, using Cyclone 18/9 MeV IBA Cyclotron.

Keywords: ^{18}F[FDG], Cyclotron, Molecular Imaging, Radiopharmaceuticals.