

ABSTRACTS

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ABSTRACTS

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PLENARY SESSION I

1. Synthesis of [¹⁸F] PSMA-1007: New beginning of prostate specific radiotracer development in Bangladesh

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INTRODUCTION

Radioisotope labeled Prostate-specific membrane antigen (PSMA) is an exciting agent for early diagnosis and treatment of prostate cancer. PSMA is expressed preferentially in prostate cancer (PCa) cells. The ⁶⁸Ga-[PSMA-1007] on October 23, 2023, at the cyclotron and molecular imaging facility of the National Institute of Nuclear Medicine and Allied Sciences (NINMAS) of the Bangladesh Atomic Energy Commission (BAEC).

MATERIALS AND METHODS

[¹⁸F] Fluoride was produced by the ¹⁸O (p, n) nuclear reaction with proton irradiation to 2.5 mL [¹⁸O] H₂O (Huayi Technology, China) using a cyclotron (18/9 MeV, IBA Belgium). The synthesized [¹⁸F] PSMA-1007 was synthesized via direct substitution on an IBA Sythera[®] autosynthesizer. [¹⁸F]F⁻ was trapped on the QMA cartridge and subsequently eluted with 750 μL of 0.075 M aqueous tetrabutylammonium hydrogen carbonate (TBAHCO₃) solution into the reaction vessel using a vacuum. After completion of the drying process, 1.6 mg of precursor in 2 mL of dimethyl sulfoxide (DMSO) was added to the reaction vessel and heated for 10 min at 5 °C. The reaction mixture was diluted with 4 mL of 5.5% ethanol (EtOH). After that, the solution was passed through the PS-H⁺ SPE and C18ec cartridges into the waste. The product, [¹⁸F] PSMA-1007, was finally eluted with 5 mL of a 30% EtOH solution into the product vial by passing through a sterile

Millex-Cathivex 0.22-μm filter and diluted with 15 mL of 0.9% saline containing 100 mg sodium ascorbate, which was also passed through the sterile Millex-Cathivex GV 0.22-μm filter into the final product vial.

RESULTS

[¹⁸F]PSMA-1007 was successfully synthesized with radiochemical yields of 46.85% and a synthesis time of about 40 minutes. Synthesized [¹⁸F] PSMA-1007 was also found to comply with all the quality control criteria, like appearance, bacterial endotoxin test, _pH, radiochemical purity, half-life, gamma-ray energy, filter integrity test, tests of residual DMSO and ethanol, sterility test, etc. [18F] The PSMA-1007 PET-CT study of four (04) patients was successfully done as a trial.

CONCLUSION

The successful synthesis and quality control assessment of [¹⁸F] PSMA-1007 at NINMAS marks a pioneering step in the process of prostate-specific novel radiotracers as well as radio-theranostic agent development in Bangladesh.

Keywords: PSMA, [¹⁸F] PSMA-1007, prostate cancer; PET-CT imaging, quality control.

2. Recent advancement of hybrid imaging especially ¹⁸F PSMA-1007 PET-CT scan for evaluation of prostate cancer

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ABSTRACT

Prostate-Specific Membrane Antigen (PSMA) is a glycoprotein that is overexpressed in the cells of prostatic cancer. Recently, Gallium-68 PSMA Positron Emission Tomography-Computed Tomography (⁶⁸Ga PSMA-11 PET-CT) and ¹⁸F Flutufolastat PET-CT (PSMA targeting) for evaluation of prostate cancer have been approved by the Food and Drug Administration of the United States of America (FDA, USA) during the years 2020 and 2021. ¹⁸F-Fluorocholine PET-CT was permitted marketing authorization in 2010 in France. The use of PSMA PET-CT scans for initial imaging to detect local lesions and pelvic spread and to survey the

biochemical recurrence (BCR) of prostate cancer with high or low levels of prostatic-specific antigen (PSA) is becoming part of 'the standard of care'. Even PSMA PET-CT scans detect metastatic prostatic cancer tissue with a low level of PSA. ^{18}F PSMA-1007 PET-CT gives better information than ^{68}Ga PSMA PET-CT. ^{18}F has a longer half-life of 110 minutes than ^{68}Ga (67.7 minutes); cyclotron production and a clear view of the pelvic region could be attained as ^{18}F PSMA is less excreted by urine. ^{18}F PSMA1007 PET-CT was developed in 2016 in Heidelberg and has high sensitivity and specificity for prostatic cancer detection. ^{18}F PSMA1007 PET-CT was first introduced in Bangladesh on October 12, 2023, at the National Institute of Nuclear Medicine and Allied Sciences (NINMAS). Four patients with prostate cancer were referred to PET-CT at NINMAS to evaluate the recurrence of prostate cancer. One patient showed extensive metastases in the skeleton, and three patients had a complete metabolic response with a clearer view of the pelvic region. Our team members in the PET-CT division are ready to perform the ^{18}F PSMA-1007 PET-CT on a regular basis in the near future at NINMAS.

PROF. DR. KAMALUDDIN AHMED ORATION

1. Multimodality imaging for evaluating response to neoadjuvant chemotherapy in locally advanced breast cancer

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Breast cancer is the most common malignancy among Bangladeshi women, accounting for 6808 total deaths in 2020, according to the World Health Organization (WHO). A large number of patients were identified at a more advanced stage of the disease, attributed to a diverse number of socioeconomic factors. The ultimate fate of the disease finally depends on proper management, i.e., a precise diagnosis and appropriate treatment. Neoadjuvant chemotherapy (NACT) is the treatment of choice for a large number of patients in the country, particularly in locally advanced breast cancer (LABC). NACT is used to downstage the disease and reduce or eliminate micrometastasis. However, the therapeutic response following the NACT is the prognostic indicator for subsequent

management of these patients, leading to personalized therapy. The final response can be evaluated by invasive post-surgical histopathological findings. But noninvasive imaging modalities like MRI, CT, and PET can play a crucial role in evaluating therapy responses. Conventional imaging modalities have limitations as they depend on changes in size and morphology. On the other hand, functional imaging techniques are superior as they identify vascular, biochemical, metabolic, and molecular changes in cancer cells. Even PET is superior to other modalities as metabolic changes can be identified before morphological changes by determining the metabolic tumor volume and demarcating the viable tumor from fibrous tissue. MRI is a well-practiced tool in Bangladesh, and PET-CT is a relatively newer modality for the huge population of our country. A recently completed IAEA Coordinated Research Project (IAEA-CRP project) is contributing to approach the LABC patients to assess the response to NACT by performing both MRI and PET; before and after NACT by using RECIST 1.1 and PERCIST criteria. Through this research, the superiority or equality of these two modalities can guide the physician in decision-making by assessing the disease status (regression, stability, or progression). PET also provides valuable information through the whole body survey by detecting the presence of distant osseous or non-osseous metastases and can be offered to patients having implants for various disease conditions. Most significantly, by notification of disease progression, the regimen of NACT can be changed or surgical planning can be altered in those groups of patients. Finally, the assessment has been compared with a post-surgical specimen to see the accurate pathological response. The outcome of this research will provide the opportunity for appropriate application of these modalities and guide the clinician in optimal cancer management for female breast cancer patients in our country.

PROFFERED PAPER SESSION I**1. ¹⁸F-FDG PET Neuroimaging: The initial experience in NINMAS**

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ABSTRACT

Objective: ¹⁸F-FDG PET neuroimaging is a newer modality in Bangladesh. This study will highlight the initial experience of ¹⁸F-FDG PET neuroimaging in single institute of Bangladesh.

Materials and methods: The study includes 37 patients who referred for ¹⁸F-FDG PET scan of brain since June 2017 to December 2023 in National Institute of Nuclear Medicine and Allied Sciences, Dhaka, Bangladesh. Brain PET scan was done with ¹⁸F-FDG PET among the study population according to standard protocol.

Results: A total 37 patients were enrolled in the study. The patients were divided into two groups; the adult group (group A) and the pediatric group (group B). Group A consists of 32 patients having history of neurodegenerative disorders and group B includes 5 patients with history of epilepsy and Autism Spectral Disorder (ASD). ¹⁸F-FDG PET findings showed predominantly Alzheimer's disease (AD) pattern (71%) among the dementia patients of group A. Rest of the patient's findings include fronto-parietal dementia (FPD) pattern (19%), mixed pattern of dementia (10%) and one patient showed progressive supra nuclear palsy. Significant hypermetabolism of temporal lobe was found in two patients and hypometabolism in one patient among the three epileptic patients. Discrete pattern was seen in patient with ASD.

Conclusion: ¹⁸F-FDG PET Brain imaging has potentially important roles for early detection and differentiation of neurodegenerative disorders, detection of epileptic foci in interictal phase of epilepsy and metabolic status of brain in ASD patients. The introduction of ¹⁸F-FDG PET scans of the brain in Bangladesh will aid in the evaluation and management

of these diseases more effectively.

Keywords: ¹⁸F-FDG PET brain scan, ASD

2. Role of ¹⁸F-FDG PET/CT in patients with primary extranodal lymphoma.

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ABSTRACT:

Background and Objective: Lymphoma is a hematological malignancy that originates from the lymphatic system and can occur at extranodal sites. Extranodal disease is common as part of the lymphomatous involvement but rarely, this could be the primary anatomical site where lymphoma arises. Primary extranodal lymphoma can involve any organs or systems, sometimes at unexpected sites with non-specific presentations, mimicking carcinoma or infection.

¹⁸F-FDG PET/CT scan has become the standard imaging modality for staging and surveillance of the disease. This study was conducted to determine the value of ¹⁸F-FDG PET/CT in baseline primary extranodal lymphoma patients.

Methodology: The study was conducted for 36 months in two centers (one government and one private) of Dhaka city. A total 98 patients were included by purposive sampling. Patients presenting with histopathology and immunohistochemistry proven primary extranodal lymphoma were included. Whole body FDG PET/CT scan was acquired from vertex to mid-thigh in a whole-body PET/CT scanner after administration of 5 to 10 mCi of ¹⁸F-FDG.

Result: 54 patients were male and 44 were female. Patients age was in between 10 to 81 years. Maximum 96% patients had histopathology and immunohistochemistry proven Non-Hodgkin's lymphoma. Diffuse large B cell lymphoma was the most common subtype. SUVmax value was in between

5 to 37. 68% patients showed hepatosplenomegaly. Maximum 29% patients had the primary extranodal site of involvement in gastrointestinal tract followed by bone, bone marrow, tonsil, thyroid, spleen and others sites

Conclusion: Primary extranodal lymphoma can affect any organ or system, although challenging to diagnose at presentation. ^{18}F -FDG PET/CT can be a valuable imaging technique. ^{18}F -FDG PET enables accurate detection of more unusual organs with extranodal lymphomatous infiltration that help in up or down staging the disease.

Keyword : Extranodal lymphoma, ^{18}F -FDG PET/CT

3. Role of ^{18}F -FDG PET/CT scan in assessment of recurrence/metastases in female breast carcinoma patients in relation to Human Epidermal Growth Factor Receptor-2

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ABSTRACT

Objective: The objective of this study was to observe the ^{18}F -FDG PET/CT scan findings in relation to Human Epidermal Growth Factor Receptor 2 (HER-2) in breast carcinoma (BC) patients treated by surgery referred to National Institute of Nuclear Medicine & Allied Sciences (NINMAS).

Materials and methods: A total of 163 patients came for ^{18}F -FDG PET/CT scan at NINMAS for either to observe therapy response or for follow up in between July 2022 to June 2023 were included. This retrospective study was carried out to assess the metastases or recurrence in relation to HER-2 receptors of postoperative BC patients by ^{18}F -FDG PET/CT scan.

Results: Age ranged from 26 to 86 years with an average of 52.07 ± 11.8 years and most common age group was in between 41 to 50 years (30.67%). Among 163 patients 152 were infiltrating ductal cell carcinoma and 11 patients were in other categories. Metastases observed in 44 patients (26.99%). Most common site of metastases was in axillary lymph nodes

(63.64%) followed by bone (43.18%), lung (36.36%) and liver (9.09%). CA15-3 was higher (average:137) in patients with metastases compared to patients without metastases (average:13.7). Among 49 triple negative patients, sixteen were with metastases. Whereas, out of 10 triple positive, three had metastases. HER-2 negative with metastases was 29 cases (65.90%) and HER-2 positive with metastases was 15 cases (34.09%). Local recurrence was found in three cases, and all were HER-2 negative. In case of HER-2 negative patients 53.85% developed metastases within two years which was 38.88% in HER-2 positive patients. SUVmax of metastatic site was also higher in HER-2 negative (average SUVmax: 7.5) than HER-2 positive cases (average SUVmax: 5.5). There is no significant difference in pattern of metastases. No individual factor was found independently associated with sites of metastases.

Conclusion: This study shows HER-2 negative and triple negative cases have more metastases and recurrence than HER-2 positive cases. There is no difference in pattern of metastases in HER-2 positive and negative patients.

Keywords: ^{18}F -FDG PET/CT, metastases, HER-2 receptor.

4. Assessment of agreement between morphologic and metabolic response to platinum based chemotherapy assessed by ^{18}F FDG PET/CT Scan in advanced non-small cell lung cancer

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ABSTRACT

Introduction: Most patients of no small cell lung cancer (NSCLC) are diagnosed at advanced stage and treated with platinum based induction chemotherapy in Bangladesh. In this study we used ^{18}F FDG PET/CT scan in these patients as imaging biomarker (IB) to determine both anatomic and biologic treatment response to chemotherapy.

Objective: To assess the agreement between morphologic response derived from CT using RECIST 1.1 and metabolic response derived from ^{18}F FDG PET using PERCIST 1.0 to platinum based chemotherapy in advanced NSCLC patients.

Patients and methods: This study was conducted at NINMAS, Shahbag, Dhaka during the period of November 2021 to August 2023. Total 14 study patients were included who underwent ^{18}F FDG PET/CT scan before and after completing chemotherapy for advanced NSCLC. Morphologic response assessment by RECIST 1.1 and metabolic response assessment by PERCIST 1.0 were performed. Agreements between responder and non-responder group from both response method were performed by kappa statistical analysis.

Results: Mean age of 14 study patients was 59 years with male predominance. In RECIST 1.1, responses were derived in four category– complete response, partial response, stable disease and progressive disease. Responses in PERCIST 1.0 were derived also in four category- complete and partial metabolic response, stable and progressive metabolic disease. In both RECIST 1.1 and PERCIST 1.0, former two category patients grouped as responder and later two were grouped as non-responder. There were nine non responder and five responder patients in both category which revealed excellent agreement (kappa value=1) between morphologic and metabolic response.

Conclusion: In advanced NSCLC, metabolic and morphologic response to chemotherapy are potentially comparable and ^{18}F FDG PET/CT scan can be performed earlier in the course of chemotherapy to improve precision medicine as metabolic response appears earlier even if no morphological responses are evident.

Keywords: ^{18}F -FDG PET/CT, NSCLC, RECIST 1.1, PERCIST 1.0

5. Current status and seasonal impact on vitamin D deficiency in the southeastern region of Bangladesh.

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ABSTRACT:

Background: Deficiency of vitamin D due to varying exposure of sunlight in adult population is one of the prevalent medical conditions worldwide.

Objectives: To investigate the prevalence and the seasonal influence of vitamin D deficiency among the people residing in the chattogram division of Bangladesh.

Methods: It was a retrospective study including 524 adult participants where mild (as insufficiency), moderate and severe (as deficiency) vitamin D deficiency were defined as 25-OHD values of 20 to <30, 10 to <20 and <10 ng/mL respectively. The serum 25-hydroxy vitamin D (25-OHD) was assessed by the chemiluminescence method. To investigate the seasonal impact three distinct seasons were broadly categorized as winter, summer and rainy season.

Result: A total 401 of (77%) female and 123(23%) male with mean age 41.07 ± 14.63 years

(range 18 -80 years) were enrolled into the study. The mean concentration of 25-OHD was 14.47 ng/mL while the respective mean value is higher in male (18.21 ± 11.16 ng/mL) than female (16.97 ± 11.26 ng/mL). A significant positive correlation between age and 25-OHD concentration was found ($p=0.000^{**}$).

The prevalence of mild, moderate and severe deficiencies was 18% (28% male, 72% female), 51% (26% male, 74% female) and 22% (15% male, 85% female) respectively. While analyzing the seasonal impact, the mean concentration was found in a descending order for summer (18.33 ± 14.39 ng/mL), rainy (17.18 ± 10.57 ng/mL) and winter season (16.46 ± 9.51 ng/mL). The prevalence of vitamin D deficiency was higher in rainy season (209; 74%) than winter (93; 73%) and summer (82; 73%). Similarly, the number of vitamin D insufficiency was higher in rainy season (51; 18%) than winter (25; 20%) and summer (18; 16%). Significant positive correlations were found between age and 25-OHD concentration in all of the three seasons (winter: $p=.05^*$; summer: $p=.002^{**}$ and rainy: $p=.000^{**}$).

Conclusion: Although some impact of the seasons on the status of vitamin D deficiency was found, it was not statistically significant. Therefore, further investigation utilizing a larger dataset is required to make an inference.

Keywords: 25-hydroxy vitamin D (25-OHD), Adult, seasonal impact, deficiency, insufficiency.

PROFFERED PAPER SESSION II**1. Nuclear cardiology for the evaluation of infiltrative cardiomyopathy: Highlighting cardiac amyloidosis and sarcoidosis**

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Objective: This abstract aims to elucidate the pivotal role of nuclear cardiology for the evaluation of infiltrative Cardiomyopathies with a specific focus on Cardiac Amyloidosis and Cardiac Sarcoidosis.

Background: Infiltrative Cardiomyopathies, such as cardiac Amyloidosis and cardiac Sarcoidosis, pose a diagnostic and management challenge. The abstract provides an overview of the pivotal role of nuclear cardiology techniques, including myocardial perfusion imaging (MPI) with the help of single-photon emission computed tomography (SPECT) using ^{99m}Tc- Pyrophosphate (PYP) and positron emission tomography (PET) using ¹⁸F-Fluorodeoxyglucose (FDG), and addressing these complex conditions. Cardiac MRI could play important role for these disease diagnosis, however its time consuming. Definite diagnosis is cardiac biopsy and again very limited centres can perform that test.

Discussion: The discussion explores into how nuclear cardiology methods aid in early detection, risk stratification, and assessment of treatment response. These techniques provide detailed insights into abnormal myocardial uptake patterns, facilitating accurate diagnosis and guiding therapeutic decisions for patients with infiltrative Cardiomyopathies.

Conclusion: In conclusion, this abstract emphasizes the indispensable contribution of nuclear cardiology in advancing the understanding and management of Cardiac Amyloidosis and Cardiac Sarcoidosis. As prevalence of these conditions increasing, nuclear cardiology provides unique techniques for improving patient outcomes and enhancing overall care for these challenging diseases. There is paucity of data for imaging

infiltrative Cardiomyopathies in Bangladesh and to the best of our knowledge this is for the first time to do both MPI and PET for precise diagnosis of these disease entities.

2. Bone Scan features of carcinoma breast patients before surgery and correlation with other imaging modality– Single institute based observational study

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ABSTRACT

Introduction: Carcinoma breast is a life threatening condition for women all over the world. Bone scan is very useful imaging modality to determine bony involvement in carcinoma breast patients. This study was designed to evaluate the bone scan findings of patients with or without neo adjuvant chemotherapy and without breast surgery.

Material and Patients: This is cross sectional observational study conducted from 2017 to 2021. A total 287 breast cancer patients without breast surgery were enrolled in this study. Bone scan was performed after I/V administration of 20mci ^{99m}TcMDP. Both anterior and posterior views and if needed additional image was taken by Siemens Dual Head Gamma Camera. Images were interpreted and data were collected. Data were compiled and analyzed by SPSS version 22.

Results: No breast surgery was performed of any enrolled patients during the studies period. Mean age of the patients were 56.38±10.12, range from 33~82yrs. Patients receiving neo adjuvant therapy was (59.1%), showed no bony or visceral metastasis. Patients having palliative chemotherapy (16.7%) showed both bony and visceral metastases. The last group of study subjects having no chemotherapy was (24.2%). Among this last group bony metastases showed (65.3%), visceral metastases showed (27.5%) and (7.2%) showed both bony and visceral metastases .

Conclusion: Bone scan is an important imaging modality for staging, treatment planning and monitoring of treatment response in breast cancer patients.

Keywords : Bone scan, Carcinoma breast.

3. Relationship between PSA level and bone metastasis in newly diagnosed prostate cancer patients referred to INMAS, Rajshahi for bone scan

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Abstract

Background: PSA is a valuable predictor for prostate carcinoma. Bone metastases is quite common among prostate cancer patients and bone scan is routinely used to detect bony metastases.

Objectives: The aim of this study is to assess the utility of PSA level for predicting bone metastasis in newly diagnosed prostate cancer patients.

Patients and Methods: This retrospective observational study was carried out in INMAS, Rajshahi over a time period of one year from March 2020 to March 2021. Total 29 newly diagnosed prostate cancer patients without history of surgery and/or chemo or radio therapy were included. Bone scan was performed with Tc 99m methylene diphosphonate (MDP) as per the standard protocol.

Results: Among 29 patients; Mean age of the patients were 62.55 ± 8.01 years. Mean PSA level was found 60.91 ± 56.77 ng/dl. Bone scan was positive for skeletal metastasis in 23 (79.3%) and negative in 6 (20.7%) patients. No patient with PSA level below 4 ng/dl had bony metastasis. Bone scan was positive for metastasis in 4 (14%) patients with PSA level in between 4-10 ng/dl and 5 (17%) patients with PSA level in between 11-20 ng/dl and 20 (69%) of patients with PSA level more than 20 ng/dl.

Conclusion: Patients with PSA level more than 20 ng/dl have high predictive value of bone metastasis.

Keywords: PSA, Bone scan, Bone metastasis, Prostate cancer.

4. The significance of TID in case of subendocardial ischemia or balanced ischemia in the setting of otherwise normal SPECT myocardial perfusion imaging study.

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ABSTRACT:

Background: In presence of abnormal SPECT MPI (myocardial perfusion imaging), transient ischemic dilatation (TID) is regarded as a sign of severe and widespread coronary artery disease (CAD) with poor prognosis. However, high TID is also observed with normal MPI. The possible explanations are balanced epicardial CAD, diffuse microvascular disease or widespread subendocardial ischemia which would be associated with adverse outcomes. However, the clinical relevance of TID and its relationship with CAD in individuals with an otherwise normal MPI exam is unknown.

Objective: To investigate the relationship between TID and the presence or severity of CAD in angiography.

Patients & Methods: This observational study was conducted in Nuclear Cardiology division of NINMAS from January 2023 to December 2023 and ten patients were identified with normal MPI but exhibited high TID values. The TID index was calculated based on published threshold values with >1.12 denoting high TID. Nine patients went through coronary angiogram (CAG) within six months and had positive findings.

Results: Among the ten patients age ranges from 34 to 74 years with male predominance. Nine out of ten patients had undergone previous CAG within a six-month timeframe, revealing triple vessel disease (TVD) in five patients (50%), double vessel disease (DVD) in three patients (30%), and single vessel disease (SVD) in one patient (10%). One patient did not have any CAG. The patients with TVD and two DVDs on CAG were obstructive CAD which was defined as diameter stenosis of 50% or more in the left main coronary artery or stenosis of 70% or more in a major epicardial vessel.

Conclusions: In this observational study, the presence of high TID associated with otherwise normal SPECT MPI indicates

presence of obstructive CAD highlighting its clinical significance.

Keywords: Transient ischemic dilatation, Gated SPECT MPI, coronary angiography, coronary artery disease.

5. Persistently low thyroglobulin (Tg) Level; A challenging manifestation in the management of Metastatic Differentiated Thyroid Carcinoma (DTC)

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ABSTRACT:

Background: The sensitivity of monitoring thyroglobulin (Tg) level and ¹³¹Iwhole-body scan (WBS) is essential for the early diagnosis of recurrent or persistent differentiated thyroid carcinoma (DTC) after radioiodine therapy. Persistently low Tg level in DTC is a diagnostically challenging manifestation within the spectrum of thyroid malignancies that complicates both diagnosis and management.

Objective: This study aims to comprehensively analyze the clinical characteristics, diagnostic approaches and therapeutic strategies associated with persistently low Tg metastatic DTC and to share our experience in this unusual occurrence.

Patients and Method: A retrospective analysis was conducted on 07 diagnosed cases of low Tg level metastatic DTC, who received radioactive iodine therapy (RAIT) from National Institute of Nuclear Medicine and Allied Sciences (NINMAS) between the years 2007 to 2023. Patients received RAIT in doses ranging from 150 mCi to a maximum of 1000 mCi, given in single to as many as seven therapies. Clinical records, blood profile e.g. stimulated TSH, Tg, AntiTgAb (both initial and latest), imaging studies e.g. ultrasonography, DxWBS, RxWBS, CT scan, MRI, ^{99m}Tc MDP Bone scan, PET CT and FNAC, excisional biopsy, histopathology data were systematically reviewed to reveal this specific thyroid carcinoma subtype.

Results: A total of seven patients, 6 males and 1 female, were included in the study. Age distribution was 30 to 70 years (median: 49years). Average Tg level (on replacement therapy) was 0.83ng/ml and anti TgAb was <5.0 IU/ml. Five had Papillary Thyroid Carcinoma (PTC) and two had Follicular variant (FTC). Four of them presented with metastasis at initial meeting, whereas rest three developed metastasis gradually afterwards. Lymph node (LN) metastasis was noted in four patients, among them two had only cervical LN metastasis, one had cervical and intra-abdominal (para-aortic) nodal metastases and last one had inguinal nodes involvement. Three patients had bone metastasis (vertebrae, ribs etc.), one had lung metastasis, and one had intra-abdominal mass and one showed chest wall involvement. Metastasis were detected through USG, CT or PET -CT, ^{99m}Tc MDP Bone scan, WBS and later confirmed by histopathology. Among three DxWBS cases, two showed negative and one showed positive scan findings. Two patients had history of radiotherapy (RT) for bony involvement. Three patients underwent re-surgery for removal of metastatic masses.

Conclusion: Beyond conventional tumor marker, patient's clinical sign/symptoms and use of other diagnostic modalities are also important for monitoring of disease progression.

Key Words: Low thyroglobulin, Differentiated thyroid carcinoma, Metastasis.

6. Evaluation of thyroid function in patients with gestational diabetes mellitus

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ABSTRACT:

Introduction: The most common endocrine disorders during pregnancy are gestational diabetes mellitus (GDM) and thyroid dysfunction. Individually, they have been shown to contribute to adverse obstetric outcomes. The aim of the study was to investigate whether there are any thyroid hormone abnormalities with the occurrence of GDM in pregnant women.

Material and methods: A case control study was conducted to evaluate and compare thyroid function in patients with and

without gestational diabetes mellitus at Institute of Nuclear Medicine & Allied Sciences (INMAS), Cumilla in collaboration with Department of Obstetrics & Gynaecology, Cumilla Medical College Hospital in between January to December 2021. According to inclusion and exclusion criteria, 148 pregnant women were included in the study, 74 patients with GDM (case) and 74 patients with normal glucose tolerance (control). Thyroid function was evaluated by serum TSH and FT4. Data analysis was done by chi-square test (categorical variables) and unpaired t- test (continuous variables).

Result: In the study, mean age was relatively higher in GDM group (28.84 ± 3.64 years) than non diabetic group (27.12 ± 3.99 years). Most of the patients 86 (58.1%) were in < 30 years age group. Majority were multigravida. TSH value was high in case group (4.68 ± 5.71 mIU/ml) in comparison to control (2.78 ± 3.74) and statistically significant ($P < 0.05$). In the study, 16.2% (24 of 148) patients developed thyroid disorder. Thyroid disorder was more in GDM (21.6%) compare to non-diabetic (10.8%) control group but the result was not statistically significant [OR: 2.3 (CI: 1 to 5.7); $p=0.074$]. In this study most common thyroid disorder was subclinical hypothyroidism both in case and control groups.

Conclusion: Instead of simply focusing on gestational diabetes, thyroid dysfunction should also receive more attention from to prevent adverse birth outcome.

Key words: Gestational diabetes mellitus (GDM), Thyroid function.

7. Observing the trend of body composition change in pre & post ablation state of thyroid carcinoma patient

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ABSTRACT:

Introduction: Thyroid carcinoma patients undergo remarkable changes in thyroid hormone level during different stages of their management. They experience thyroidectomy induced hypothyroidism for a brief period before radioiodine ablation therapy (RAIT), followed by iatrogenic subclinical

hyperthyroidism for some group of patients as part of standard treatment protocol. Thyroid hormone is a known influencer of our body composition, so this study aims to comprehend the potential change in composition evoked by pre and post ablation state of Ca. Thyroid patient.

Patients and Methods: This study was conducted in the Institute of Nuclear Medicine & Allied Sciences, Mitford, Dhaka, Bangladesh during May 2023 – January 2024. Fifteen thyroid cancer patients referred for post-surgery radioiodine ablation were scanned with Dual Energy X-ray Absorptiometry for body composition analysis including total body fat, lean and bone percentage, Fat Mass Index (FMI), visceral adipose tissue volume. Scan was done using Stratos DR machine, and each patient was scanned twice, at pre-therapy state with very high serum TSH level (≥ 100 mIU/L) and three months post therapy when serum TSH level was suppressed (≤ 0.1 mIU/L).

Result: Fourteen patients had history of papillary thyroid carcinoma with one case of follicular carcinoma. Male to female ratio 4:11 and mean age 39.9 ± 14.1 years. With reversal of hypothyroid state, body mass index (BMI) of ten patients decreased, remained unchanged in two, and increased in three. However, ten out of 15 patients showed increase in total body fat percentage and corresponding decrease in lean percentage. Visceral adipose tissue volume was decreased in nine patients and increased in six.

Conclusion: This study is part of a larger study investigating body composition change in thyroid cancer patients. Though the sample size is too small to analyze statistical significance, it is observed that majority of the patients show reduction in body weight but increase in total fat percentage.

Keywords: Body composition change, thyroid cancer, radioiodine ablation.

8. Comparative study between ^{99m}Tc pertechnetate Scan with percentage uptake and radioiodine uptake (^{131}I) in hyperthyroid patients - An institute based experience

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ABSTRACT:

Introduction: Radio-nuclide thyroid scanning is crucial to differentiate grave's disease and thyroiditis in hyperthyroid patients. Though radioiodine (^{131}I) has been the standard radio isotope, ^{99m}Tc pertechnetate is commonly used due to its radiochemical properties. Thyroid scan with percentage uptake using ^{99m}Tc pertechnetate is more advantageous than ^{131}I , as it has good image quality, less time consuming with low radiation exposure. The aim of our study was to compare the results of ^{99m}Tc pertechnetate percentage uptake and radioiodine uptake(^{131}I) in differentiating grave's disease and thyroiditis.

Patients and methods: This prospective study was done in INMAS, Khulna from January 2022 to December2023.Total 56 biochemically hyperthyroid patients underwent Radio-Iodine uptake test and thyroid scan with ^{99m}Tc pertechnetate. We compared the result of ^{99m}Tc pertechnetate thyroid uptake at 30min to 24 hours ^{131}I uptake. ^{99m}Tc pertechnetate uptake > 4.0 % considered as grave's disease whereas,<0.7 % as thyroiditis. Kappa test and Pearson correlation test was done to see the agreement and positive correlation between these two tests.

Result: Among 56 patients 70% were female with mean age of 36.5(SD-10.684). Out of 56 cases, 23 cases were diagnosed as thyroiditis (41.1%) and 20 patients were diagnosed as grave's disease (35.7%) by both methods. There was 23.2%

disagreement (13 Patients) in between these two methods, where 57.1% patients were diagnosed as grave's disease by ^{131}I uptake. The value of kappa statistics was 0.589 (p<.001) which stated a moderate agreement between these two tests. The value of individual patients' data were also plotted in a scatter diagram, that showed a strong positive correlation (Pearson correlation co-efficient=0.648, p<0.001) in the findings of two test.

Conclusion: Comparing the diagnostic accuracy our small scale study focusing strong correlation between ^{99m}Tc pertechnetate and ^{131}I - uptake in differentiating grave's disease and thyroiditis.

9. Radioactive iodine therapy responses in children compared to adult population having differentiated thyroid carcinoma with lymphnode metastasis

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ABSTRACT

Background:Papillary thyroid carcinoma (PTC) accounts for 80-90% of all differentiated thyroid carcinoma (DTC). Compared to adults, childrensuffer less from DTC. Most cases of extrathyroidal involvement are aggressive but have a better prognosis and treatment responsiveness compared to adult patients.

Objective: This study was aimed to evaluate the therapeutic responsesof radioactive iodine (^{131}I) therapy (RAIT) inDTC with lymph node metastases diagnosed in children versus adult patients.

Patients and Methods:ARetrospective cohort study was carried out at the National Institute of Nuclear Medicine & Allied Science (NINMAS). Clinical data was obtained from the patient's registry between 2018 and 2019 which included demographic characteristics, histopathological reports, blood parameters, High-resolution neck ultrasound (HRUS), Initial and follow-upThyroglobulin (Tg) and Tg antibody (TgAb) levels, post-therapy whole body (RxWBS) and large dose scans

(LDS). Response to RAIT was statistically analyzed, evaluated, and compared one year after the therapy.

Results: 32 patients in all (16 adults and 16 children) who underwent thyroidectomy, followed by RAIT were included in this study. Selected patients were divided into two age groups. The mean age of the pediatric patients (group A) was 15.75 ± 2.646 years (range 10 to 18 years) and the adult patients (group B) 27.31 ± 6.247 years (range 19 to 65 years) with a ratio of F:M-2:1. After a year, therapy response was assessed using the ATA guidelines. Following a year of observation, 56.3% of children showed excellent responses to RAIT, while 43.8% was achieved by adults. Biochemical and structural incomplete responses were found in 37.6% and 56.3% of children and adults respectively. The study revealed better responses to RAIT in children compared to adults. No difference in the course of the disease is observed based on the RAIT dosage. Long-term follow-up is required to know the final disease status.

Conclusion: Age significantly impacts RAIT administration protocol and treatment outcomes in DTC patients with lymph node metastases, necessitating age-based risk stratification and optimized administration schedules for optimal therapeutic benefits.

Keywords: Differentiated Thyroid Carcinoma, Radioiodine (I^{131}) Ablation Therapy, Lymphnode Metastasis, serum Thyroglobulin.

PROFFERED PAPER SESSION III

1. ^{18}F PSMA-1007 and ^{18}F FDG PET/CT in an advanced prostate cancer patient - A case report

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ABSTRACT:

Case report: Positron emission tomography (PET) is currently playing crucial role in the assessment of prostate cancer. $^{68}\text{Ga}/^{18}\text{F}$ prostate-specific membrane antigen (PSMA), ^{11}C Choline, and

^{18}F Fluciclovine are the most commonly used non FDG PET tracers. ^{18}F -FDG PET is not routinely recommended in prostate cancer due to low glycolytic nature of the prostate tumor cells. However in advanced and aggressive cases ^{18}F -FDG PET can detect lesions. Till September 2023, ^{18}F -FDG was the only available PET tracer in our country to detect recurrence and non-osseous metastases. We reported a case of 53 years old male who underwent ^{18}F PSMA-1007PET/CT scan for restaging on October, 2023. The patient had previous ^{18}F -FDG PET/CT scan on January, 2023. FDG PET showed hypermetabolic cervical, mediastinal and abdominal lymph nodes and as well as multiple skeletal lesions. Patient received chemotherapy and anti-androgen therapy. However, after 10 months patient's PSA raised from 225 ng/ml to 616.5 ng/ml. In the PSMA scan, we found extensive nodal and skeletal involvements with progression of disease. In this case FDG positive scan reflects the aggressiveness of the disease and however extensive PSMA avid lesions including the positive lesions in FDG indicate the patient could be benefited from PSMA based therapy.

Key words : Prostate cancer, FDG, PSMA

2. Detection of two distinct pathologies with similar clinical presentations using nuclear imaging technique in infiltrative cardiomyopathy : A case study of two female patients

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ABSTRACT:

Introduction: In Bangladesh, infiltrative cardiomyopathies are rarely diagnosed probably due to lack of access to diagnostic facilities, delayed presentation, and a high burden of obstructive coronary artery disease. Here, we present two cases of hypertrophic cardiomyopathy to evaluate the role of nuclear cardiology in precisely diagnosing infiltrative cardiomyopathies, particularly in the context of limited access to cardiac MRI and myocardial biopsy in Bangladesh.

Case Reports: Two female patients aged 40-45 years presented with strikingly similar symptoms including exertional dyspnea, palpitations, weakness, biventricular hypertrophy, and bi-atrial enlargement on echocardiogram, raising suspicion of infiltrative cardiomyopathy. One of the patients had access to cardiac MRI. Employing nuclear imaging techniques— ^{99m}Tc -PYP scan, ^{18}F -FDG cardiac PET, and ^{99m}Tc -MIBI perfusion scan—highlighted their critical role in distinguishing between cardiac amyloidosis and cardiac sarcoidosis. Additional biochemical analysis (serum free light chain ratio, immunofixation electrophoresis) validated imaging findings. One patient was diagnosed with cardiac amyloidosis based on positive ^{99m}Tc -PYP scan and negative FDG Cardiac PET, while the other was diagnosed with cardiac sarcoidosis based on negative ^{99m}Tc -PYP scan and positive FDG cardiac PET, guiding appropriate treatment.

Conclusion: In regions where, infiltrative cardiomyopathies are less frequent and underdiagnosed, nuclear cardiology emerges as an invaluable diagnostic approach, bridging the gap when cardiac MRI or myocardial biopsy is inaccessible. Our findings highlight the pioneering potential of non-invasive nuclear imaging techniques in facilitating early detection, guiding appropriate management, and raising awareness, thereby potentially transforming cardiac care in Bangladesh.

Key words: Cardiac amyloidosis, Cardiac sarcoidosis, ^{99m}Tc -PYP scan, ^{18}F -FDG cardiac PET

3. Unusual bone metastases in sinonasal squamous cell carcinoma on SPECT-CT bone scintigraphy: A rare case report

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ABSTRACT:

Back ground: Squamous cell carcinoma (SCC) is the most common sinonasal neoplasm and accounts for 50-60% of all sinonasal malignancies. This is an aggressive malignancy that presents itself insidiously and is generally advanced when

diagnosed; but distant metastases are rare. We reported a case of a patient with SCC of sinonasal tract with an unusual pattern of bone metastases.

Case report: A 45- years old male presented with epistaxis and a small palatine mass for last 4 months was admitted in ENT department of Mymensingh Medical College Hospital (MMCH) and diagnosed as undifferentiated non-keratinizing squamous cell carcinoma of sinonasal tract. He also developed swelling & pain around multiple joints. X-ray right wrist joint suggested primary bone tumor with the differentials of aneurysmal bone cyst or fibrous dysplasia. Then he was sent for ^{99m}Tc -MDP bone scintigraphy to identify the underlying cause as below elbow and below knee bone metastasis is very rare. Bone Scintigraphy demonstrated increased radiotracer uptake in the bones around the both shoulder joints, both elbow joints, both wrist joints, metacarpal joints of both sides, both knee joints, both ankle joints and metatarsal joints of both sides. The regional SPECT-CT showed lytic lesions with irregular cortical destruction in acromial process of both scapulae, medial end of left clavicle, head & lower end of both humeri, upper & lower end of both radius & ulna, metacarpal bones of both sides, lower end of both femurs, upper & lower end of both tibia & fibula and talus of both sides suggesting metastases. Periosteal reactions are seen in upper and lower end of both ulnas and pathological fracture in right ulna. Biopsy was done and confirmed the presences of metastatic disease.

Conclusion: Bone scintigraphy with regional SPECT-CT plays a useful role in detecting bone metastases in sinonasal squamous cell carcinoma, thus helps in staging as well as management of the patient.

Key words: Squamous cell carcinoma, Sinonasal tract, bone metastases, SPECT-CT

4. Metastatic rectal carcinoma to breast and pattern of aggressive dissemination of a young female detected by FDG PET-CT Scan- A case report

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ABSTRACT:

Background: Breast metastases from rectal carcinoma are

incredibly uncommon. Here we describe a patient with the metastatic deposit in the breast from rectal carcinoma & the pattern of disseminated metastases within one year after the initial diagnosis.

Case Summary: A 28-year-old female patient diagnosed with carcinoma rectum in February 2023 and underwent surgery in the following March received radiotherapy in June and completed chemotherapy in November 2023. Her first PET-CT scan was done in November 2023, due to the rising tumor marker (CEA), which showed two suspicious, ill-defined soft tissue density hypermetabolic areas in the left breast along with hypermetabolic right lower cervical lymph node. A focal hypermetabolic intercostal muscle nodule was noted in the right tenth intercostal region. Histopathology and immunohistochemistry from the left breast mass showed metastatic, poorly differentiated carcinoma. Two weeks after the PET-CT scan, the patient suddenly developed chest pain, breathing difficulty, and a hard lump in both breasts. To assess the disease progression, another PET-CT scan was done in January 2024. The second PET-CT scan showed morpho-metabolic progression of prior left breast mass lesions along with newly developed hypermetabolic mass lesions in the right breast & right chest wall. Metastatic metabolic progression also noted in right lower cervical, left axillary and abdominal lymph nodes. Metabolic progression of the previously noted intercostals muscle nodule with a newly developed hypermetabolic subcutaneous nodule was seen in the right posterior chest wall. Newly developed metastatic hypermetabolic peritoneal deposits and hepatic metastases were also evident along with bilateral moderate pleural effusions and mild ascites. The patient is now on conservative and symptomatic treatment followed by palliative chemotherapy.

Conclusion: Metastatic rectal carcinoma to the breast indicates a highly aggressive tumor. In this case report, the FDG PET-CT scan showed an unusual metastatic pattern and rapid aggressive dissemination within a short period.

Keywords: Breast metastases, Carcinoma rectum, FDG PET-CT

5. Diagnostic precision and evaluation of therapeutic response with ^{99m}Tc MDP bone SPECT-CT in a unique case of osteosclerotic metastasis from lung adenocarcinoma: A case report.

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ABSTRACT:

Background : Most bone metastasis of lung cancer generally have osteolytic changes. Here we present a distinctive case of exclusive osteoblastic sclerotic metastasis in a lung adenocarcinoma patient detected by ^{99m}Tc MDP bone SPECT-CT and also its role in evaluation of therapeutic response.

Case report: A 57-year-old male, recently diagnosed as lung adenocarcinoma and experiencing severe low back pain, underwent whole-body ^{99m}Tc bone scintigraphy. Initial planar bone scintigraphy exposed intense radiotracer uptake in L-3 vertebra with focal increased uptake in left lateral aspect of L-4 vertebra. Regional SPCT- CT delineated that increased uptake in the L-3 vertebra signified exclusive hyperdense osteosclerotic changes, while focal increased uptake in left lateral aspect of L-4 vertebra correlated with end plate degeneration in CT images. After getting 10 fractions of radiotherapy at 3000 cGy on lower lumbar vertebrae, coupled with palliative chemotherapy for the primary lung tumor , follow-up bone SPECT-CT was done after 6 months. Bony lesion showing decreased radiotracer uptake compare to previous one. Using simplistic region of interest count analysis (1263 vs.727) along with marked improvement of clinical symptoms suggest good therapeutic response.

Conclusion: The integration of SPECT-CT played a pivotal role in accurate diagnosis, treatment planning and monitoring of therapeutic response with greater precision.

Key words: Osteosclerotic metastasis, adenocarcinoma lung, SPECT CT