ABSTRACTS

OF

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ABSTRACTS

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PLENARY SESSION

1. Scientific Writing -- Mind Your Step

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ABSTRACT

Scientific writing which is very much different from other type of writings dates back to the 1600's. However the style of writing has changed keeping in pace with the time. In early days scientific writing was much easier and were not peer-reviewed. Today the scientific writings are peer-reviewed before publication in academic journals. Early works may have been wordy and hard to understand. Today's scientific writing has much changed focusing on clear communication and is well structured, much concise. Scientific writing is quite challenging for those who are beginners. Like other skills it is a kind of craftsmanship to master the art and may even take a longtime. So, it is essential to know the art of scientific writing and keep abreast of the changing rules of writing.

2. Current Progress in Theranostics

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ABSTRACT

Theranostics is a form of targeted cancer therapy that involves delivering radioactive molecules, called radioligands, to cancer cells. These radioligands bind to specific receptors on the surface of cancer cells, delivering radiation directly to the tumor cells while sparing healthy cells. The key feature of theranostics is combining both diagnostic and therapeutic options with a single radiolabeled molecule to diagnose and treat cancer. This approach allows for a personalized treatment plan based on the patient's specific disease and individual characteristics.

One of the most promising applications of theranostics is in the treatment of neuroendocrine tumors (NETs), a rare type of cancer that arises from cells in the endocrine and nervous systems. Theranostics has been shown to be effective in treating NETs that express somatostatin receptors, with several radiolabeled somatostatin analogs approved for clinical use worldwide.

Recent progress in radionuclide therapy and theranostics includes the development of new radiolabeled molecules and techniques for targeting cancer cells. For example, prostate-specific membrane antigen (PSMA) has been identified as a promising target for prostate cancer, and radiolabeled PSMA inhibitors have shown promising results in clinical trials. Additionally, the development of new radioligands with improved targeting and efficacy, as well as improvements in imaging techniques that allow for more precise targeting of cancer cells, has been explored more recently as a way to enhance treatment outcomes.

Overall, the progress in theranostics is opening up new possibilities for personalized cancer treatment, with the potential to improve patient outcomes and quality of life.

Keywords: Theranostics, radioligands, prostate-specific membrane antigen (PSMA), drug delivery.

PROF. DR. KAMALUDDIN AHMED ORATION

1. Radioactive Iodine Treatment in Differentiated Thyroid Carcinoma: Prof. Dr. Kamaluddin Ahmed's Legendary Work and Subsequent Experiences for 43 Years at NINMAS

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ABSTRACT

Background: Radioiodine treatment in thyroidectomized differentiated thyroid carcinoma (DTC) patients was introduced at the National Institute of Nuclear Medicine & Allied Sciences (NINMAS), Bangladesh by Prof. Dr. Kamaluddin Ahmed in 1980, and the Thyroid Division of the National Institute of Nuclear Medicine & Allied Sciences (NINMAS) and all INMAS continued his work to date.

Objectives: The objective of this study is to evaluate the pioneer's work and the long experience of the outcome of radioactive iodine (RAI) treatment in DTC and associated variables at NINMAS.

Patients and Methods: Prof. Kamaluddin Ahmed treated the first patient of DTC with RAI at NINMAS in 1980 and archived the first file and started to archive all files treated by RAI in the medical record room of the Thyroid Division of NINMAS (Previously named INM). He had taken the responsibility of lifelong follow-up of those patients. His successor nuclear medicine physicians have been following in his footsteps. The data of this retrospective study were obtained from the mentioned archived patient files. It is noteworthy that a total of 8128 patients with DTC received radioiodine therapy at this institute during the period of 1980 to 2022 and one-fifth of the patients received RAI multiple times.

A total of 5047 patients were treated during the period from 1980 to 2017. Among them, 3482 patients were included in this study who were followed up until 2021. Age, sex, histopathological diagnosis, thyroglobulin (Tg) and anti-thyroglobulin antibody (TgAb) levels, and parathyroid hormone on the 15th day of thyroidectomy were analyzed. Risk stratification for recurrence and staging was calculated for dosing of radioiodine. A single dose of radioiodine has been given ranging from 30 mCi to 200 mCi according to the postsurgical risk assessment. Repeated doses of radioiodine were given in the cases of persistence of disease and recurrent cases.

Results: The age range of DTC patients was 5-87 years (39.90 ± 12.67 years) with the majority of the patients belonging 30-39 years. The median age was 38 years. Female to male ratio was 3.74:1. RAI-treated DTC patients' number had noticed a 72-fold and 14.9-fold increase in the last decade compared to the 1980s and 1990's decade respectively.

Papillary thyroid carcinoma (PTC) and follicular variant of thyroid carcinoma (FVPTC) together were evaluated in PTC-3311 (95.09%) cases and follicular thyroid carcinoma (FTC) was diagnosed in 171 (4.9%).

Complete response was observed by a single dose of radioiodine ablation in 2853 (81.94%) and persistence of disease 388(11.14%) and recurrence was noted in 241 (6.92%) patients with DTC. Tg and TgAb levels at the pre-therapy state were significantly higher in patients who had persistence of disease or recurrence ($P < 0.005$).

Conclusion: Significantly increasing number of patients with DTC were treated by radioiodine in the last decade. Complete response was observed in 81.94% of DTC patients by giving a single dose of radioiodine.

PROFFERED PAPER SESSION- 1

1. Analysis of Bone Mineral Density and Associated Risk Factors: Single Center Study

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ABSTRACT

Background: A huge number of elderly people suffer from osteoporosis in Bangladesh but prior detection is often missed, leading to worsening condition. The occurrence of low bone density and its relative parameters were attempted to be observed in this study from a single center.

Methods: A cross-sectional study was done involving 354 patients who came for BMD (bone mineral density) testing. Using the Dual Energy X-Ray absorptiometry

(DXA), the bone mineral densities of two different portions of the skeleton, such as the spine and femur/total hip, were measured. Considering the values of T-scores, the results were analyzed.

Results: A total of 354 patients (F= 299, M= 55) with a mean age of 57.68±11.9 years were included in this study. In 151 (51% of women) and 23 (42% of men), BMD machine-generated low bone mineral density of the spine, indicating either osteopenia or osteoporosis. 97% of female patients and 18% of male patients had bone vulnerability. Age had a significant negative correlation with both the skeletal sites of the spine ($p = 0.008$, $r = -0.142$) and the femur/total hip ($p = 0.000$, $r = -0.23$). No significant association between low bone density and geographic disparity (such as urban and rural) was found. Low bone density of the femur and hip was significantly associated with diabetes ($p = 0.000$) and patients with diabetes and hypertension ($p = 0.007$) considering past medical history. Low BMD in the spine was found significant in multiparous women (>2 children) ($p = 0.009$).

Conclusion: This study found an association between low bone density and diabetes, hypertension, and multiparity in women.

Keywords: Bone Mineral Density, Dual Energy X-Ray absorptiometer, diabetes mellitus, hypertension, parity

2. Menopausal age of Differentiated Thyroid Carcinoma (DTC) patients after single dose of Radioiodine therapy–Single Institute based Experience

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ABSTRACT

Introduction: Menopause is a natural and unavoidable change in all women's life. Radioiodine therapy (RAIT) is the treatment of choice for patients with differentiated thyroid carcinoma (DTC). Considering these two, this study was conducted to evaluate the effect of different dose of radioiodine (^{131}I) therapy on menopausal age of DTC patients.

Patients and methods: This recorded review data was analyzed in INMAS, Mitford from 2000 to 2019 among 225 female patients with DTC who were referred for radioiodine therapy of different doses (75mCi,100 mCi and 150mCi).

Results: Among 225 patients, a total of 47 women (20.88%) experienced menopause after RAIT during this study period. The average age of menopause in Bangladesh is 46.7 years (95% CI). In this study mean menopausal age of the study subjects were 44.19±4.6 years. after 75mCi of radioiodine therapy 13 patients experienced menopause with mean age 45.69±2.2, 28 patients treated with 100 mCi had menopause with mean age 44.43±4.7 and 06 patients who received 150

mCi had menopause at a mean age of 44.1±3.0. The one sample t test showed that P value is <.05.

Conclusion: This initial observational study reveals that the mean menopausal age after radioiodine therapy are lower than normal mean menopausal age.

Key word: Menopause, Radioiodine therapy.

3. Thyroid Disorder Pattern in Children Over One Year at NINMAS

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ABSTRACT

Introduction: A significant fraction of paediatric and juvenile endocrine diseases is thyroid-related. Congenital hypothyroidism (CH), hyperthyroidism, thyroid agenesis, dysgenesis, thyroid ectopia, thyroid nodules, carcinoma, and thyroiditis are the most common pediatric thyroid disorders. The objective of this study is to evaluate the referral pattern of thyroid disorders in children and adolescents at National Institute of Nuclear Medicine and Allied Sciences (NINMAS).

Patients and Methods: Institute-based descriptive study of referred children with thyroid disorders. Thyroid profile consisting of serum TSH, FT3, FT4, high-resolution neck ultrasound, 99mTc-thyroid scan and radioiodine uptake (131I) were done.

Results: Total 176 children were referred with suspected thyroid disorders and DTC. Among them, 26 were hypothyroid. Congenital anomalies of the thyroid gland were found in 17 patients (F=10, M= 7). Nine (F=4, M=5) patients had thyroglossal duct cysts, agenesis of the thyroid gland was noted in three (F=2, M=1) and five (F=4, M=1) had ectopic thyroid gland. Thyroiditis was found in 11 (F=9, M=2) patients. Diffuse thyromegaly in 22 (F=18, M=4) and goiter in 15 (F=13, M=2). Hormone analysis revealed hyperthyroidism in 51 (F=34, M=17), hypothyroidism in 16 (F=13, M=3), and euthyroidism in 13 (F=7, M=6). Total 630 patients with DTC (papillay, follicular and follicular variant of PTC) were registered for RAIT, of which 31 (4.92%) were children (F=26, M=5). Furthermore, under the ADP project of IAEA and BAEC titled "Screening of congenital hypothyroidism in newborn babies (phase 2)", a total of 33040 new born babies were screened and CH was confirmed in 26.

Conclusion: Clinicians should keep their level of suspicion for childhood thyroid disorder for prompt interventions.

Keywords: Pediatric thyroid disorders, Congenital hypothyroidism, Thyroid function tests, Neonatal screening.

4. Outcome of patients after 5 years of receiving radioactive iodine ablation for differentiated thyroid carcinoma at INMAS, Rajshahi

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ABSTRACT

Objectives : For treatment of differentiated thyroid carcinoma (DTC), radioactive iodine ablation (RAI) had been practiced at Institute of Nuclear Medicine and Allied Sciences (INMAS), Rajshahi for a long time. The objective of this study was to assess the treatment outcome of RAI ablation in patients with DTC ,therapeutic response of ^{131}I avid metastasis

Material and Methods: In this retrospective study records of 257 patients with DTC from January 2015 to December 2017 were analyzed. After proper surgical management RAI ablation was given following the upgraded management protocol of SNMB. On the basis of risk stratification lower dose of ^{131}I (30-100 mCi) was given for low risk group and higher doses (>100-200 mCi) for high and intermediate risk group. On followed up, treatment response was evaluated by diagnostic whole body scan (WBS) along with serum thyroglobulin (Tg), anti-thyroglobulin antibody (Anti-Tg Ab),

high resolution ultrasound (HRUS) examination of neck and other relevant investigations according to patient's clinical response. On the basis of treatment response patients were classified in two groups-complete response (CR) and persistent disease (PD).

Result: Among 257 patients 89 (34.63%) were male and 168 (65.37%) were female; M:F-1:1.9. Five patients were lost to follow up. Out of 252 patients 235 (93.25%) had papillary carcinoma and 17 (6.74%) had follicular carcinoma. After one year total 231 (89.68%) patients were considered disease free since no abnormality was found in their WBS and HRUS of neck with negative Tg and anti-Tg antibody. Among the rest 21 (10.31%) patients 2 nd dose RAI ablation was given in 4 patients for ablation of residual thyroid tissue and in 2 patients for ^{131}I avid cervical lymph node metastasis. Only one patient showed I-131 avid diffuse pulmonary metastasis who required ablation for 3 times. Among non avid ^{131}I metastases 10 patients had lymph node metastasis, 2patients had lung metastasis and 2 showed bone metastasis. Average follow up period was 5 years. After 5 years follow up, CR was observed in 239 (94.84%) patients and PD or recurrence was observed in 13 (5.16%) patients. Average received dose of radioactive iodine for CR cases was 86.4 ± 28.3 mCi and for PD cases was 338 ± 17.5 m Ci. In patients with CR the initial average Tg level was 32.5 ng/ml and after receiving last therapy it was 1.3 ng/ml. Whereas, in PD group initial average Tg level was 163.2 ng/ml, which was rising gradually on an average 182.0 ng/ml .

Conclusion: Radioactive iodine ablation is highly effective to achieve treatment goals in patients with DTC and iodine-avid loco-regional metastases. However, cases with iodine non-avid metastases are less likely to show complete response and other treatment modalities are suggested for their further management.

5. Lung metastases in Differentiated Thyroid Carcinoma in Children-Case report of three patients

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ABSTRACT

Background: Differentiated thyroid carcinoma (DTC) contributes only 1-2% of pediatric malignant tumor and papillary carcinoma is the most common type. However, higher level of aggressiveness is commonly observed as loco-regional or distant metastasis especially in lung.

Case Report:

Case 1: An 18 years old boy, after thyroid surgery in 2014, attended our institute for radio-iodine ablation. According to histopathology report and risk stratification he was treated with 100 mCi radio-iodine as fixed dose therapy followed by suppressive dose of levothyroxine. After one year patient was disease free on the basis of thyroglobulin(Tg) and whole body iodine scan(WBS) report. He became irregular in follow up and stopped medication. Eventually he presented with neck swelling on 2021. On evaluation, elevated Tg and radiotracer uptake was noted in neck, mediastinum and bilateral lung fields on WBS. Patient went through re-surgery & received 2nd dose(150mCi) of radio-iodine Ablation.

Case 2: Another 14 years child attended our institute for radio-iodine ablation after total thyroidectomy on 2019. Since the patient was in high risk group, he was treated with a fisced dose 100mCi radio-iodine followed by suppressive dose of levothyroxine. After first year, WBS showed intense distribution of radiotracer in both lungs field with elevated S.Tg (Tg-710.0ng/ml) level. Therefore, patient got second dose (100mCi) and followed up for another year. About after 2nd year, patient still showed intense lung uptake with high S.Tg(Tg-550ng/ml). Recently patient got 3rd dose (150mCi) of high radio-iodine ablation.

Case 3: A 10 years old boy of diagnosed papillary ca. thyroid with neck node metastasis, attended INMAS, Khulna for radio-iodine ablation. On pre-ablative evaluation, significant amount of thyroid remnant and few nodes were found. According to body weight, patient got 35mCi radio-iodine and on post therapy WBS radio iodine uptake was observed in thyroid bed and both lungs. Patient is getting suppressive dose of levothyroxine and planning for a second dose.

Conclusion: Though DTC with lung metastasis is rare in children, early diagnosis and proper management with regular follow up, results in positive outcome. However, screening for distant metastasis at regular intervals should be considered in patients high risk.

Key word: Papillary carcinoma, Lung metastasis, Radio-iodine ablation, Serum thyroglobulin(S.Tg).

6. Low Parathormone Level Following Total Thyroidectomy-Observation of Patient Traits in A Single Institute

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ABSTRACT

Background & Objectives: Surgical debulking of thyroid and neck lymph nodes is the mainstay of differentiated thyroid cancer treatment during which parathyroid glands are at risk of either removal or vascular insufficiency. The purpose of this study was to evaluate and categorize the total thyroidectomy patients with low parathormone level who were referred for radio-iodine ablation therapy.

Material & Methods: Two hundred seventeen differentiated thyroid cancer patients record who underwent total thyroidectomy with or without modified neck dissection between February,2020 and December,2022 was evaluated retrospectively. This was a simple observational study. Post-operative levels of serum parathormone and calcium were documented and statistical analysis was performed.

Results: Among 217 patients, post-operative low parathormone level were observed in 51.2% and low serum calcium in 27.6% of total patients. Moreover, 50.7% of total thyroidectomy patients and 52.1% total thyroidectomy with modified neck dissection developed low parathyroid hormone level. The age group most affected by low parathormone level was 25-34 years. Furthermore, low serum calcium levels were found in 55% patients who had low parathormone level.

Conclusion: In this study, 25-34 years age group was more prone to develop post-operative low parathormone level with female sex predilection.

Keywords: Parathyroid hormone, Serum calcium, Total thyroidectomy, Modified neck dissection.

7. Demographic Pattern of Bone Mineral Density in Male: Experience of a Single Institute

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ABSTRACT

Introduction: As the average life expectancy of people is increasing, people are more vulnerable of developing osteoporosis. Osteoporosis was once considered as a disease of elderly, but in recent years, it is occurring at any age and several factors are associated with low Bone Mineral Density (BMD).

Objective: To observe the current demographic pattern of BMD in male patients of NINMAS and to evaluate different variables related to BMD.

Material and Methods: In this retrospective study 347 recards of male patients were analyzed, who were referred to NINMAS for Dual-Energy X-ray Absorptiometry(DEXA) scan during the period of January 2022 to December 2022. BMD was measured at right and left femoral neck and lumbar spine (L1-L4).Data about age, sex, body mass index (BMI), bone mineral content (BMC) were recorded. Reporting was done according to T-score following WHO criteria.

Result: Mean age of the 347 male patients was 55 ± 15.4 years mean ± SD BMI was 24.71±4.57 kg/m^2. According to age, patients were divided into 4 groups. In age group GI (18 to 37 years), 53 patients; in GII (38 to 57 years),119 patients; in GIII (58 to 77years),161 patients, in GIV (>77years), 14 patients. No significant correlation was found between age and BMD. Regression analysis between age and T-scores was done and in case of right femur T-score with age, R=.045 and significance .399; in case of left femur T-score with age, R=.057 and significance .290; in case of spine T-sore with age, R=.055 and

significance 306. Scatter plots showed no positive or negative relation in all the cases. Result of BMD in both femur showed normal in 186(53.6%), osteopenia in 139(40.1%) and osteoporosis in 22(6.3%) patients. On the other hand, BMD results in spine showed normal in 138 (39.8%), osteopenia in 143(41.2%) and osteoporosis in 66(19%) patients. Discordance between femoral and spinal BMD was evident (in Chi-Square test p <.001). According to BMI patients were divided in to 4 groups; underweight, normal, overweight and obese. Pearson's correlation test showed there are positive correlation in BMI and T-score in case of right femur.341, in left femur .377 and in spine .18

Conclusion: It can be concluded that patient with underweight and normal BMI have more risk of low BMD. This also suggests, increased body mass may benefit BMD.

Keywords: Bone Mineral Density (BMD), Bone Mineral Content (BMC),Body Mass Index (BMI), Dual-Energy X-ray Absorptiometry (DEXA), Osteoporosis, Osteopenia.

8 Short-term Outcome of Radioiodine Therapy in Primary Hyperthyroidism with Pre-therapy Low Radio Iodine Uptake by Thyroid Gland

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ABSTRACT

Introduction: The dosage of ^{131}I for successful treatment is based on many factors. Modified fixed dose of 131I has been practiced for treatment of hyperthyroidism at NINMAS and it was assumed that patients with low uptake needs higher dose of RAI. The purpose of this study was to evaluate the response of radioactive iodine therapy (RAIT) in hyperthyroid individuals with low 131I uptake (RAIU) values.

Patients and Methods: A total of 188 clinically and scintigraphically proven hyperthyroid patients who had RAIT between September 2021 to June 2022 were included. Patients with low 131I uptake by the thyroid gland was included in Group I and high 131I uptake in Group II. Post RAIT patients were followed up after 3 months with thyroid function tests to determine the outcome.

Results: A total of 188 patients were studied after 3 months of RAIT. Group I had 44 patients (F = 37, M = 7), and Group II had 144 (F = 99, M = 45). In groups I and II, the mean age was 45 ± 13.55 and 35 ± 13.10 years respectively, and the weight was 63.2 ±10.8 kg and 60 ±12.5 kg. Investigation reports of Group I - FT3 = 4.9±2.68pmol/L, FT4 = 12.99 ± 14.5 pmol/L, and TSH = 0.01 mIU/L with ATD replacement and before RAIT therapy, mean RAIU = 8.57±2.23% (2 Hrs) and 14.4±8.51% (24 hrs). Whereas, Group II showed, FT3 =6.2 ±6.6 pmol/L, FT4= 8.29 ± 7.11pmol/L, RAI uptake = 22.2 ± 10.89% (2 hrs) and 34.2 ± 15.96% (24 hrs). In Group I, the mean dose of 131I therapy was 13.02 ±1.75 mCi; in Group II, it was 12.5 ±2.2 mCi. Follow-up at 3 months showed euthyroidism in 13 (36%), hypothyroidism in 19 (52.7%) and hyperthyroidism in 4 (11.1%) patients of Group I. Eight patients (18.2%) did not return for follow-up. Whereas, 30 (22.9%) patients in Group II were euthyroid, 83 (73.4%) hypothyroid, and 18 (13.7%) were found hyperthyroid with 13 (9%) patients lost to follow up.

Conclusion: Patients with hyperthyroidism in this study showed a near-optimal outcome regardless of their RAI uptake value.

Keywords: Radioactive iodine therapy, Radio iodine uptake, Hyperthyroidism.

9. New dimension as a pandemic frontliner: INMAS, Dinajpur perspective

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ABSTRACT

The initial experience of performing high resolution computed tomography (HRCT) of chest in suspected COVID-19 pneumonia using dual headed SPECT/CT (Symbia Intevo Bold) at INMAS, Dinajpur worth a sharing in this mask free post pandemic period. Technologists of this institute were not initially well trained in HRCT radiography but they availed intensive training for two weeks at INMAS, Chattogram, followed by in-house work experience and hands on demonstration by the experts of Siemens. Meanwhile, the physicians kept updating their knowledge by actively participating in trainings and workshops regarding the diagnosis and management of COVID-19.

The study was done between November 2020 and August 2022 among 1270 (M=774, F=496) suspected COVID-19 pneumonia patients with an average age of 52.1(men) and 49.1(women) years. Patients of 60-69 years were maximum in number in both genders. According to HRCT evaluation, COVID 19 pneumonia was diagnosed in 354 (27.9%) patients. Among them 274 (77.4%) patients had mild pneumonic features, 63 (17.8%) had moderate and 17 (4.8%) had intense changes. Diagnostic radiological features include a) bilateral lung involvements and ground glass opacities, b) posterior and peripheral distribution (94.9 %), c) basal involvement (77 %) d) crazy paving pattern (21.5 %), and e) septal thickening (21.5 %). Moreover, reverse halo sign (18%), consolidation (15.4%), pleural thickening (14.4%) and fibrosis (7.7%) were also reported.

The resources at INMAS, Dinajpur are limited. It is located 413 km from Dhaka, but all the personnel proved their potential to provide patient services during the pandemic period by doing more than a thousand chest CTs. The tools provided by the DGHS and Bangladesh Lung Foundation (BLF) helped us upgrade our academic knowledge, clinical skills and inspired us to play a frontline role in the COVID-19 pandemic.

Keywords: High resolution chest CT, COVID-19 pneumonia, pandemic, dual headed SPECT/CT.

PROFFERED PAPER SESSION-2

1. Patient Trends of ^{18}Fluorine-FDG PET/CT Scan in a Pediatric Population: Seven Years Experience at NINMAS

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ABSTRACT

Introduction: National Institute of Nuclear Medicine and Allied Sciences (NINMAS) is the first government institute of Bangladesh to start PET/CT in 2016 and it has one of the largest databases of PET/CT in the country. Pediatric cases that underwent ^{18}F-FDG PET/CT scans in the last seven years were received.

Patients and Methods: Pediatric patients who had ^{18}F FDG PET/CT scan at NINMAS from 2016 to December 2022 were retrospectively included and patient record files were reviewed for demographic analyses as well as to identify patient trends in recent years.

Results: A total of 204 pediatric patients were included in this study excluding their follow-up visits which were 5.8% of total

referrals. The mean age of the patients found was 11.2 ± 4.8 years. Among the patients, 149 (73%) were male with a mean age of 10.7±4.7 years and 55 (27%) were female with a mean age of 12.8± 4.6 years. The highest number of patients were studied in the year 2022 which was 54 (26.47%). With 127 (62.25%) cases, Hodgkin's lymphoma was the most frequent oncological indication of PET/CT found in the pediatric population. Non-Hodgkin's lymphoma cases were 26 (12.75%), childhood blastoma were 9 (4.41%), and 8 93.92%) sarcoma cases. Other oncological indications found were yolk sac tumor, unknown primary, lung cancer, ovarian cancer, testicular cancer, etc. which included 27 (13.23%) cases. Tuberculosis was the non-oncological indication for PET/CT with 7 (3.43%) cases including multidrug-resistant tuberculosis (MDR-TB) and abdominal TB.

Conclusion: Since the establishment of the ^{18}F-FDG PET/CT imaging facility, the number of pediatric cases has increased gradually over the years except in the year 2020 when the world was going through the Covid-19 pandemic. Our review shows PET/CT is a valuable tool for imaging and is widely used in pediatric oncological cases with few non-oncological indications as well.

Key words: ^{18}F-FDG PET/CT, Paediatric patients.

3. Extra nodal lymphoma involvement evaluated by ^{18}F-FDG PET-CT scan–experience in NINMAS

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ABSTRACT

Introduction: Lymphomatous infiltrations at anatomical sites other than the lymph nodes are termed extranodal lymphomas. The commonest sites of extranodal involvements include the stomach, spleen, Waldeyer ring, central nervous system, lung, bone, and skin. ^{18}F-FDG PET/CT scan plays an important role in the evaluation of extranodal lymphomas.

Patients and methods: This cross-sectional study was conducted in the PET/CT division of the National Institute of Nuclear Medicine and Allied Sciences, Dhaka, from January 2022 to December 2022. The study included 232 patients with lymphoma, both Hodgkin's lymphoma (HL) and non Hodgkin's lymphoma (NHL), who were referred for ^{18}F- FDG PET/CT scan in NINMAS.

Results: Among the 232 lymphoma patients, the age range is from 5 years to 80 years, with a predominance of men. There were 111 patients with HL and 121 patients with NHL. Extranodal involvement was 9% (n=10) in HL and 35% (n=42) in NHL. The most common site of involvement is the skeletal system, with 15 patients (28.8%), while pulmonary (n-12; 23.1%), GIT (n-10; 19.2%), and muscular (n-7; 13.5%) involvement come next among total lymphoma patients. Manifestation at another site comprises 15.4% (n-8).

Conclusion: ^{18}F-FDG PET/CT imaging plays an important role in the identification and evaluation of extranodal lymphomas. Though the data is only for one year, it reflects the potential role of PET/CT for the evaluation of extranodal manifestations

Keywords: ^{18}F-FDG PET/CT, Extranodal lymphoma, Hodgkin's lymphoma, non Hodgkin's lymphoma.

4. Staging of Breast Cancer under 40 years Patients by F-18 FDG PET/CT Scan at Institute of Nuclear Medical Physics, Savar

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ABSTRACT

Background: Women with breast cancer under 40 years have poor outcome than older women. Undetected metastasis at the

time of staging has been suggested to account for this difference. Our objective was to evaluate baseline staging of breast cancer patients under 40 years of age.

Patients and Methods: A retrospective study was performed on patients who had breast cancer and underwent ^{18}F-FDG PET/CT scan at Institute of Nuclear Medical Physics (INMP), Savar from January 2019 to December 2022. INMP report database were reviewed for analyses of younger than 40 years breast cancer patients.

Results: A total of 368 patients were underwent F-18 FDG PET/CT scan for breast cancer during January 2019 to December 2022. Pre-operative F-18 FDG PET/CT scanning was done only in 32 patients (8.6%) and among them 15 patients were found under 40 years who underwent baseline F-18 FDG PET/CT scan at INMP, Savar. The mean ages of the patients were 32.4 ± 7.0 years and all the patients were female. Biopsy proven histopathology report showed 12 invasive ductal cell carcinoma (IDCC), three mucinous carcinoma. Triple negative immuno-histochemistry (IHC) was found in four patients. ^{18}F-FDG PET/CT scan showed two stage IV patients, one stage IIIA patient, four stage IIB patients, five stage IIA patients, three stage IA patients. The mean size of primary tumor was 3.8 ± 2 cm. Seven patients had less than 2 cm primary tumor. The mean SUVmax of primary tumor in stage I, II, III was 8.67 ± 3.61 and stage IV was 7.8 with p value > .001. One patient who had stage IA showed low metabolic activity (SUVmax 1.4). Nodal metastases were found in eleven patients. The highest SUVmax 24.7 found in a stage IIA patient who had triple negative IHC. Post staging mastectomy was done in ten patients and lumpectomy in three patients.

Conclusions: Metabolic activity was variable and no significant change was found in stage I, II, III and stage IV patients. However, our results highlight the high yield of metabolic activity even in stage IIA patient and assessing distant metastasis under 40 years patients for further oncological management.

5. Post-Therapeutic Response Evaluation in Non Small Cell Lung Cancer by F-18 FDG PET/CT Imaging: Initial Experience at NINMAS

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ABSTRACT

Introduction: ^{18}F-FDG PET/CT is increasingly used in evaluation of treatment response for patients with non-small cell lung cancer (NSCLC). The aim of this study is to evaluate therapeutic response in NSCLC patients using PET response criteria in solid tumors (PERCIST) to assess metabolic response and response evaluation criteria in solid tumors (RECIST) to assess morphologic response.

Patients and methods: We retrospectively reviewed data of total five patients of NSCLC from January 2021 to June 2022 who had come to NINMAS for ^{18}F-FDG PET-CT imaging both at baseline evaluation and therapy response evaluation. Therapy response was evaluated using PERCIST and RECIST criteria.

Results: Three patients were male and two were female with mean age being 57 years. All of them were diagnosed as advanced stage of NSCLC and came to evaluate therapy response after completion of chemotherapy except one who was receiving targeted therapy.Mean duration of therapy response evaluation was 76.6 days. Four out of five patients showed stable disease (SD) after RECIST evaluation and one showed complete response (CR). PERCIST evaluation showed progressive metabolic disease (PMD) in two patients, partial metabolic response (PMR) in two patients. The patient with CR on RECIST also found to have complete metabolic response (CMR) on PERCIST. Patients were followed up for progression free survival assessment and median time of PFS found is 15 months.

Conclusion: ^{18}F-FDG PET-CT scan has potential in giving information about both metabolic response to therapy using PERCIST and morphologic response to therapy using RECIST. By utilizing these standard approaches whereas

possible, this imaging can offer improved information to the clinicians in non-invasive way for choosing an appropriate management plan in NSCLC patients.

Key words : PET response criteria in solid tumors (PERCIST), PET response evaluation criteria in solid tumors (RECIST).

6. ^{18}F-PET/CT Findings in a Patient with Sarcoidosis: A Case report

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ABSTRACT

Background: Sarcoidosis is a multisystem disease characterized by the formation of noncaseating granulomas that can affect any organ of the body with extremely variable clinical course. ^{18}F-FDG PET/CT is a useful technique for detecting active inflammatory sites in patients with sarcoidosis thus help in diagnosis, monitoring response and predicting prognosis. We present a case of sarcoidosis with hepatic involvement detected by ^{18}F-FDG PET/CT scan.

Case Report: A 44-years-old female with history of mediastinal lymphadenopathy visilid to NINMAS for whole body ^{18}F-FDG PET/CT scan. She had history of low grade fever, weight loss and generalized weakness for two years. Her previous investigations revealed hilar lymphadenopathy on chest rediographi. Chest CT scan showed thoracic lymphadenopathy in bilateral hilar, right paratracheal, precarinal, subcarinal, prevascular regions and aortopulmonary window and reported as stage-1 sarcoidosis. Serum calcium level was 12.24 mg/dl (ref-8.4-10.2 mg/dl), Serum ACE-137 U/L (ref-12-68 U/L), fiber optic bronchoscopy with bronchoalveolar lavage (FOB+BAL) study showed reactive and inflammatory changes which were in favour of sarcoidosis. AFB staining was negative, Gene expert MTB-negative; tuberculosis was excluded. Then she was advised for PET/CT to see the extent of the disease. PET/CT revealed multiple hypermetabolic mediastinal and abdominal lymph nodes. There was also heterogenous intense FDG uptake (SUVmax:9.6) in liver without definite change on CT likely due to sarcoidosis involvement in the liver. Patient had previous H/O of carcinoma of right breast 13 years back and treated with surgery followed by chemoradiotherapy. Her tumor marker (CA15-3) was normal. There was no metabolic evidence of recurrence or metastases at mastectomy site or axillary region or skeletal infiltration.

Conclusion: This case shows the usefulness of ^{18}F-FDG PET/CT for the diagnosis of extrapulmonary involvement of sarcoidosis which may guide the patient for monitoring treatment response as well as prognosis.

Keywords: Sarcoidosis, ^{18}F-FDG PET/CT.

7. Incidental Diagnosis of Mesenteric Cyst by PET/CT Imaging-A Case Report

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ABSTRACT

Introduction: Mesenteric cysts are benign and rare abdominal masses and may be localized all over the mesentery from duodenum to rectum however, they are mostly found in the ileum and right colon mesentery. Pre-operative diagnosis is difficult due to variable clinical symptoms and signs and often diagnosed incidentally during work up for other treatment. Here we report a case of metastatic ovarian carcinoma in which mesenteric cyst is incidentally diagnosed. Optimal treatment is surgical excision of the cyst with laparotomy or laparoscopy.

Case report: A 65 years old woman was diagnosed and treated for metastatic ovarian carcinoma referred to PET/CT division of NINMAS for follow up PET/CT scan to evaluate recurrence due to persistent abdominal complaints. PET/CT scan revealed metabolic and morphologic regression of previously reported hypermetabolic abdominal lymph nodes and insignificant change of hepatic SOLs. .In addition, a well-defined cystic lesion at right paracolic gutter is seen, suggesting mesenteric cyst. The cyst was histopathologically proven as mesenteric cyst.

Conclusion: Although mesenteric cyst is uncommon, it must always be taken into consideration for making a differential diagnosis of pelvic cystic lesions. We incidentally found a mesenteric cyst in PET/CT scan while looking for recurrence of ovarian cancer and biopsy report also confirmed the diagnosis.

Keywords: ^{18}F-FDG PET/CT, Meseuteric cyst.

8. Bilateral Renal Involvement in Lymphoma on ^{18}F-FDG PET/CT Scan: A Case Report

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ABSTRACT

Background: Diffuse large B-cell lymphoma (DLBCL) is the most common subtype of non–Hodgkin's lymphoma (NHL), and constitutes 25% of all NHL cases . Extra nodal involvement such as gastrointestinal, head and neck, orbital, central and peripheral nervous system, thorax, bone, skin, breast, testis, thyroid and genitourinary system can be seen in 25-40% of HL and especially NHL patients. Renal involvement in lymphoma is commonly seen in case of widespread nodal or extranodal lymphoma which is known as secondary renal lymphoma (SRL). Only renal involvement of lymphoma without evidence of elsewhere disease is rare and known as primary renal lymphoma (PRL). Here a case of SRL in a known DLBCL patient is presented.

Case Report: A 19-year-old woman with DLBCL attended PET/CT division of NINMAS for ^{18}F-FDG PET/CT scan to assess therapy response following 12 cycles of chemotherapy. She was diagnosed as NHL by USG guided biopsy from cervical lymph node. Her post chemotherapy CT scan of abdomen and Ultrasonogram showed no abnormality. After 6 hours of fasting with a blood glucose level of 10.4 mmol/L, whole-body PET/CT imaging with low-dose nondiagnostic CT was performed 45 minutes later the intravenous injection of 5.7 mCi ^{18}F-FDG PET/CT. ^{18}F-FDG PET/CT Scan revealed metabolically active lesious involving cervical, mediastinal and abdominal lymph nodes. Multiple intense FDG avid pulmonary nodules in both lungs suggesting pulmonary infiltration. Skeletal and peritoneal involvement was also noted. Multiple intense FDG avid soft tissue density lesions involving both kidneys were evident. PET-CT scan can provide information regarding anatomy as well as functional status earlier than other conventional diagnostic tools available. In this reported case renal involvement was detected by PET-CT where CT scan of abdomen reported normal renal findings.

Conclusion: Meticulous search for renal involvement is important while PET/CT reporting to diagnose SRL or PRL. This is more important in disseminated lymphoma.

Keywords: Bilateral renal lymphoma, ^{18}F-FDG PET/CT.

9. Triple negative Breast Cancer with low F-18 FDG uptake in PET/CT scan during pre-therapy staging- A case report

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ABSTRACT

Introduction: Triple-negative breast cancer (TNBC) is a distinctive subtype of breast cancer that does not express estrogen receptors (ER), progesterone receptors (PR), or human epidermal growth factor receptor 2 (HER-2).

^{18}F-FDG PET/CT scan is playing a potential role in the assessment of breast cancer which is more sensitive for the TNBC due to its higher ^{18}F-FDG avidity compared to other subtypes of breast cancers. However, in rare cases low FDG uptake in TNBC is also evident.

Objective: The objective of this case report is to share the experience of low FDG uptake in a TNBC patient, while usually we found higher FDG avid primary tumor in the TNBC subtype.

Case Report: A 74 years old Bangladeshi woman presented with a painless palpable mass in her right breast for six months. Core biopsy revealed infiltrating ductal cell carcinoma and USG-guided fine needle aspiration cytology from right-sided axillary lymph nodes showed metastatic ductal cell carcinoma. According to the immunohistochemistry report she was diagnosed with TNBC and referred to NINMAS for a whole-body ^{18}F-FDG PET/CT scan for pre-therapeutic staging. PET/CT demonstrated no evidence of distant metastasis however, a heterogeneous soft tissue density lesion (56 x 39 mm) involving the central part of the right breast was detected with low FDG uptake (SUV max: 2.2) and minimal contrast enhancement. Few low FDG avid (SUVmax: 1.6) right axillary lymph nodes were also detected. Finally, she was diagnosed with stage III TNBC according to the American Joint Committee on Cancer Staging (AJCC) 8th edition.

Conclusion: The frequency of TNBC with a lower SUV (less than or equal to 2.5) is noteworthy and may often causes diagnostic dilemma. Previous experience in NINMAS showed that TNBC patients had higher SUVmax value. Hence, incidental low FDG uptake in the breast tumor should be considered for further review or investigations to confirm the presence of breast cancer.

Keywords: Triple-negative breast cancer (TNBC), Positron emission tomography/ Computed tomography (PET/CT).

PROFFERED PAPER SESSION-3

1. Cardiac Sympathetic Neuroreceptor Imaging: An Exciting Technology To Differentiate Dementia With Lewy Bodies (DLB) From ALZEHIMER'S Disease (AD)

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ABSTRACT

Background: Because of clinically overlapping symptoms, sometimes differentiation of dementia with Lewy bodies (DLB) from Alzheimer's disease (AD) is difficult. But an early and accurate diagnosis of DLB is important for proper therapeutic management. It had been reported that 123I-metaiodobenzylguanidine (MIBG) cardiac neuroreceptor imaging well correlated with the histopathological feature of Lewy body disease. This study was designed to unravel the impact of 123I-MIBG imaging in evaluating patients with DLB.

Subjects and Methods: Nineteen patients (Male: 9; Age: 65 ± 6 yrs) with clinically diagnosed DLB were enrolled for this study in Nuclear Cardiology Division, Fujita Health University Hospital, Japan from June through December 2010. Brain perfusion SPECT was performed with N-isopropyl-p-123I-iodoamphetamine (123I-IMP) and images were analyzed with age matched 3-dimensional streotactic surface projections (3D-SSP). Within 2 wks of brain scan, myocardial function by electrocardiographically gated 99mTc-sestamibi (99mTc-MIBI) SPECT and 123I-MIBG cardiac sympathetic neuroreceptor imaging were performed on the same day. Heart to mediastinum (H/M) uptake ratios of 123I-MIBG were recorded accordingly.

Results: 3D-SSP showed significantly decreased perfusion in the parietotemporal, occipital cortex, posterior cingulate, and precuneous regions. Among 19 patients, 14 did not show any accumulation of MIBG and 5 patients showed focally decreased tracer uptake in the myocardium. In contrast, all patients showed normal myocardial perfusion and left ventricular ejection fraction.

Conclusion: Cardiac sympathetic nerve function imaging with 123I-MIBG scan in conjunction with evaluating cerebral blood flow applying the special software (3D-SSP) proved to be very useful tool for the differentiation of patients with DLB from AD.

2. Observation of Metastatic Pattern in bone scintigraphy in Triple Negative versus Triple Positive Breast Cancer patients: Experience of a Single Institute

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ABSTRACT

Introduction: In breast cancer various subtypes have been identified based on expression of hormone receptors for estrogen (ER) and progesterone (PR) and human epidermal growth factor receptor 2 (HER2) gene amplification. This study was planned to gain insight into metastatic behavior of such immunohistochemical subcategories, namely triple negative and triple positive breast cancer, by analyzing a small group of patients referred to our institute for bone scan.

Patients and Methods: The study was executed at Institute of Nuclear Medicine & Allied Sciences, Mitford, Dhaka from May to October 2022. Study subjects were selected from only those patients who were reported triple negative (TNBC) or triple positive breast cancer (TPBC) based on complete histopathology report and immunohistochemical analysis. Skeletal scintigraphy was conducted in accordance with standard protocol .Findings were recorded and finally statistical analyses were performed with IBM SPSS and Microsoft Excel.

Result: Total 30 female carcinoma breast patients were enrolled. Out of them, 18 were TNBC and 12 were TPBC. About 53.3% of the patients presented with lymph node metastasis, 68.8% of them were triple negative and 31.2% were triple positive. Regarding other organs, skeletal and hepatic metastases were found in 25% cases of TPBC group, while history of lung metastasis was documented in 5% cases of TNBC group. Bone scintigraphy done in our institute revealed positive scan in about 25% subjects of the triple positive group but none of the triple negative group (p value 0.025).

Conclusion: Our study indicates that in this single center experience, triple negative breast cancer shows propensity for lymph node metastasis, while triple positive breast cancer tends to metastasize skeletal system.

Keywords: Breast cancer, metastatic pattern, triple negative, triple positive.

3. SPECT/CT Bone Scintigraphy in the Evaluation of Multicentric Giant Cell Tumor of Bone in an 18 Year Old Woman-A Rare Case Report

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ABSTRACT

Back ground: Giant cell tumors (GCT) are rare benign bone tumor and best known for their local aggressiveness and high recurrence. Multicentric GCT of bone is extremely rare and accounts for less than 1% of all GCTs. Bone scintigraphy with ^{99m}Tc-MDP plays a major role in detecting synchronous or metachronous localization of these lesions.

Case History: An 18 year old woman treated seven months ago for synchronous multicentric giant cell tumor of bone located at right middle finger and left lower jaw, presented now with complaints of pain & swelling in upper left arm and right chest wall. Then she underwent a whole body bone scintigraphy using ^{99m}Tc-MDP looking for other lesions or for a metastatic tumor workup with regional SPECT/CT imaging. Bone scintigraphy demonstrated increased radiotracer uptake in proximal left humerus, right 12th rib ,distal part of left tibia and an suspected equivocal uptake in left iliac bone. The regional SPECT/CT showed sub-articular expansile lytic lesion in proximal left humerus, a lytic lesion in right 12th rib. CT portion also detected an additional lytic lesion in left iliac bone that showed equivocal radiotracer uptake. CT guided FNAC from these lesions confirmed the diagnosis of multicentric giant cell tumor of bone.

Conclusion: Bone scintigraphy plays a useful role in detecting synchronous or metachronous localization of GCT. The SPECT/CT imaging increases the diagnostic accuracy of the bone scan and allows accurate anatomical identification of the lesions which helps in proper treatment planning.

Keywords: Multicentric GCT of bone, Whole body bone scan SPECT/CT imaging.

4. Hemangioma in calf muscle detected by ^{99m}Tc RBC scan- A rare case report

Urnas Islam, Ehsan Ul Karim, Sharmin Reza, Rahima Perveen, Farzana Rahman Ananna, Tapasi Sarker, Mashrufa Sultana, Saleha Sultana, Faria Jisan, Nasreen Sultana, Sadia Sultana

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ABSTRACT

Introduction: Unique benign vascular tumors occurring in muscles known as intramuscular hemangiomas most frequently affect the trunk and limbs. The majority of these lesions cause musculoskeletal pain, stiffness, and localized swelling that worsens over time. Intramuscular hemangiomas are rare, accounting for 0.8% of all benign vascular tumors. The ^{99m}Tc RBC scan is a nuclear imaging technology that has been validated for the diagnosis of hemangioma.

Case Report: An eighteen-years-old man who had been experiencing left calf muscle pain and edema for a year was referred at NINMAS for ^{99m}Tc RBC scan of left calf muscle swelling. His previous high resolution ultrasound with doppler flow of the left calf muscle swelling indicated a heterogeneous soft tissue mass-like structure with low flow peripheral vascularity. MRI report also suggested a possible hemangioma. FNAC report of the calf muscle swelling revealed fibro vascular connective tissue exhibiting numerous large dilated thick wall vascular spaces filled with RBC suggesting hemangioma. ^{99m}Tc RBC scan was conducted in accordance with standard protocol to confirm the intramuscular hemangioma.

Conclusion: This case, which was the first instance at NINMAS when a hemangioma was seen in the calf muscle. It demonstrated the need to include intramuscular hemangioma as a differential diagnoses when a young patient complains of a swelling in calf with intractable pain

because only accurate investigations can help for proper treatment planning.

Keywords: Hemangioma; Calf muscle; RBC scan; Colour Doppler.

5. Recurrent Hyperparathyroidism with Parathyroid Carcinoma in ^{99m}Tc Sestamibi SPECT/CT Positive having Multiple Osseous Manifestation–An Interesting Case Report

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ABSTRACT

Background: Recurrent hyperparathyroidism, which is one of the important cause of hypercalcaemia, is often seen among middle-aged people. In addition to laboratory testing, for localization of lesion radionuclide scan, CT, MRI, and ultrasound have been shown to be helpful.Among these imaging methods, SPECT/CT fusion imaging is more useful tool for finding of parathyroid lesions.

Case report: A 23 years old male with history of recurrent hyperparathyroidism was referred to our department for detection of parathyroid adenoma. Patients presented with the feature of hypercalcaemia. He also complaints of swelling in upper and lower left cheeks and right leg for last 3 years. Histopathology from all swelling revealed ossifying fibroma. During this period, he was found to have a positive left inferior parathyroid adenoma on SPECT/CT imaging for two times. Subsequently adenectomy and neck dissection was done. Each time histopathology report confirmed parathyroid adenoma. But after few months later of the last surgery, all his previous symptoms returned back. Then again SPECT/CT was done and revealed parathyroid adenoma in same location with an additional ectopic parathyroid adenoma in superior mediastinum. Then, Hemi-thyroidectomy and parathyroidectomy were done and the histopathology report showed parathyroid carcinoma.

Conclusion: This case suggests potential benefits of ^{99m}Tc Sestamibi SPECT/CT for preoperative localization of complicated parathyroid lesion.

Keywords: Parathyroid carcinoma, ^{99m}Tc Sestamibi SPECT/CT, FDG/PET.

6. ^{99m}Tc ECD brain SPECT for Assessment of Perfusion Abnormalities in a case of Autism Spectral Disorders : First case in Bangladesh

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ABSTRACT

Introduction: In recent years, epidemiological studies have shown a rapid increase in the prevalence of autism spectrum disorders (ASD). Throughout the world, it is reported to be 1 in 150 children. From a systematic review, the prevalence of ASD was found to be ranging from 0.15–0.8% in Bangladesh. Single photon emission computed tomography (SPECT) study of brain is a validated nuclear neuroimaging tool for assessment of brain perfusion and is eligible for being utilized as a diagnostic tool for ASD.

Objective: To evaluate regional cerebral blood flow abnormality of ASD patients assessed by radionuclide brain SPECT Imaging. To clarify which regions of brain abnormality contribute autistic behavior by surface view analysis with eZIS software. To find out the relationship between regional cerebral blood flow (rCBF) abnormalities and symptom profile in the autistic patients.

Case Report: A three-years-old male child clinically identified as having autism spectrum disorders was referred to NINMAS for a brain perfusion scan. According to the established protocol, a brain scan was performed. Following the intravenous delivery of 2 mCi of ^{99m}Tc ECD, a low dose of sedation was given. Dynamic sequential SPECT pictures were acquired from the vertex through the base of the skull for 30 minutes at a rate of 20 frames per second after the administration of ^{99m}Tc ECD. The simple Z-score imaging system (e-ZIS) software was used to analyze DICOM images. Both during the study and the recovery period, blood oxygen levels (pO2) and heart rate were monitored and recorded.

Multiple focal areas of decreased radiotracer concentration were seen (hypo-perfusion) in both frontal lobes, left temporal lobe, right parietal, right precuneus, and in both hypothalamus. The rest of the brain parenchyma perfused uniformly. The ventricular system appeared to be normal in diameter and no mass lesion or midline shifting could be seen. After an easy Z-score imaging system application-severity of regional cerebral blood flow (rCBF) decreased in a specific voxel of image (VOI), parietal lobes, precuneus, and posterior cingulate gyri and the score was 1.64.

Conclusion: Radionuclide brain SPECT imaging revealed rCBF in ASD patients. If a link could be established, the physician would be able to treat the patient more skillfully and with more cutting-edge interventions, including transcranial stimulation therapy, hyperbaric oxygen therapy, drugs like pregnenolone and cilostazol, and other interventions as required.

7. Diagnosis of Milroy Disease by Lymphoscintigraphy - A Case Report

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ABSTRACT

Introduction: Milroy disease is a primary lymphedema with congenital onset characterized by swelling of the whole body or lower limb. Milroy disease often begins at birth or may appear throughout the early years of life. Bilateral lower limb lymphedema is a defining feature, and it may get worse with time. Small or nonexistent lymphatic vessels result from mutations in the FLT4 gene, which controls the growth or maintenance of the lymphatic system. This results in the development of primary lymphedema. This case report describes a case of Milroy disease which was diagnosed by Lymphoscintigraphy.

Case Report: A one-year-old male newborn was seen with edema in both lower limbs that had existed since birth, along with one episode of fever. His delivery was a normal vaginal delivery in a hospital, and everything went smoothly. His APGAR score shortly after birth was satisfactory. At the age of 7 months, he was identified as having protein energy malnutrition. He was referred to NINMAS for lymphoscintigraphy of both lower limbs. His vital signs were normal upon assessment. He had normal skin condition, bilateral pitting edema, and mild anemia. Examination of the heart, lungs, and abdomen revealed no other abnormalities. He

had no prior surgeries. From birth, he was active and playful. Studies such as CBC with ESR with Peripheral Blood Film, FT4, and TSH were normal. ICT for filaria was negative. Both lower limbs; Color Doppler scans revealed normal results. Positive familial history of limb edema was present. His lymphoscintigraphy of both lower extremities showed bilateral Grade IV lymphoedema.

Conclusion: Radionuclide lymphoscintigraphy and genetic testing can be used to diagnose Milroy disease. Lymphoscintigraphy is a safe and non-invasive imaging method that has no known side effects. It can determine the duration and severity of lymphedema. It is critical to diagnose the disease at an early stage in order to manage it effectively and avoid subsequent infections and complications.

8. Unexpected extraosseous uptake of ^{99m}Tc MDP in multiple organs during Bone Scan: A case report

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ABSTRACT

Introduction: Bone scintigraphy with 99m-Technetium methylene diphosphonate (^{99m}Tc-MDP) is usually performed for evaluation of skeletal abnormalities. Extraosseous accumulation of ^{99m}Tc-MDP on bone scan is uncommon. Here we report a case of a breast cancer with ^{99m}Tc-MDP uptake in both lungs, thyroid, myocardium and kidneys.

Case Report: A 27-year-old woman with carcinoma of right breast (operated), post chemotherapy (8 cycles) and radiotherapy stats and treated with oral Tamoxifen, was referred to for a ^{99m}Tc MDP bone scintigraphy due to severe bodyaches. She also had history of chronic kidney disease. She had elevated serum calcium level and CT proven right hilar lymphadenopathy, bilateral pleural effusions, and mild right lung fibrosis. Whole-body bone scan showed radiotracer accumulation in thyroid glands, both lungs, heart, and both kidneys. Additionally, the radiotracer concentrations in the joints of both shoulders were increased, which could be osteoarthritic changes. SPECT/CT were same findings.

Conclusions: Hypercalcemia caused by extensive metastases may explain intense extraosseous ^{99m}Tc MDP accumulation in multiple organs of Extraosseous radiotracer uptake during bone scan demands climicopathologic corretation.

Keywords: ^{99m}Tc-MDP, bone scan, extraosseous uptake, SPECT/CT.

9. Evaluation of Cellulitis over Right Temporomandibular region by 3-phase- bone scan: Report of a rare case

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ABSTRACT

Introduction: It is uncommon for the intracapsular and pericapsular regions of the temporomandibular joint (TMJ) to develop cellulitis. Clinically, cellulitis over the temporop-mandibular region typically manifests as fever, trismus, preauricular swelling, jaw pain and failure to articulate. This report describes a case of cellulitis over the temporomandibular region that was evaluated by 3-phase-bone scintigraphy at NINMAS.

Case Report: A 50-year-old patient with complaints of excruciating earache for six months was sent to NINMAS for a three-phase bone scan. He was experiencing pain on the right side of his face, which was followed by difficulty in swallowing. An anterior open bite with premature post-contact was discovered during a clinical evaluation. Spiral CT scan of the face showed both the mandibular condyles and the mandibular fossa are in normal alignment and joint space are normal at the TM joint. His three-phase bone scintigraphy revealed increase radiotracer concentration in the head-neck region's soft tissues on flow and blood pool images. Delayed images didn't show any further uptake in the same osseous structures. So the overall results pointed to right temporo-mandibular region cellulitis.

Conclusion: This case study demonstrates the value of three-phase bone scintigraphy as one of the key imaging modalities for identifying cellulitis of the temporo-mandibular region and assisting clinicians in initiating the effective management.

10. High Probability Reno Vascular Hypertension Detected by Captopril Renogram: A Case Report

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ABSTRACT

Introduction: Renovascular hypertension is a treatable type of secondary hypertension develops as a result of narrowing of the renal arteries. Renal angiography, a somewhat invasive procedure is the gold standard for diagnosis. In contrast, captopril renography is a well-researched, non- invasive method that has been used over three decades for diagnosing severe renovascular hypertension .This case report describes a child suffering from renovascular hypertension diagnosed by Captopril Renogram.

Case report: At Scintigraphy division of NINMAS, an 8-years-old girl who had high and uncontrolled blood pressure for a prolonged period of time (5years) was sent for Captopril Renogram test. Since diagnosis she was taking multiple (nine) anti-hypertensive medications. The renal ultrasound revealed hypoplastic right kidney with no evidence of renal arterial stenosis in duplex study. Her plasma renin levels is high. She was previously diagnosed a case of lupus nephritis with right sided hypoplastic kidney. Captopril renography was done following baseline study. Results showed non-visualized right kidney with markedly reduced percentage of tracer uptake, prolonged renogram curve, and markedly reduced GFR as compared to baseline renogram suggesting, a high probability of renovascular hypertension.

Conclusion: In our situation, renal angiography corroborated what the noninvasive captopril renography had suggested a high likelihood of renovascular hypertension. Captopril renography also accurately predicted the success of angioplasty and the restoration of normal blood pressure.

This instance adds credence to the theory that captopril renography is helpful in identifying children with hypertension due to renal artery stenosis, who might benefit from revascularization.

PROFFERED PAPER SESSION-4

1. Evaluation of High Specific Activity Fission 99Mo Adsorption Stability on Alumina Column

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ABSTRACT

The present study was conducted to evaluate the adsorption stability of high specific activity Fission 99Mo on alumina (Al_2O_3) column of the 99Mo/99mTc-Generator, which is the main workhorse in nuclear medicine sector. The experiment was carried out by using RIPD-TEC 99Mo/99mTccolumn (bed: 5.69 cm3). The chemically processed Na299MoO4 solution was loaded into the columns and was eluted with 10 mL 0.9% NaCl to obtain 99mTc up to 100 times during three weeks. The radioactivity of 99mTc, breakthrough of 99Mo and the effective dose rates of unshielded columns were measured. The 99mTc-eluate radioactivity (23 hr. elution) of first to ending was 4.995GBq to10.36MBq, while the breakthrough (99Mo) was 0.006% to 0.22% respectively. The detected radiation dose rates after loading day, 1stweek, 2nd week and 3rd week were 950µSv/hr, 640µSv/hr, 88µSv/hr and 12µSv/hr respectively at summit adsorbed points (upper 1-2 mm) of the columns. It was observed that the highest radiation dose rates were found in the upper 1-2 mm position of the column. Almost half of the maximum radiation dose was found in the next 2-3mm position of the column and they gradually decreased towards the bottom of the column. The positively polarized surface of the alumina has high attractive force to the 99MoO42-adsorbate. Therefore, the shifting of adsorbed 99Mo was nonappearance which has been demonstrated the high stability of alumina column and low probability of denature.

Keywords: Adsorption, radioactivity, effective radiation doses.

2. Synthesis and Quality Control of 11C-Methionine at National Institute of Nuclear Medicine and Allied Sciences (NINMAS)

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ABSTRACT

The most often used PET (Positron Emission Tomography) Radiopharmaceutical for Brain Tumor imaging and staging is ^{11}C-methionine. Due to its features, ^{11}C-methionine PET offers a high rate of brain tumor identification and effective lesion delineation. ^{11}C-methionine shows low uptake in normal brain tissue in comparison to other PET Radiopharmaceuticals, the resulting low physiological uptake allows a better identification and delineation of low to intermediate grade tumors. It also demonstrates higher sensitivity to imaging and staging of Multiple Myeloma.

^{11}C-methionine was synthesized via 11C methylation from L-cysteine thiolactone (3 mg) in a 400µL solution of 1:1 (v/v) 1 M NaOH and ethanol at ambient temperature. According to European Pharmacopoeia all Quality Control parameters were checked. Synthesized ^{11}C-Methionine was identified by recording the principal-peak at 511.5 keV and half-life of 20.28 minutes. The observed PH was 6.0. Radiochemical purity was determined by high performance liquid chromatography (HPLC) with radiometric detection by observation of a single peak in the chromatogram. The average content of ^{11}C-Methionine was higher than 99%. The Enantiomeric (L- and D-isomers) was identified by HPLC with UV and radiometric detectors. The observed percentage of L-^{11}C-Methionine was greater than 90%. In Residual solvents analysis, ethanol concentration was 14348.209and no tracers of acetone and acetonitrile were detected. The sterility and Bacterial Endotoxin test was passed. Synthesized ^{11}C-methionine maintains all the requirements of European Pharmacopoeia and it can be used for imaging and staging of Brain Tumor and Multiple Myeloma at NINMAS.

Keywords: Positron Emission Tomography, ^{11}C-methionine, L-cysteine thiolactone, Enantiomeric.

3. Reaction Mechanism Study of ^{18}F labeled 2-Fluoro- 2-deoxy-D-glucose, [^{18}F]FDG

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ABSTRACT

Production of 2-[^{18}F]Fluoro-2-deoxy-D-glucose, ([^{18}F]FDG) is more efficient and comparatively less costlier than other PET radiopharmaceuticals. The production of [^{18}F]FDG has been done by the reaction between mannose triflate and [^{18}F]F-, produced from Cyclotron. The reaction is occurred by a concerted mechanism. Cryptand [2.2.2] is used as a catalyst and since it is SN2 reaction, acetonitrile is used as polar aprotic solvent. Synthesis of [^{18}F]FDG from mannose triflate can be done by two pathways: electrophilic substitution reaction and nucleophilic substitution reaction. Nucleophilic fluorination produces better yield as well as take less time than electrophilic fluorination. Triflate is a good leaving group in the mannose triflate. Nucleophile [^{18}F]F- ion approaches the precursor, mannose triflate at 2-carbon position from the backside and leaving group triflate, leaves the mannose by the formation of [^{18}F]FDG through inversion of configuration. The reaction product, [^{18}F]FDG is optimized by Density Functional Theory (DFT) method using hybrid density functional Becke-3–Lee-Yang-Parr (B3LYP) and basis set 6-31g(d,p) in gaussian09 software. The energy & thermodynamic properties are calculated from the optimized structure. 2-fluro-deoxyglucose is accumulated much more in the living cells than 3-fluro-deoxyglucose and 4-fluro-deoxyglucose. Four columns (QMA, SCX, Alumina B and C18) have been used for the successful reaction and purified product.

Keywords: Mannose triflate, fluoride ion ([18F]F-), 2-[18F]Fluoro-2-deoxy-D-glucose, ([18F]FDG), nucleophilic substitution bimolecular (SN2).

4. Routine Production of [^{18}F]FDG at National Institute of Nuclear Medicine and Allied Sciences (NINMAS): Synthesis and Quality Control Protocols

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ABSTRACT

The most widely used radiopharmaceutical in the expanding medical imaging technology of Positron Emission Tomography (PET) is 2-deoxy-2-[^{18}F]fluoro-D-glucose [^{18}F]FDG. It is mainly used in the diagnosis and staging of various cancers. Because of its wide range of applications, the utilization of [18F]FDG has increased. This work will cover [^{18}F]FDG) synthesis and quality control procedures, followed at NINMAS. In NINMAS, [^{18}F]FDGwas being synthesized in Synthera® auto-synthesizer by nucleophilic fluorination reactionusing mannose triflate as precursor and Kryptofix. The quality control requirements of ^{18}F–FDG can be found in United States Pharmacopeia (USP), British Pharmacopeia (BP), European Pharmacopeia (EP) and the Chemistry, Manufacturing, and Controls (CMC) section from United States Food and Drug Administration (US FDA) PET draft guidance documents.Basic requirements include radionuclide identity, radiochemical purity, chemical purity, pH, residual solvent, sterility, and bacterial endotoxin level.We confirm the radionuclidic identity by both obtaining a gamma spectrum and measuring the half-life of the product. The radiochemical purity is also checked by TLC.Sterility, endotoxins and radiochemical purity can be finished after the [^{18}F]FDG has been released. [^{18}F]FDG produced in NINMAS facility provide high purity at higher input activity.The quality control protocols of produced [^{18}F]FDG follows specifications provided by United States Pharmacopeia. Synthesis time and yield are more or less similar in all produced batches.

Keywords: Positron Emission Tomography, 2-deoxy-2- [^{18}F] fluoro-D-glucose [^{18}F]FDG, Radionuclide identity, Radiochemical purity, Chemical purity, pH, Residual solvent, Sterility, Bacterial endotoxin.

5. Estimating production yield of Flearine-18 radioisotope with 18/9 MeV Cyclotron installed at NINMAS

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ABSTRACT

Cyclotrons have become the tool of choice for producing the short-lived, proton-rich radio-isotopes used in biomedical applications. 18F is the radioisotope of choice for many radiopharmaceuticals due to its glucose analogous and half-life of 110 min. ^{18}F[FDG] is being produced at NINMAS on a regular basis with the 18/9 MeV cyclotron. Depending on the requirements, 2500 to 4000mCi of ^{18}F radioisotope were being produced with a 40 to 50 micro amp beam current and 60-minute bombardment time by the nuclear reaction18O(p,n)^{18}F. This nuclear reaction occurs within a niobium conical target. Because of the variable production parameters, the production of ^{18}F varies. Parameters used in the production of 18F radioisotope are limited to physical factors such as target material, target volume, collimator, stripper foil, and ion source. More than 150 production batches were carried out successfully. Yield of 18F radioisotope from the 18O(p,n)^{18}F nuclear reaction were recorded at the end of bombardment and analyzed for beam current of 40 µA, 45 µA and 50 µA respectively.

Keywords: Cyclotron, FDG, enriched 18O, Nuclear Reaction.

6. Cyclotron based Production of 11C-Methionine (^{11}C-MET) and it's Prospective Use

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ABSTRACT

Introduction: A cyclotron is a sort of compact Particle accelerator that generates radionuclides with a short half-life, mostly suitable for diagnostic molecular imaging. ^{11}C-methionine (^{11}C-MET) is one of the most important radiopharmaceuticals, which is widely used in PET-CT neuroimaging to diagnose brain cancers. ^{11}C-MET has also been employed specifically for the identification of glioma in all stages due to reduced baseline absorption in healthy brain tissue compared to [^{18}F]FDG. The main problem of ^{11}C-MET PET imaging is the short physical half-life of C-11, approximately 20 minutes and the requirement of its on-site production.

Material and methods: The starting point of the production of ^{11}C labeled radiopharmaceuticals is the 14N(p,α)^{11}C nuclear reaction using an on-site cyclotron. The [^{11}C]CO2 produced in a cyclotron, will be trapped in the molecular sieve of the synthesis module unit to a temperature of 250°C for 90 seconds while purging the sieves with a nitrogen gas flow of 15 ml/min.. One of the radio-synthetic route of 11C-MET is to reduce [^{11}C]CO2 to methanol with LiAlH4 in a tetrahydrofuran (THF) environment and addition of 57% hydriodic acid solution to react with [^{11}C]MeOH to form [^{11}C]-CH3I.

Conclusion: Inclusion of more onsite cyclotron facility and production ^{11}C labeled radiopharmaceuticals, especially ^{11}C-MET will ensure effective brain tumor diagnosis in our country.

Keywords: [^{11}C]-Methionine, Brain tumors, Positron Emission Tomography (PET)-Computed Tomography CT), Cyclotron.

7. C-11 radioisotope production via the 13N(p,a) ^{11}C nuclear reactionwith "Cyclone 18/9 MeV IBA Cyclotron" installed at NINMAS

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ABSTRACT

^{11}C is a radioactive PET Isotope used widely in medical imaging to diagnose various conditions such as cancer, heart disease, and neurological disorders. Carbon-11 is generally produced with a cyclotron by proton bombardment of nitrogen gas according to the 14N(p,α)^{11}C nuclear reaction.

With the 18/9 MeV Cyclotron, NINMAS successfully produced four batches of C-11 in four separate occasions, on 27 and 28 September 2022, and on 01 and 02 February 2023. The production process involved irradiating a target with a 20 μA current, followed by the extraction of 11C and measurement of its activity.

The production of ^{11}C was successful in each time with high extraction ratios. The irradiation time and target actual activity were also measured. After synthesis, the activity of the produced 11C radiotracer, especially 11C-Methionine, was measured and compared to the target actual activity.

Keywords: C-11 PET Radionuclide, ^{11}C-Methionine, Cyclotron, Beam Current.