

## PLENARY SESSION-I \_\_\_\_\_

### 1. Practicing Pediatric Nuclear Medicine; Thinking out of the Box

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Over the past fifteen years, pediatric nuclear medicine has been practicing differently from the general nuclear medicine or adult nuclear medicine. Practice of pediatric nuclear medicine includes premature infants to adolescents and young adult patients with wide range of level of development. Practicing pediatric nuclear medicine has some important technical aspects e.g. immobilization, individualized imaging methodology, dosimetry and instrumentation. These are well accepted and being practiced. Anxiety, fear, apprehensions, limited ability to understand or follow instruction leads to limited cooperation and limits the procedure, sometimes incomplete study or diagnostic error. Besides the technical aspects, satisfying the patients and their parents often remains to be a major challenge.

Children differ from adults in more than just size. They are special groups and need special care and attention with dedicated procedures. Nuclear medicine imaging often requires relatively long period and the patient needs to remain still or immobilized. Understanding and managing pediatric patients, development of child friendly environment, age appropriate distraction techniques or video clip can reduce the fear or anxiety of the patients and parents. Use of modern and versatile equipments, trained pediatric nuclear medicine staffs, auxiliary

services like sedation or anesthesia and multifaceted team approaches can help to achieve better quality images.

The apex referral of nuclear medicine is NINMAS in Bangladesh, which has long history of practicing pediatric nuclear medicine and providing services more than 36% pediatric patients. IAEA assisted regional projects have developed new insights of practicing pediatric nuclear medicine at NINMAS. Little intervention with innovative ideas or distraction techniques in pediatric patient imaging has increased the better imaging results and patient satisfaction without use of sedation.

### 2. Nuclear Medicine Education in Bangladesh

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The history of modern Nuclear Medicine is considered for last 75 years only but the actual history may be of 2400 years old! Credit of early nuclear medicine may be given to two ancient Greek philosophers, Democritus and Hippocrates who lived between 460 and 370 BC. Democritus gave the theories that led the discovery of radioactivity and Hippocrates formulated the basics of practicing medicine according to rules and ethics. The fusion of these two theories may be the first step of nuclear medicine specialty.

In Bangladesh the first Nuclear Medicine Center was established in 1961. Initially the people were either trained abroad or self educated. The Institute of Nuclear Medicine (INM) was established in 1978 which was affiliated to the University of Dhaka and the first formal course of Nuclear Medicine, a one year diploma called 'Diploma in Nuclear Medicine (DNM)' was started in 1987 under the leadership of

Prof. Kamaluddin Ahmed, then Director of INM. With the introduction of DNM the doctors either working or interested in Nuclear Medicine got a platform of formal Nuclear Medicine education at home.

The DNM course was upgraded to a two years master's course called M. Phil (Nuclear Medicine) in 1998. Prof. M. A. Karim and Prof. Fauzia Moslem were the main initiators while the present author gave the all secretarial and other supports. In the year of 2001 the course was further upgraded to MD (Nuclear Medicine) which was a five years course. Unfortunately due to the policy of the then government only one batch of student could complete that MD course. The course was back to M Phil and the students continued the two years course under Dhaka University and later under Bangabandhu Sheikh Mujib Medical University (BSMMU).

The two years course in Nuclear Medicine was felt insufficient in comparison to the course & curriculums of the other countries and rapid development of Nuclear Medicine especially in the field of oncology and therapy. So we were trying to cover the scope of Nuclear Medicine more vividly with a complete background of medicine. With that idea a new course & curriculum of 5 years residency program leading to a degree of MD (Nuclear Medicine) was proposed to the BSMMU which was passed in November 2016. The first batch of MD (Nuclear Medicine) residency program consisting of 10 local and 1 foreign students were admitted in NINMAS in March 2017. The second batch who qualified the combined PG Entrance examination will start their classes in next month.

With the introduction of MD (Nuclear Medicine) residency program now our students are getting world class education at home. This may be mentioned here that all three degrees of DNM, M.Phil and MD are recognized by Bangladesh Medical and Dental Council (BMDC).

Besides formal education, the different nuclear medicine institutes and Society of Nuclear Medicine, Bangladesh (SNMB) organizes different seminars, symposiums, training programs and continued medical education program throughout the year. Some of these educational programs are attended by renowned faculties from other parts of the world.

Bangladesh Journal of Nuclear Medicine is a regular journal published by SNMB where our physicians and scientists can publish their research works. They also present papers in different international seminars regularly and publish them in international journals. Our Nuclear Medicine members are actively involved with educational & research programs of IAEA, AFNMB, ASNM, WARMTH, WFNMB and other related organizations.

Nuclear Medicine is rapidly increasing in Bangladesh. Presently more than 22 centers are giving services in different corners of the country. Many of them are in upgrading phases and at least 8 more centers are in pipeline in the government sector. It is expected that some more private centers will also come up especially with PET-CT.

Presently we have acute shortage of manpower in the nuclear medicine centers. It is anxious that the crisis will be more in coming years. We need more trained nuclear medicine manpower as well as proper utilization of them who are sitting idle or misplaced due to existing policy of the government.

For promotion and development of nuclear medicine practice and scientific activities in developing countries of Asian region, a new organization 'Asian Regional Cooperative Council for Nuclear Medicine' (ARCCNM) was formed in February 2001. The newly formed council felt the necessity of educational activities for promotion of nuclear medicine in the region and a school named 'Asian School of Nuclear Medicine' (ASNM) was founded in February 2003 in

Dhaka. The school has already got recognized by the WFNMB, IAEA, ESNM and other nuclear medicine bodies. Now ASNM has three permanent campuses in Shanghai, Osaka and Seoul. The school is offering different educational programs including fellowship exam under the Asian Board of Nuclear Medicine. Some of Bangladesh Nuclear Medicine physicians have already availed those programs and now proud fellows of the board.

Education is a continuous process. Now we have ample facilities of nuclear medicine education in Bangladesh. E-learning or webinar is the latest opportunities. We should try our best to avail those.

### **3. Radioiodine-Refractory Differentiated Thyroid Cancer, Management**

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About 95% of all thyroid cancers are differentiated thyroid cancer, which is usually treated with surgery in the first instance, followed by ablation of the thyroid remnant with radioiodine (RAI). Radioiodine refractory thyroid cancer is an uncommon entity, occurring with an estimated incidence of 4-5 cases/year/million people. RAI refractoriness is more frequent in older patients, in those with large metastases, in poorly differentiated thyroid cancer, and in those tumors with high 18-fluorodeoxyglucose uptake on PET/CT. These patients have a 10-years survival rate of less than 10%.

Treatment of those patients is a challenge. Regarding treatment option it is recommended that once <sup>131</sup>I treatment is terminated, L-thyroxine treatment is maintained to suppress TSH secretion and focal treatment

of metastases is performed whenever needed. This may include surgery, external radiation beam therapy, and thermo-ablation (radiofrequency or cryo-ablation and ethanol injection). Also, because bone metastases may induce skeletal related events at short term interval (11), bisphosphonate or denosumab treatment may be effective in patients with bone metastases.

Periodic active surveillance by US, FDG-PET/CT scan or a CT scan of the neck, chest, abdomen and pelvis with contrast is advocated in those cases; follow up interval may be extended up to one year depending on patient's disease progression. Most of the patients with refractory advanced disease have an aggressive course and a life expectancy of 3-6 years after the diagnosis of distant metastases. However, metastatic DTC can be asymptotically stable for long periods of time, in particular in young patients with small lung metastases from a well differentiated papillary or follicular carcinoma and in such patients the benefits of novel therapies may be largely outweighed by drug toxicities. In recent years, FDA approved new therapeutic novel agents with molecular targets have become available, with tyrosine kinase inhibitors (TKIs) being the most investigated drugs. Two of these compounds, sorafenib and lenvatinib, have shown significant expected response rates and have significantly improved the progression-free survival in the two largest published prospective trials on TKI use. However, no overall survival benefit has been achieved yet. This is probably related to the crossover that occurs in most patients who progress on placebo treatment to the open treatment of these studies. In consequence, the challenge is to correctly identify which patients will benefit from these treatments. It is also crucial to understand the appropriate timing to initiate TKI. Sorafenib and lenvatinib are very costly and associated with side effects. Chinese scientist successfully recently evaluated TKI; apatinib, which shows promising result in 90% cases both in efficacy and side effect, its cost will be also less. It is hoped that this novel drugs will be available in our country very soon with best results, especially for poor patients.

## PLENARY SESSION-II \_\_\_\_\_

### 2. Nuclear Imaging in Cardiac Amyloidosis

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Amyloidosis is a heterogeneous group of diseases characterized by localized or systemic deposition of insoluble extracellular fibrillary proteins in organs and tissues

Several types of amyloid can infiltrate the heart resulting in a restrictive cardiomyopathy, heart failure, and atrial and ventricular arrhythmias. The majority of individuals with cardiac amyloidosis have myocardial deposits formed from misfolded light chain (AL) or transthyretin (TTR) proteins. Diagnosis of amyloidosis and differentiation between the types is important for prognosis, therapy, and genetic counseling. Cardiac TTR amyloidosis, is an under-diagnosed cause of heart failure. Amyloid derived from wild-type TTR results in a restrictive cardiomyopathy, most commonly presenting in men in their early 70's onwards, but occasionally seen as young as age 60. Although almost 1 in 4 males > 80 years have some TTR-derived amyloid deposits at autopsy, the clinical significance of a mild degree of deposition is unknown--generally clinical manifestations of heart failure occur once

enough amyloid has been deposited to cause LV wall thickening.

Cardiac amyloidosis should be suspected in individuals with heart failure and thickened ventricles with grade 2 or greater diastolic dysfunction on echocardiography or typical findings on cardiac magnetic resonance imaging (CMR; diffuse late gadolinium enhancement, ECV expansion or characteristic T-1 relaxation times); diagnosis is confirmed by endomyocardial biopsy and typing of amyloid fibrils as needed.

Scintigraphy is a noninvasive method that may facilitate early diagnosis, distinguish various forms of cardiac amyloid, and may be useful in following disease burden. The amyloid-specific tracers presented in this talk have been used with planar imaging and/or single-photon emission computed tomography. To date, there are no approved cardiac amyloid tracers although investigational tracers are currently under examination. Several studies confirm the high sensitivity and specificity of <sup>99m</sup>Tc-bone compound scintigraphy (DPD or PYP) for cardiac ATTR amyloidosis; recent studies highlight the value of DPD and/or PYP in differentiating cardiac ATTR from AL amyloidosis. A distinct advantage of <sup>99m</sup>Tc-PYP imaging, even when echocardiography and CMR are diagnostic for cardiac amyloidosis, is its ability to specifically identify ATTR cardiac amyloidosis non-invasively and thereby guide patient management.

## PROFFERED ORAL PRESENTATION

### 1. Assessment of Agreement between Pretest Probability Score and Summed Stress Score of Myocardial Perfusion Imaging in Coronary Artery Disease

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#### ABSTRACT

**Objective:** Cardiovascular diseases are considered an important cause of mortality & morbidity in many developing countries including Bangladesh. The first step in evaluating a patient with CAD is the clinical assessment of pretest probability. American Heart Association/ American College of Cardiology (AHA/ACC) guidelines recommend the use of Diamond and Forrester Method (DFM) or Duke Clinical Score (DCS) for calculating Pretest Probability Score (PPS). Myocardial Perfusion study (MPI) can calculate the Summed Stress Score (SSS), an index obtained by adding the individual scores derived from the 17 segments. This study was performed to assess the agreement between the established PPS with SSS so that it can help in risk stratification.

**Patients and Methods:** This cross-sectional observational study was carried out in National Institute of Nuclear Medicine & Allied Science (NINMAS), BSMMU from July 2016 to June 2017. A

total of 89 suspected or known CAD patients were included in this study. PPS was calculated by Duke clinical scoring from brief clinical history. SSS was calculated by nuclear medicine software while performing Myocardial Perfusion Imaging (MPI). Statistical analyses were carried out by using the IBM Statistical Package for Social Sciences (SPSS) version 20.0.0 (IBM Corporation Software Group Somers, NY). Pearson correlation and Bland & Altman analyses were applied for assessing correlation and agreement between PPS and SSS. Degree of relation between variables is expressed by 'r' (Pearson's correlation coefficient).

**Results:** The mean of PPS was found  $14.73 \pm 3.35$  and that of SSS was found  $16 \pm 14.01$ . A positive correlation ( $r=0.108$ ;  $p=0.312$ ) between PPS and SSS. With Bland and Altman analysis, it was observed that mean difference of PPS and SSS was  $-1.27 \pm 14.045$ . The limit of agreement ranged from  $-28.798$  to  $26.259$ . There was a positive correlation between PPS and SSS. Mean difference between the two scores was small. The bias between the scores was not significant. The differences within mean  $\pm 1.96$  SD were not statistically significant.

**Conclusion:** This study shows PPS and SSS can be used interchangeably. This analysis of agreement between PPS and SSS can further enhance prediction of CAD and upgrade the utilization of SSS for risk stratification in CAD patients, which will influence therapeutic management of the patients and play a major role to reduce cardiovascular mortality and morbidity.

**Keywords:** Pretest Probability Score, Summed Stress Score, Myocardial Perfusion Imaging, Coronary Artery Disease.

## **2. Evaluation of Recurrent Thyroid Carcinoma by High Resolution Ultrasonography where $^{131}\text{I}$ -Whole Body Scan is Negative and Normal Thyroglobulin (Tg) Level**

**Shankar Kumar Biswas, Fatema Sultana Haque, Farhana Rahman, Mazharul Islam and Sanowar Hossain**

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### **ABSTRACT**

**Objective:** Total thyroidectomy followed by radioiodine therapy (RIT) and life long hormone replacement is the routine protocol of differentiated thyroid cancer management. During follow up usually we consider serum thyroglobulin (Tg) and whole body scan (WBS) with  $^{131}\text{I}$ . This study was designed to unravel the impact of ultrasonography in patients with recurrent thyroid cancer where WBS was negative and normal Tg level.

**Patients and Methods:** We enrolled ten patients (Age:  $36 \pm 13$  Yrs; Female: 9) who were attended to Institute of Nuclear Medicine & Allied Sciences (INMAS), Dhaka for routine follow up. All patients were sent for further management after total thyroidectomy. Thyroid scan with  $^{99\text{m}}\text{Tc}$  and other relevant laboratory tests were performed initially. RIT was given according to our institutional protocol. During follow up at certain intervals WBS with 4 mCi  $^{131}\text{I}$  and Tg level were evaluated. Along with these, neck palpation and high resolution ultrasound were done routinely for specific features of metastasis (i.e loss of hilar fat, rounded shape & micro calcification).

**Results:** All of them got differentiated papillary thyroid carcinoma. Two patients needed revision surgery for removing residual tissue. Lymphovascular invasion was present in 4 patients and substantially they needed radical neck dissection. Four patients needed nodal dissection for the 2nd time. Six patients

took 150 mCi radioiodine, one patient 75 mCi, one patient 50 mCi, and remaining one patient underwent operation abroad and took only 30 mCi. Six patients needed radioiodine ablation for the 2nd time. Tg level at the time of recurrent disease was  $6.5 \pm 3.85$  ng/ml (Ref. normal in INMAS: 6.45-20.27 ng/ml) and all of them showed normal findings in WBS.

**Conclusions:** During routine check up not only Tg & WBS, neck palpation and high resolution ultrasound played pivotal role for evaluating nodal metastasis where WBS and Tg level were unfavorable. This work may open new research window.

**Key Words:** Papillary carcinoma thyroid, Thyroglobulin, Whole body scan & High resolution ultrasonogram.

## **3. DTPA Renogram, A Very Useful Method to Detect Functional Status of Sonographically Detected Hydronephrotic and Non-hydronephrotic Individual Kidneys**

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### **ABSTRACT**

**Objective:** Abnormal accumulation of fluid in renal pelvicalyceal system is known as hydronephrosis either due to true or functional ureteric obstruction. Ultrasound is very useful modality to detect hydronephrosis either mild, moderate or marked. But renal parenchymal functional status of hydronephrotic kidney cannot be detected by Ultrasonography. IVU is a commonly used modality in our country for sonographically detected hydronephrotic kidney for further details i.e. site of obstruction and excretory anatomy; which is costly and hazardous. IVU can tell predominantly about renal excretory pathway but cannot detect the split function of the hydronephrotic

kidney. DTPA renogram can be a useful modality by which we can easily detect the true or functional obstruction of renal excretory pathway along with split function of individual kidney. To see the parenchyma functional status of different types of sonographically detected hydronephrotic and non-hydronephrotic kidneys.

**Patients and methods:** This retrospective study was done at Institute of Nuclear Medicine & Allied Sciences (INMAS) Rajshahi in the period of January to December 2015. A total 63 patients of unilateral (Rt /Lt) hydronephrosis were included with Male: Female ratio was 2:1 and age range from 2-65 yrs. All of the patients came to our institute for DTPA renogram and maximum after IVU. Before renogram we have done ultra-sonogram to detect the hydronephrotic and non-hydronephrotic kidneys. Before starting of renogram all the patients were properly hydrated and adequately void urine. We had used diuretic injection usually after 10 minutes of starting of renogram.

**Results:** Among 63 Left kidneys; 17 were non-hydronephrotic and rest 46 were hydronephrotic. Mean Split function of non-hydronephrotic kidneys were  $62.8 \pm 24.3$  SD, 29 mild hydronephrotic kidneys were  $46.2 \pm 14.9$  SD, 5 moderate hydronephrotic kidneys were  $22.2 \pm 19.5$  SD and split function of 12 markedly hydronephrotic kidneys were  $20.4 \pm 16.3$  SD. Among 63 right kidneys; 31 were non-hydronephrotic and rest 32 were hydronephrotic. Mean split function of 31 non-hydronephrotic right kidneys were  $68.5 \pm 18.7$  SD, 21 mild hydronephrotic kidneys were  $47.0 \pm 16.4$  SD, 3 moderate hydronephrotic kidneys showed  $41.4 \pm 14.1$  SD and 8 marked hydronephrotic kidneys had  $9.0 \pm 3.8$  SD. Among 46 left hydronephrotic kidneys 22 were parenchymal insufficiency of which 7 were in mild, 5 in moderate and 10 in markedly hydronephrotic kidneys. Among 32 right hydronephrotic kidneys only 10 were renal parenchymal insufficiency of

which 1 was in mild, 2 in moderate and 7 were in markedly hydronephrotic kidneys. Though hydronephrosis along with renal parenchymal insufficiency is more in left side but non-functioning kidneys are more on right side.

**Conclusion:** Unilateral hydronephrosis is a common sonographic finding. DTPA renogram can easily detect true or functional renal outflow obstruction as well as parenchymal functional status of the hydronephrotic kidney. So, DTPA renogram should be done before IVU which can reduce unnecessary IVU hazard and risk for the patients with functional renal outflow obstruction as renogram is more informative. IVU should be done only those patients who have true outflow obstruction to locate the obstruction level.

#### **4. Shielding Design of PET/CT Facility Installed in Nuclear Medical Physics Institute, Bangladesh**

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Abstract High resolution (4 mm) of PET/CT from Philips of model Ingenuity with timing resolution and coincidence window are 600 ps and 5 ns respectively is newly installed in Nuclear Medical Physics Institute. 128 slice CT component incorporated with PET, give comparatively lower dose than the 0.511 MeV annihilation photons associated with positron decay from PET scan. So, for designing shielding in our PET/CT facility, only 0.511 MeV annihilation photons energy has been considered. In this paper, AAPM Task group 108 (American Associations of

Physicists in Medicine) analysis for PET and PET/CT shielding requirements is used for our PET/CT facility shielding design. From theoretical calculation as shielding requirement, 1.1 cm Pb thickness or, 13 cm concrete thickness are found. Practically, all walls and ceiling are 30.48 cm (1 foot) thick made of concrete with density 2.35 g cm<sup>-3</sup> for more safety. This paper reveals what measures have been taken to protect the environment and occupational workers from PET/CT radiation hazard.

## 5. Evaluation of Transient Ischemic Dilation (TID) Ratio in gated SPECT Myocardial Perfusion Imaging (MPI) with Pharmacological Stress Agents

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### ABSTRACT

**Objective:** Transient ischemic dilation (TID) refers to an apparent increase in the size of the left ventricular cavity on stress myocardial perfusion imaging compared to rest imaging. This study was performed to correlate the role of TID ratio in gated SPECT MPI in Coronary Artery Disease (CAD).

**Patients and Methods:** Seventy four suspected or known CAD patients underwent MPI performed with Tc-99m sestamibi. Single day stress - rest protocol with pharmacological stress was followed, according

to established practicing protocol of NINMAS. A statistical analysis was carried out by using the Statistical Package for Social Sciences version 20.0 for Windows (SPSS Inc., Chicago, Illinois, USA). Student t-test was used for continuous variables. Chi-square test used to compare categorical data. P values <0.05 was considered as statistically significant.

**Results:** A total number of 74 patients, of which 63 (85.1%) male and 11 (14.9%) female were studied. The mean age found to be 53.8±10.5 years and. Majority (90.5%) patients had hypertension, 45(60.8%) had diabetic mellitus and 39(52.7%) had dyslipidemia in blood lipid profile, 44(59.5%) were past smoker. The mean ejection fraction was 44.6±14.6 percent.

The mean abnormal TID ratio was 1.25 ± 0.35 in patients having abnormal MPI findings and 1.03±0.21 in having normal MPI findings. The difference was statistically significant (p<0.05) between two groups. Among the patients with TID ratio >1.19, 24(64.9%) patients were in MVD group and 13(92.9%) were in SVD group. And among the patients with TID ratio <1.19, 13(35.1%) were in MVD group and 1(7.1%) were in SVD group. The difference was statistically significant (P<0.05) between two groups. The mean TID ratio was 1.08±0.21 in single vessel disease and 1.24±0.26 in multiple vessel disease. The difference was statistically significant (p<0.05) between two groups.

**Conclusion:** This study suggests that the TID ratios could provide incremental diagnostic information to standard myocardial perfusion analysis for the identification of severe and extensive disease in patients with suspected or known CAD.



## 6. Clinico-pathological Features and Treatment Outcomes of Differentiated Thyroid Carcinoma (DTC) in a Tertiary Level Health Care Center of Bangladesh

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### ABSTRACT

**Objective:** This study evaluates clinico-pathological features and treatment outcomes of differentiated thyroid carcinoma affected patients who had attended Rajshahi Medical College Hospital as well as private clinics and then Institute of Nuclear Medicine & Allied Sciences, Rajshahi for primary surgical management and post-operative radioiodine ablation therapy respectively.

**Patients and methods:** Clinico-pathological features and treatment outcomes of 254 patients of histologically proved differentiated thyroid carcinoma (DTC) were recorded from their ultrasonography report, pre-operative cytology, operation note, post-operative histopathology and radioiodine ablation therapy related follow-up book between 2011 and 2015 and analyzed using statistical software IBM SPSS v. 16.

**Results:** Among the sample (n=254), 211 (83 %) were female and 43 (17 %) were male. Mean ( $\pm$  SD) age was 36 ( $\pm$  11) years. Regarding the USG findings of thyroid gland, 187 (74 %) had unilateral nodule and 67 (24 %) had bilateral nodules. And, in relation to

FNAC findings of thyroid nodules among this study sample (n=254), 223 (88%) had malignant cytology, 16 (6%) had borderline cytology and 15 (6%) had benign cytology. Regarding the histopathological findings of thyroid nodules, 241 (95 %) had papillary carcinoma and 13 (5 %) had follicular carcinoma. In relation to surgical management, 185 (73%) had undergone total thyroidectomy with central clearance, 48 (19%) had undergone total thyroidectomy with selective neck dissection, 13 (5%) had undergone completion thyroidectomy and 8 (3%) had undergone total thyroidectomy with modified radical neck dissection. Regarding radioiodine ablation dose, 198 (78%) had been given 138 millicurie (5.1 gigabecquerel) and 56 (22%) had been given 178 millicurie (6.6 gigabecquerel). And, in relation to treatment outcome from 2011 to 2016 among the sample (n=254), 26 (10%) were treated in 2011 and had recurred once (in 2014), 49 (20%) were treated in 2012 and had recurred twice (once in 2015 and once in 2016), 46 (18%) were treated in 2013 and had recurred twice in 2016, 49 (19%) were treated in 2014 and had recurred once in 2016 and 84 (33%) were treated in 2015 and had no recurrence upto 2016.

**Conclusion:** Apart from three major health problems namely coronary artery disease, diabetes and geriatric diseases; cancer ranked fourth worldwide. And, among cancer related diseases, thyroid cancer is the fourth most prevalent condition especially in women. Therefore, early and successful management of differentiated thyroid cancer related conditions is needed to follow widely and equitably so that mortality and morbidity related to these conditions can be reduced significantly. Through the findings of this study, such well-established management protocol has been highlighted at this tertiary level at Rajshahi, Bangladesh. However, large-scale relevant studies are required to evaluate ongoing management protocol in order to attain world-level standard.

**Key words:** Differentiated thyroid carcinoma (DTC), Clinico-pathological features, Treatment outcomes.

## 7. Genetic Mutation Analysis in Patients with Congenital Hypothyroidism Attending BSMMU Hospital

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### ABSTRACT

**Objective:** Congenital hypothyroidism (CH) is one of the commonest inborn endocrine disorders in Bangladesh. Genetic involvement behind this disease is vast and complex. Genetic mutation is one of the major causes of CH which can lead to absent, hypoplastic or ectopic thyroid gland, or can cause defect in the hormone synthesis pathway. The genes associated with congenital hypothyroidism are classified into two main groups: those involved with thyroid gland dysgenesis and those with dyshormonogenesis. The purpose of this study is genetic mutation analysis in terms of mutation in different genes in already diagnosed patients with CH who are attending BSMMU hospital.

**Materials and Methods:** This cross-sectional study, carried out in National Institute of Nuclear Medicine & Allied Sciences (NINMAS) from July 2016 to June 2017. A total of 27 diagnosed patients with CH from 24 unrelated families were included. All laboratory procedures were conducted in Institute for Developing Science and Health Initiatives (ideSHi). Blood samples were used for DNA extraction. Conventional PCR was done for DNA amplification.

Direct sequencing of specific regions of PCR products was done using BigDye Chain Terminator version 3.1 Cycle Sequencing Kit (Applied Biosystems, USA) and ABI PRISM 310 automated sequencer (Applied Biosystems, USA). BLAST was used for mutation analysis and data were presented as numbers and percentage.

**Results:** Out of total 27 patients, eight had dysgenesis and 19 had dyshormonogenesis. A total of four TPO gene mutations namely, 1117G >T, 1193G>C, 2145C>T and 2173A>C were found to involve with dyshormonogenesis. Among the four mutations, 1117G >T and 1193G>C were in exon 8 and they resulted in change in amino acid at protein position 373 (Ala>Ser) and 398 (Ser>Thr). Other two mutations namely, 2145C>T and 2173A>C were found in exon 12. Substitution mutation 2145C>T did not change the amino acid proline to another amino acid at position 715. The substitution 2173A>C resulted in 725Thr>Pro. In TSHR gene, all three mutations namely, 2181G>C, 2161G>C and 1523C>T were found in exon 10. These mutations eventually lead to change in the primary amino acid sequence in TSHR peptides. The amino acid substitutions that occurred in TSHR protein were: 727Glu>Asp, 721Val>Leu and 508Leu>Ser, respectively. Exon 3 of PAX8 gene was analyzed and no mutation was found.

**Conclusion:** CH, being the most common inborn endocrine disorder, and also having a higher prevalence in Bangladesh; it requires more genetic analysis and evaluation for better understanding of the disease. Genetic analysis like this study will help to evaluate the factors responsible for developing CH which can lead us to better management or preventive measures in future.

## 8. Application of easy Z-score Imaging System (e-ZIS) in Brain Perfusion SPECT as an Adjunct to Diagnose the Neurodegenerative Diseases.

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### ABSTRACT

**Objectives:** Decreased regional cerebral blood flow (rCBF) in different area of cerebral cortex on brain perfusion SPECT images had long been a qualitative identifier of neurodegenerative disorders. The e-ZIS allows computer-assisted statistical analysis of brain perfusion SPECT images. We evaluated the diagnostic value of brain perfusion SPECT using eZIS in patients with various neurodegenerative diseases.

### Patients and Methods:

This retrospective study was conducted in National Institute of Nuclear Medicine and Allied Sciences (NINMAS). Patients who underwent brain perfusion SPECT with clinical likelihood of having neurodegenerative disorders using 99m Tc- ethyl cysteinate dimer (ECD) from February to December 2017 were included in this study. For the quantification of perfusion deficit, e-ZIS version 3 (Mastuda et al.) was used.

**Results:** Brain perfusion SPECT was performed on 30 patients. Decreased rCBF was observed in the posterior cingulate cortex, precuneus and parietal cortex in 12, suggesting Alzheimer's disease (AD). Decreased rCBF in the frontal gyrus and insula were seen in two, suggesting fronto temporal dementia (FTD). Decreased rCBF in the occipital lobe, precuneus gyrus and posterior cingulate cortex was seen in four, consistent with dementia with lewy bodies (DLB). Normal brain perfusion SPECT was seen in two. Personal communication with clinicians revealed that the scan results played pivotal role in initiating appropriate pharmacotherapy.

**Conclusions:** The rCBF pattern observed using e-ZIS is disease specific and a newly available modality to clinicians in major institutes of Nuclear Medicine, Bangladesh to aid initiation of appropriate management of dementia.