	Dose rate (microSv/h) during		
	Calibration	Perfusion	
Position	Mean	Mean	Range
Surgeon on the right side	0.6	3.8	2.5-4.4
Over the perfusion circuit	0.3	11.2	7.4-17.5
Perfusionist (120cm from P-C)	0.1	0.8	0.5-1.1
80 cm from patient's feed	0.1	0.5	0.3-0.6
Instrumentist on the left side	0.1	1.7	0.5-3.5
Surgeon on the left side	0.3	1.7	0.6-3.7
Rest position of the instrumentist (90cm from bed)	0.2	0.6	0.4-1.1
Nuclear medicine physician (140cm from patient's hip)	0.1	0.4	0.2-0.7
Head of the patient	0.6	1.2	0.6-3.7
Anaesthesia instruments area (50cm from patient's head)	0.1	0.3	0.1-0.6
Anaesthetist (90cm from patient's head)	0.1	0.1	0.0-0.1

Conclusion: The highest occupational radiation levels were found at the surgeon's working place. In the worst scenario (5 hours of occupational factor), the dose received would be 22 microSv/procedure. Therefore, considering the public dose limit of 1 mSv/year and the number of treatments carried out in our institution (15/year), surgical staff involved in ILP treatments do not require the classification of "exposed workers".

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Assessment of neutron spectra produced by a cyclotron using bubble detectors

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Aim Neutrons are the most important radiation emission around non self-shielded cyclotrons. However, relatively few data on the measured spectral distribution of neutrons have been published, due to either the relatively complexity and cost of portable electronic spectrometers or the time consuming procedures need by indirect methods. We investigate the neutron spectra produce in the reactions $^{18}O(p,n)^{18}F$, $^{14}N(p,\alpha)^{11}C$ and $^{16}O(p,\alpha)^{13}N$, and on the cyclotron collimation system, using a relatively easy to use and inexpensive bubble detector spectrometer. Materials and methods The spectrometer we used consist of a set of 6 bubble detectors (BDS, BTI Bubble Technology Industries), with different energy threshold (10, 100, 600,1000, 2500, 10000 keV). The BDS provide instant visible detection and measurement of neutron dose. Inside the detector, tiny droplets of superheated halocarbour are dispersed throughout a clear polymer. The interaction between neutrons and polymer nucleus produce the droplet's vaporization forming a visible gas bubble trapped in the polymer. The number of droplets provides a direct measurement of the tissue-equivalent neutron dose. A standard unfolding allows evaluation of the neutron fluence (neutrons/cm2) in each energy interval. After exposure, the spectrometers can be re-used through recompression in a pressure chamber. Thick water target were irradiated for the $^{18}O(p,n)^{18}F$ and $^{16}O(p,\alpha)^{13}N$ reactions, while a thick gas target was used in the case of $^{14}N(p,\alpha)^{11}C$. The collimation system elements are made in Tantalum and special irradiation were performed, in order to drive the beam to hit only a collimator and not a target. To increase the statistical accuracy, for each reaction studied, the set of dosimeters was exposed 3 times; irradiation time was optimized for each nuclear reaction in order to get an optimal number of bubbles in each dosimeter, avoiding saturation. Results According to nuclear evaporation theory, measured spectra can be fitted by a maxwellian distribution function, $N_v(E) = A \cdot E \cdot \exp(-(E/k \cdot t)$. In particular, for $^{18}O(p,n)^{18}F$, we obtained a nuclear temperature of approximately 1.5 MeV and a neutron fluence about 5 times higher than in the others reactions. For the Tantalum collimator, the great majority of the neutrons emitted was in the energy bin 1.0 - 2.5 MeV, and the temperature parameter resulted 0.9 MeV. In conclusion, bubble detectors are relatively inexpensive, easy to use and proved to be useful in detection of neutrons around a biomedical cyclotron. A spectrometer based on these detectors makes possible sufficiently accurate field measurement of neutron spectra, providing relevant data for planning of new facilities.

1801 – Wednesday, October 14, 2008, 12:00 - 13:00, Hall 1

Plenary 4: Highlights Lecture

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Highlights of EANM'08

O. Schober (GE)

TECHNOLOGISTS ORAL PRESENTATIONS

T1 - Sunday, October 12, 2008, 11:30 - 13:00, Hall 14c

Technologists Oral Session 1

T01

Reducing patient movement on a SPECT camera dedicated to cardiac imaging

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In the past 12 months there have come to the Nuclear Medicine market a number of small gamma cameras dedicated to performing myocardial perfusion imaging. One of these machines the Siemens C-cam images the patient in a semi-reclining position (with a 20^o incline) using a chair and not on a horizontal couch. It was noted that whilst this position helped to reduce the gut activity seen in the image during acquisition there was more patient movement seen on the images than was typically seen when the patient was imaged supine. The aim of this study was to identify methods by which patient movement can be minimized when imaged on a new dedicated cardiac SPECT machine. The SPECT acquisitions of 319 patients were analyzed each patient was assigned to a different strategy for reduction of patient movement. The stress and rest imaging was studied and movement was assessed in each of these acquisitions. Three strategies were devised. Position A: both arms elevated above the head. Position B: Both arms above the head and the use of a chest strap. Position C: Left arm above the head, right arm down by the side of the patient and chest strap. Patient movement was assessed by the lead technologist as none, mild, moderate or severe. The results are tabulated below

Position	n (scans)	Movement (%)			Total
		Mild	Moderate	Severe	
A	256	42	33	5	80 (31%)
B	182	30	11	2	43 (24%)
C	204	9	8	1	18 (9%)

In Position A, there was movement in both studies in 14 patients, stress in 29 and rest in 15, in Position B, there was movement in both studies in 11 patients, stress in 10 and rest in 10, In Position C there was movement in both in 3 patients, stress 7 and rest 5. When performing cardiac myocardial perfusion SPECT on a dedicated machine with a semi-recumbent couch most movement occurs after stress imaging though patients who move in the stress acquisition tend to move in rest. The best strategy for reducing movement is to adopt Position C (Left arm above the head, right arm down by the side of the patient and chest strap) .

T02

Parameters Optimization of Filtered Back Projection in Myocardial Perfusion Imaging Reconstruction

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Introduction: Nowadays, even if it is noticed an increasingly wider use of Iterative Methods (IM), a significant number of NM Departments is still routinely using Filtered Backprojection (FBP) as the method of choice in what concerns image processing in MPI. Several authors recommend the use of same filter parameters, no matter what the patient physical characteristics are. Assuming that images acquired for a patient weighting 120kg and 170cm high shouldn't be processed with identical filtering parameters as the ones acquired from a patient with 55kg for the same 170cm, it has been decided to develop the present work, allowing to study the relationship between filtering parameters and the Body Mass Index (BMI). **Material and Methods:** First part of the study consists on the collection of several samples of myocardial perfusion scintigraphies, all of them obtained using the same ^{99m}Tc agent, using doses and acquisition conditions in strict accordance with the suggested on the related EANM Guidelines, coming from patients with very distinct BMI. Patients were divided into distinct groups: Group A integrates patients with a BMI until 23, Group B integrates patients with BMI between 23 and 30, Group C integrates patients with BMI between 30 and 40 and Group D, enrolling patients with BMI of more than 40. All studies were processed with Butterworth filters, with different order and cut-off frequencies. A medical committee of three different expert-clinicians, evaluated the final results and the clinical value of the images, in order to obtain a situation of clinical adequacy and constancy. **Conclusions:** A "correspondence table" between filtering parameters and BMI, to be applied on MPI, in situation of application of ^{99m}Tc agents and using Butterworth filters and FBP was created and it is proposed as starting point.**Keywords:** image processing, filtered backprojection, myocardial perfusion imaging

T03

Calculation of Ventricular Ejection Fraction in Nuclear Medicine: Evolving Procedures

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Aim: Ventricular Ejection Fraction(EF) is a strong indipendent prognostic predictor in heart diseases for hard events. Over these years, it have been accurately obtained by various nuclear medicine procedures: First-Pass RadioNuclideAngiography(FPRNA), Gated-Blood-Pool RadioNuclideAngiography (GBPRNA) and Myocardial Perfusion(MP) gated-SPECT. Purpose of this study is to compare these techniques to identify the most reliable and complete for diagnosis-prognosis for an individual patient. **Methods**: FPRNA, similarly to radiological ventriculography, is performed by dynamic ECG-gated acquisition (Single-Head Gamma Camera equipped with LEHS collimator) following iv injection of bolus of Tc^{99m}-tracer (usually DTPA) into a central vein (brachial/giugular) for a total time of 30-45sec with high time-resolution framing (30-40 f/sec). Instant right-left EF are calculated at rest and during stress together with parametric imaging in RAO view. Standard GBPRNA is more simple to be performed after in-vivo red-blood cells labelling (single or double-head Gamma Camera(GC) equipped with LEHR/GP collimator). ECG-