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RESEARCh 4LIFE®
an EANM initiative
Annual Congress of the European Association of Nuclear Medicine

Congress Center Hamburg
Hamburg, Germany

October 10 – 14, 2015

Technologist Sessions

Technologist Programme Committee

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G. Testanera (Rozzano, Milan)

Members:
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M. Federspiel (Copenhagen)
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Welcome to Hamburg!

Dear Friends and Colleagues,

The EANM congress is a unique and exciting occasion for Nuclear Medicine professionals to confront themselves with all aspects of the discipline. We feel that every educational session must not only offer up to date information, but also the possibility to share the attendees' experience and confront their daily practice with European standards. In this spirit, a great part of the sessions will be in an interactive form or will consist of round table discussions. We very much want to hear the Technologist voice and discuss the EANM vision on the challenges that Nuclear Medicine is going to face in the near future.

In the past years we set some fixed appointments that you will also encounter at the 2015 Congress.

Every year we dedicate the first session to the Technologist Guide presentation, which in 2015 will address Brain Imaging. During the session the authors will discuss aspects of the chapter they produced for the book and will try to give an overview of the Tech Guide contents. Both the Guide and the session will be organised by the Technologist Committee in cooperation with the Neuroimaging Committee and the SNMMI Technologist Section. The subject of Technologist Competencies is currently one of the most discussed topics, and also at this year’s congress, we will have a dedicated round table that will consist of an interactive session that will encourage the discussion on the Technologist role in Nuclear Medicine, the challenges of multimodal imaging and the differences between education and daily practice in European Countries.

This last topic will be also highlighted during the Technologist Interest Meeting, in which 3 colleagues from different European countries will give a brief talk about the education system and working profile of Nuclear Medicine Technologists in their homeland.

‘Interaction’ will be the key word of Technologists Sessions, and all three Mini Courses will be interactive sessions dedicated to indicative signs and artefacts in Nuclear Medicine imaging. Technologists are also welcome and encouraged to send their scientific abstracts and participate with their original works in the dedicated Oral Presentation Sessions and Poster Sessions that will be part of the programme. To summarise, the programme will offer 3 mini courses, 6 Continuing Technologist Education (CTE) sessions and 3 oral presentation sessions. Poster sessions will also be organised.

We look forward to welcoming you to the EANM Congress 2015 in Hamburg.

Sincerely,

Giorgio Testanera
Chair, EANM Technologist Committee
EANM Congress Gothenburg 2014 – Technologist Awards

Best Oral Presentation

Role of Advanced Practitioner in the clinical setting of a multi-disciplinary clinic for alpha emitting 223Radium-dichloride therapy for bone metastases in castration-resistant prostate cancer
Brighton and Sussex University Hospitals NHS Trust, Brighton, UNITED KINGDOM
OP 446, EJNMMI (2014) – Vol. 41-Sup2-S257

Nominees for Best Oral Presentation:

2nd Nominee
Is it possible to use Teflon cannulae for Radionuclide Equilibrium Angiography?
M. Casanova Martins, C. Humphreys, A. Queiroz, C. Gascoigne, P. Ali
Nuclear Medicine Department, Singleton Hospital, ABMU HB, Wasles NHS Trust, Swansea, UNITED KINGDOM
OP215, EJNMMI (2014) – Vol. 41-Sup2-S207

3rd Nominee
Quantitative assessment of 18-FDG PET/CT and dbPET: Relationship with Breast Cancer prognostic factors
Eresa, Valencia, SPAIN
OP196, EJNMMI (2014), Vol.41-Sup2-S205

Best Poster Award

Research Practice development in nuclear medicine technologists
Haute École de Santé Vaud Lausanne, SWITZERLAND
TP48, EJNMMI (2014), Vol.41-Sup2-S656

Nominees for Best Poster Presentation:

2nd Nominee
Comparison of Imaging Angle and Analysis Software on the Measurement of Left ventricular Ejection Fraction
W.C. Way, C. Huang, J. Lin, S. Wang
Taipei Veterans General Hospital, Taipei, TAIWAN
TP44, EJNMMI (2014), Vol.41-Sup2-S654

3rd Nominee
Interobserver and intraobserver variation of phase analysis results in ECG-gated myocardial perfusion SPECT related to repeated reconstructions
M. Hakala, T. Koivumaki, M. Hakulinen, M. Kokkonen, A. Leinonen, T. Laitinen
Kuopio University Hospital, Kuopio, FINLAND
TP42, EJNMMI (2014), Vol.41-Sup2-S654
### Annual Congress of the European Association of Nuclear Medicine

**Outline Technologist Programme HALL 4**

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**CTE I:** Beam Imaging (Tech Guide Book Launch)

**CTE II:** International Workshop on Radiation Protection for Nuclear Medicine Technologists

**CTE III:** Interactive: Comprehensive PET/MR Practice

**CTE IV:** Joint Session with Inflammation & Infection Committee: Infection Imaging in Nuclear Medicine

**CTE V:** Lean Principles and Improved Departmental Management
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| 08.15 – 09.45| CTE I – Brain Imaging  
(Tech Guide Book Launch)  
Chair: A. Santos, Lisbon, (tba)                                                                   |
| 08.15 – 08.45| Imaging in Oncological Brain Diseases (PET/CT)  
G. Testanera (Rozzano, Milan)                                                                     |
| 08.45 – 09.15| Tracers for Brain Imaging  
A. Socan (Ljubljana)                                                                                  |
| 09.15 – 09.30| Principles of Functional Brain Imaging with Radiotracers  
A. Signore (Rome)                                                                                   |
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| 11.30 – 12.00| How it All Began: 1998 Competencies Document  
J. Jorge (Lausanne)                                                                                 |
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G. Testanera (Rozzano, Milan)                                                                       |
| 12.30 – 13.00| Adapting to Future: EANM-TC Document on Competencies  
P. Fragoso Costa (Oldenburg)                                                                      |
| 14.30 – 15.30| Mini Course I – Interactive: Signs in Nuclear Medicine Imaging  
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| 15.45 – 16.45| PET/CT Artefacts  
L. Lezaic (Ljubljana)                                                                                 |
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Chair: S. Rep (Ljubljana), N. Gulliver (London)                                                           |
| 17.00 – 18.00| SPECT/CT Artefacts  
A. Geão (Lisbon)                                                                                           |
CTE I
Brain Imaging
(Tech Guide Book Launch)
**Imaging in Oncological Brain Diseases (PET/CT)**

G. Testanera (Rozzano, Milan)

Molecular imaging techniques are used to generate maps of functional and biochemical activity in target tissues in vivo. Currently, PET is one of the most successful techniques in the diagnostic work-up of brain tumours, its importance deriving from its ability to address various metabolic features of gliomas, relevant for diagnosis, classification, characterisation, preoperative evaluation, radiotherapy planning and post-therapeutic monitoring.

PET/CT is defined as an integrated or multimodality technique that employs a combination of a PET and a CT system with a single, conjoined patient handling system. It allows sequential acquisition of corresponding PET and CT portions of the examination with the patient in the same position for both PET and CT and enables co-registration of both data sets. It has grown in importance, especially thanks to the increasingly widespread availability of radiopharmaceuticals. PET/CT not only contributes to differential diagnosis, but also offers the possibility of tailoring imaging to different clinical indications. The two main metabolic features extensively studied so far are glucose metabolism by means of $^{18}$F-FDG and the amino acid transport (incorporation) using amino acid radiopharmaceuticals such as $^{11}$C-methionine ($^{11}$C-MET), $^{18}$F-fluoroethyltyrosine ($^{18}$F-FET), $^{18}$F-labelled 3'-deoxy-3'-fluorothymidine ($^{18}$F-FLT) and $^{18}$F-dihydroxyphenylalanine ($^{18}$F-DOPA; fluorodopa). In the spirit of continuity with EANM and international guidelines on the topic, we shall cover the major clinical applications of these techniques, together with acquisition methods and patient preparation; some notes are also provided on quantitative imaging and radiotherapy planning. Brain imaging is a competitive diagnostic environment, in which many tools are technically evolving to offer the best solutions available for patient care. Nuclear Medicine accepts the challenge and this talk, based on Tech Guide chapter, is designed to identify clinical scenarios in oncology in which positron emission tomography (PET) and computed tomography (CT) may modify patient management and in which a combined PET/CT study would offer great diagnostic value.
Tracers for Brain Imaging
A. Socan (Ljubljana)

Positron emission tomography (PET) and single photon emission computed tomography (SPECT) imaging use positron and gamma-emitting radioisotopes that can easily be incorporated into biological molecules and thus allow the measurement of functional parameters (physiological and/or pharmacological interactions) of tissue rather than just providing the anatomical definition of structures. Both techniques are exceptionally sensitive (PET more than SPECT) and can detect picomolar or even femtomolar concentrations of radiolabelled compound and enable the dynamic acquisition of relatively fast kinetics (of the order of seconds for PET). With these properties, PET/SPECT can facilitate the quantitative measurement of rapid physiological/pharmacological processes of bio molecules in the living brain.

For the tracer (radiopharmaceutical) to be able to enter the CNS (brain), it has to cross BBB (blood brain barrier). It is therefore prerequisite that that radiotracer posses the capacity (proper physicochemical properties) of crossing the BBB, by free diffusion or by specific transport mechanisms.

Depending on the brain target of the imaging and therewith needed properties, tracers for the brain imaging can be divided in several groups: rCBF tracers, metabolic tracers, tracers targeting neurotransmission and receptors, tracers targeting amyloid, tracers for brain tumor imaging.

Physiological properties needed by the radiopharmaceutical to be used for the measurement of brain perfusion are as follows; they must be able to cross BBB (blood-brain barrier), their extraction must approximate unity and must be independent of blood flow, as a consequence their initial distribution will be proportional to regional cerebral blood flow (rCBF). They also must be retained within the brain in their initial distribution long enough for diagnostic tomographic images to be obtained. (eann guide,3). Ideally, tracer uptake should show no redistribution, initial tracer uptake reflecting rCBF at fast time window after injection, then remains almost unchanged for several hours. Result is image independent of rCBF variations occurring after the fixation time. Today there are two tracers used for evaluation of rCBF in routine clinical practice: 99mTc-HMPAO (exametazime) and 99mTc-ECD (bicisate). Other tracers available like 123I-IMP and H$_2$15O are today still used mainly for research purposes. Main metabolic substrates of the brain are oxygen and glucose. Both metabolic pathways are studied with specific tracers. Glucose metabolism is studied with analogues of glucose. $[^{18}F]$FDG (2-(18F)Fluoro-2- deoxy-D-glucose) today represents the working horse of imaging in several fields of PET Nuclear medicine. $[^{18}F]$FDG is a glucose analogue and therefore taken up by cells in part by glucose transporters (glucose does not freely cross BBB and cell membrane) and is then phosphorylated by hexokinase into FDG 6-phosphate which cannot be metabolized (unlike glucose) and is consequently trapped in cell. Since FDG accumulates in brain tissue depending on facilitated transport of glucose and hexokinase mediated phosphorylation, it is suitable for imaging of regional cerebral glucose consumption and is currently the most accurate in-vivo method for the investigation of regional human brain metabolism. $^{15}$Oxygen is the tracer in research used to study regional cerebral metabolic rate of oxygen (rCMRO2).
Synaptic cleft is the place where interactions between cells take place. The neurotransmitter released by the presynaptic neuron reaches the postsynaptic cell membrane where receptors are present and initiates the neurotransmission chain of events. The transmitter can also reenter in the presynaptic neuron via the reuptake channels, which actively participate in modulating the intracleft concentration. All the constituents of the synaptic transmission chain, i.e. transmitter, receptors and reuptake channels, can be modulated by functional requests, as a consequence of local physiology, disease and under the effect of drugs. All three are possible target of imaging with radiolabeled tracers. Dopaminergic system is because of the importance of the brain functions connected with its integrity (movement disorders, Parkinsonism, dementia with Lewy bodies) the most extensively studied neurotransmitter system in brain. Nuclear medicine imaging. Several SPECT and PET dopaminergic tracers are now days available for routine clinical practice and research. $^{[18]}$F-fluorodopa and cocaine derivatives labeled with $^{123}$I and $^{99m}$Tc ($^{[123]}$I-beta-CIT, $^{[123]}$I-FP-CIT and $^{[99m]}$TcTRODAT-1) are the most frequently used tracers for the study of the nigrostriatal dopaminergic dysfunction in PD. Other dopaminergic ligands, such as those for the dopamine receptors, have been used for the identification of post-synaptic dopaminergic deficit in parkinsonian neurodegenerative disorders (D$_1$ receptor ligands), for the assessment of neuroreceptor/neurochemical changes and drug occupancy in psychiatric disorders (D$_1$ and D$_2$ receptor ligands) and for pharmacological studies on endogenous dopamine changes (D$_2$ receptor ligands). (D$_2$: $^{[11]}$C-raclopride, $^{[18]}$F-fallypride,...)

Ligands for serotonin receptors ($[^{[1]}$C]-WAY-100635) and/or transporters can be applied to the study of neurodegenerative disorders such as Alzheimer’s disease (AD) and neuropsychiatric disorders such as depression.

Tracers for the cholinergic system can be used for the study of neurodegenerative disorders such as Alzheimer’s disease, Parkinson’s disease, Lewy-body dementia, and progressive supranuclear palsy.

Tracers for the central benzodiazepine (BZD) receptors ($[^{[1]}$C]-flumazenil, $[^{[1]}$C]-iomazenil) have been used in patients with epilepsy to identify the epileptogenic focus characterized by a focal decrease of BZD receptor density, for the study of neuronal loss in AD, and for the study of BZD receptor density in schizophrenic patients and post-traumatic stress disorder (PTSD). $^{[1]}$C-PK 11195, a ligand for the peripheral BZD receptor, has been used for the in vivo imaging of microglial activation in stroke and AD.

Amyloid plaques and neurofibrillary tangles are pathological markers found in Alzheimer disease (AD) post-mortem brains. Recently, several PET tracers have been developed that bind to amyloid plaques and hence can be used as amyloid imaging agents ($[^{[1]}$C]-BIP, $[^{[1]}$C]-SB-13). Further analogues of the tracer such as $^{[18]}$F-flutemetamol are currently being introduced into clinical practice.

Radiolabelled amino acids offer significant improvement in the diagnostic evaluation of cerebral tumors in comparison with conventional anatomical imaging. Increased amino acid transport in brain tumor cells results from over expression of the transporter systems and is related to alterations in the tumor vasculature and tumor cell proliferation. Several radiolabelled amino acids are available, the most frequently used being (methyl-$^{[1]}$C)-L-methionine (MET), 3-($^{[1]}$C)-iodo-$^{[1]}$iodo-β-methyl-L-tyrosine (IMT) and O-(2-($^{18}$F)fluoroethyl)-L-tyrosine (FET).

As the number of PET/SPECT centers grows, applications of use in clinical neurology will increase for early and/or presymptomatic diagnosis of diseases and more target-specific radiotracers and ligands will be developed.
Principles of Functional Brain Imaging with Radiotracers
A. Signore (Rome)

Tracers
Radiotracers for CNS examinations enter the CNS crossing the blood brain barrier (BBB). Their prerequisite is the capacity of crossing the BBB or with free diffusion or by specific transport mechanisms.

rCBF tracers
The detection of the local level of blood supply to the brain derives from the application of the Fick's principle, based on the use of freely diffusible substances. In consequence, tracers for studying rCBF are freely diffusible. Some of them freely return back from brain to blood (back diffusion), others after crossing the BBB are transformed in non-diffusible species that allow an easy and efficient investigation of their regional distribution. Basically, the concentration of such tracers in the brain is proportional (either not linearly) with rCBF. The most commonly used tracers are trapped in the brain for times sufficiently long to allow an efficient SPECT detection. They are often referred as ‘chemical microspheres’. Indeed, their behavior is quite different from that of microspheres, which are trapped in the brain ‘linearly’ with rCBF. These tracers are ‘flow limited’ but not ‘flow linear’. It is important to bear this in mind whenever looking at SPECT rCBF images. Linearization procedures have been proposed but none with sound theoretical basis. In the most precise terms, the brain distribution of these ‘chemical microspheres’ reflects the local value of the ‘steady state influx constant’, a parameter dimensionally expressed as ml/min/g, connected to flow by a complex expression. Nevertheless the performance of these tracers can cope with research and clinical requests efficiently. Since their appearance more than 1000 scientific papers have been published and their use is recommended by several scientific associations (see below).

Metabolic tracers
As already said, the main metabolic substrates of the brain are oxygen and glucose. Both metabolic pathways are studied with specific tracers. 15-oxygen (positron emitter half life 110 sec) is the tracer used to study regional cerebral metabolic rate of oxygen (rCMRO2) but clinical use of this method is not done. Glucose metabolism is studied with analogues of glucose, mainly labeled 2-deoxy-glucose. This analogue has the characteristic of sharing with glucose the affinity for the membrane specific glucose transporter (glucose does not freely cross BBB and cell membrane) and the first glycolytic step (hexokinase transform of glucose to glucose 6-P). Phosphoglucoisomerase, the next enzyme in glycolytic pathway, does not recognize 2-D-glucose-6P, which consequently accumulates inside the cells. The cells that accumulates 2-DG inside the CNS are mainly astrocytes which physiologically carry on the glycolytic reactions. The level of glucose demand is regulated by neuronal-astrocyte interactions, recently reviewed. The amount of glucose imported by the cells is also dependent of the level of oxygen supply. A great deal of effort has been spent in developing physical and mathematical models of the brain kinetics of 2-Dglucose. These models have been made operative by the reduction to easily computable expression, as that proposed by C. Patlak with his graphical analysis or by Blomqvist with his linearization.
**Neurotransmission and receptors**

Synaptic cleft is the place where interactions between cells take place. The neurotransmitter released by the presynaptic neuron reaches the postsynaptic cell membrane where receptors are present and initiates the neurotransmission chain of events. The transmitter can also reenter in the presynaptic neuron via the reuptake channels, which actively participate in modulating the intracleft concentration. All the constituents of the synaptic transmission chain, i.e. transmitter, receptors and reuptake channels, can be modulated by functional requests, as a consequence of local physiology as well disease and under the effect of drugs. The three components listed above are all possible target of imaging with radiolabeled tracers. At the research level the entity of synthetic activity and of intracellular transport, and the density of postsynaptic receptors and presynaptic reuptake sites have all been investigated. At the moment the most extensive practice has been done with dopaminergic system tracers, mainly cyclotron labeled products. Dopaminergic system has been chosen as the preferential target for this studies because of the importance of the brain functions connected with its integrity, and also because the spatial distribution of the system is adequately known and segregated as to be well investigated with the spatial resolution of PET/SPECT instrumentation. The field of neuroreceptor investigation is now becoming more of clinical availability, with the market appearance of several reliable and easy to use receptorial tracers.

**PET/SPECT radiopharmaceuticals for neurotransmitter systems**

Ligands for the dopaminergic system are the tracers most frequently used in the clinical setting. These tracers have been widely used for the assessment of patients with Parkinson’s disease (PD) and related movement disorders. $[^{18}F]$fluorodopa and cocaine derivatives labeled with $^{123}$I and $^{99m}$Tc ($[^{123}I]$beta-CIT, $[^{123}I]$FP-CIT and $[^{99m}Tc]$TRODAT-1) are the most frequently used tracers for the study of the nigrostriatal dopaminergic dysfunction in PD. Other dopaminergic ligands, such as those for the dopamine receptors, have been used for the identification of post-synaptic dopaminergic deficit in parkinsonian neurodegenerative disorders (D$_2$ receptor ligands), for the assessment of neuroreceptor/neurochemical changes and drug occupancy in psychiatric disorders (D$_1$ and D$_2$ receptor ligands) and for pharmacological studies on endogenous dopamine changes (D$_3$ receptor ligands).

Ligands for serotonin receptors and/or transporters can be applied to the study of neurodegenerative disorders such as Alzheimer’s disease (AD) and neuropsychiatric disorders such as depression. New ligands for serotonin transporters are under evaluation in humans. Tracers for the cholinergic system can be used for the study of neurodegenerative disorders such as Alzheimer’s disease, Parkinson’s disease, Lewy-body dementia, and progressive supranuclear palsy.

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<td>$[^{99m}Tc]$HMPAO</td>
<td>rCBF</td>
<td>See guidelines</td>
<td>Clinical</td>
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<tr>
<td>$[^{99m}Tc]$ECD</td>
<td>rCBF</td>
<td>See guidelines</td>
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<td>$[^{123}I]$IMP</td>
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Tracers for the central benzodiazepine (BZD) receptors have been used in patients with epilepsy to identify the epileptogenic focus characterized by a focal decrease of BZD receptor density, for the study of neuronal loss in AD, and for the study of BZD receptor density in schizophrenic patients and post-traumatic stress disorder (PTSD). \[^{11}C\]PK 11195, a ligand for the peripheral BZD receptor, has been used for the in vivo imaging of microglial activation in stroke and AD. New ligands ‘disease-specific’, such as probes for amyloid plaques (\[^{11}C\]PIB, \[^{11}C\]SB-13) or neurofibrillary tangles will be likely used in the near future for the assessment of patients with mild cognitive impairment and AD.

Table showing some of the available radiopharmaceuticals for brain receptors, transporters and enzymes

<table>
<thead>
<tr>
<th>Dopamine</th>
<th>Dopamine transporter</th>
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<tbody>
<tr>
<td>[^{11}C]SCH 23390</td>
<td>[^{11}C]raclopride</td>
</tr>
<tr>
<td>[^{11}C]NNC 112</td>
<td>[^{11}C]FLB 457</td>
</tr>
<tr>
<td>[^{11}C]NMSP</td>
<td>[^{11}C]methylphenidate</td>
</tr>
<tr>
<td>[^{18}F]fallypride</td>
<td>[^{18}F]ß-CIT</td>
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<tr>
<td>[^{18}F]fluoroethylpiperone</td>
<td>[^{18}F]ß-CIT-FP, [^{123}I]ß-CIT-FP</td>
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<tr>
<td>[^{123}I]BZM</td>
<td>[^{123}I]ß-CIT</td>
</tr>
<tr>
<td>[^{123}I]epeidepride</td>
<td>[^{123}I]altropane</td>
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<tr>
<td>[^{11}C]DTBZ</td>
<td>[^{18}F]6-F-dopa</td>
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<th>Serotonin</th>
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<td>5-HT1A receptors</td>
<td>5-HT2A receptors</td>
</tr>
<tr>
<td>[^{11}C]WAY-100635</td>
<td>[^{11}C]MDL 100907</td>
</tr>
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<td>[^{11}C]DWAY</td>
<td>[^{11}C]NMSP</td>
</tr>
<tr>
<td>[^{18}F]FCWAY</td>
<td>[^{18}F]altanserin</td>
</tr>
<tr>
<td>[^{18}F]p-MPPP</td>
<td>[^{18}F]setoperone</td>
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</table>

<table>
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<tr>
<th>Acetylcholine</th>
<th>Acetylcholinesterase</th>
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</thead>
<tbody>
<tr>
<td>Muscarinic receptors</td>
<td>Nicotinic receptors</td>
</tr>
<tr>
<td>[^{11}C]NMPP, [^{123}I]IQNB</td>
<td>[^{18}F]2-F-A-85380, [^{18}F]6-I-A-85380</td>
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<tr>
<td>[^{123}I]S-F-A-85380</td>
<td>[^{11}C]MP4A</td>
</tr>
<tr>
<td>Opiate receptors</td>
<td>GABA receptors/central benzodiazepine receptors</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>[18F]cyclofoxy</td>
<td></td>
</tr>
</tbody>
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References (recent literature, 2004-2005):


CTE II
Interactive: Multi-Professional Discussion on Extended Competencies for Nuclear Medicine Technologists
How It All Began: 1998 Competencies Document

J.A. Pires Jorge (Lausanne)

The aim of this talk is to describe the content and the structure of the "Competencies for the European nuclear medicine technologist" as well as the context and process of professionalization of nuclear medicine technologists within EANM where this document was produced in the years 1990. Following the informal but periodic work meetings exchanges between European nuclear medicine technologists in the early 1990, then in a formal basis within the EANM Technologists Committee since 1994 and before the establishment of a new class of EANM membership called “Technologists member” in 1999, the “1998 Competencies Document” represents a major milestone in the professionalization process of these health care professionals. At that time, taking in account the heterogeneity and the diversity of education entry level backgrounds and professional practices in Europe, the “1998 Competencies Document” offers a first common definition of the profession and allows the identification and the description of the tasks that can be performed all over Europe by the so-call “European nuclear medicine technologists” should they be, at a national level, nurses, radiographers, nuclear medicine technologists and so on. The “1998 Competencies Document” defined the “competency” as “having the ability, knowledge and authority to carry out effectively and efficiently the work required”. On this basis, the nuclear medicine technologist work required is described in nine chapters: Patient Care and Welfare; Departmental Organisation; Instrumentation with Quality Control; Performance of Imaging; Performance of In-vitro Tests; Radiotherapeutic Procedures; Radiopharmacy; Radiation Protection and Occupational Health and Safety. However, to describe “the work required” it is a necessary issue, but it might not be sufficient to shed light on all the complexity of technologists work activity and its evolution considered as a professionalization process. Some thoughts will conclude this talk trying to clarify the several meanings that the term “professionalization” might offer: the political and administrative, the cultural and identity, the educational and cognitive and the management dimensions. In other words, a useful and meaningful description of professional competencies must be aware on which dimension of the term of “professionalization” are this description aimed.

References:
How it All Developed: Advance Practice and Interaction with External Societies

G. Testanera (Rozzano, Milan)

This lecture will give an overview of the recent projects on Technologist Competencies and education. In October 2009 EANM Technologists Committee and SNMMI Technologist Section opened a discussion table on Technologist Advance Practice. The discussion lead at the creation of a joint working party having the goal to stimulate debate, on a Euro-American level, about the perceived value or otherwise of advancing practice within individual European countries and America, in order to produce a discussion document with a primary focus on Advanced Practice and a secondary focus on Entry Level Practice. The draft document created by August 2010 was circulated through various international channels and underwent consultation exercises in a great number of conferences, to be discussed. The final paper was able to describe the intellectual background of the topic recognizing the UK perspective driving the document. Advance Practice has to be seen as an evolution and not a revolution, being able to build a clinical career ladder. The document also focused on the value of leadership for implementing advanced practice and acknowledged some real examples of Advanced practices.

After the finalization of the discussion document on Advanced Practice, EANM Technologist Committee had obtained a really strong intellectual instrument to face challenges presented by the difficulty of creating a consensus position paper on Technologist Competencies in Europe. Difficulties were not only related to language and cultural differences between individual countries, but also to the different regulations regarding Nuclear Medicine Technologists role. EFRS, the European Federation of Radiographers involved EANM Technologist Committee in two projects: Medrapet for radiation protection and EQF6 for education. These projects will be the focus of the lecture, together with exemplification of particular European situations. Attending this lecture participants will understand importance of building a wide consensus when discussing delicate topics as Technologists competencies and education, respecting differences between individual countries and specific situations. It important to Identify clearly the past and present role of NMT, and how is defined by international bodies and national societies. Clear definition will easier the process of discussing competencies with connected professions like Radiographers and Radiation Therapists.

This lecture intends not only to be a lesson but also a confrontation with different national realities and problems. Questions are welcome and could lead to further research on this fundamental topic.
Adapting to Future: EANM-TC Document on Competencies

P. Fragoso Costa (Oldenburg)

With the fast evolution of health care technologies it became evident that Technologists must keep up the pace with technological development. This is particularly true for Nuclear Medicine Technology. With the development of Radiopharmacy, Dosimetry and Clinical Advanced Practice there is a need to redefine the Technologists Competencies and be able to limit or extend them in order to facilitate a multidisciplinary teamwork and ensure the best clinical practice towards patients. At this moment the international bodies that officially recognise Nuclear Technologists as an independent Technologist specialisation acting on European EANM and IAEA. It is therefore the responsibility of EANM, as a scientific body representing Nuclear Medicine Technologists, to elaborate state of the art documents that can be used by European peers.

It was with this spirit that the EANM Technologists Committee embraced the task to emit an official statement regarding the Nuclear Medicine Technologists Competencies. Keeping the core competencies in line with the original document written in 1998 and seeking a harmonization with partner Technologists specializations, specifically radiographers and radiotherapists, were the main criteria while defining the renewed Competencies Document.

The objective of this session is to present an introduction of the process involved in developing the updated Document on Competencies and to engage in a discussion with the audience, in particular regarding the variability observed in Nuclear Medicine Technology practice throughout Europe. It is clear that this presents a considerable challenge, having in mind that the educational paths to become a Nuclear Medicine Technologist in the European context vary from a vocational education to high school graduates. It is, however, clear that the end result of this path should be kept harmonised and standardised, in regards to quality, but at the same time sufficiently flexible to be supported by national legislations.

It is intended that the Document on Competencies becomes a reference in good practice of Nuclear Medicine Technology and also a basilar stone of the process of harmonising the specialisation internationally.

Suggested Reading:
Mini course I
Interactive:
Signs in Nuclear Medicine Imaging
Nuclear medicine is an imaging specialty that helps by giving functional information and aids a wide variety of specialties in determining causes of medical problems based on images. Classical radiological signs have been reported extensively as a result of a myriad of pathophysiological processes. In general, when encountered, they aid in diagnosis of conditions and add confidence for the reader; at times even hinting at a specific diagnosis. The naming of signs is commonly associated with objects from everyday life to establish familiarity with visual findings. Association of signs and disease comes with regular practice, and improves understanding of the image and its underlying cause. It is also important to be aware of rare signs as they may often cause misinterpretation. While the areas of uptakes in nuclear medicine usually correlate to the area of disease, there are cases of scans which produced unusual findings caused by unexpected pathophysiology or anatomical abnormalities. This lecture will contain illustrations of different signs in nuclear medicine as reported in the literature and discuss the causes for their appearances and possible differentials when encountered.
Mini course II
Interactive:
PET-CT Artefacts
PET/CT Artefacts

L. Lezaic (Ljubljana)

For accurately quantifiable PET images necessitates optimal operation of PET hardware as well as the application of a range of software algorithms that correct for variable, missed and unwanted detected events. The PET/CT imaging has presented several challenges that affect the accuracy of PET quantification. These challenges are primarily rooted in the use of CT for the AC of the PET data and necessitate specialized image processing algorithms to mediate their effects on the resultant PET images. Examples of these challenges include the effects of high density material, such as oral and intravenous contrast media or metal implants, on CT numbers; truncation effects due to the mismatch between the CT and PET FOVs; and a temporal mismatch between the PET and CT data acquisition and its effect on the internal structures that are affected by involuntary motion. In addition to issues with the hardware and data processing, image artefacts may arise from suboptimal patient preparation and handling of activity prior to or during the examination. Proper patient instruction, preparation and handling prior to and during the examination are key to a diagnostically useful examination.

Further reading:

Mini course III
Interactive:
SPECT/CT Artefacts
**SPECT/CT Artefacts**

A. Geão (Lisbon)

The association of SPECT and CT images can have a synergic effect in Nuclear Medicine imaging. Although, the use of SPECT and CT combined images must be careful, due to the several artefacts that may occur and that can diminish the accuracy of this combined technique. The identification of the artefact and its source (if related to the equipment or to patient characteristics) is very useful in order to prevent or correct the artefact or even minimize its effect on image quality.

Nuclear Medicine Technologists have an important role on the implementation of strategies that help avoid the artefact to occur or minimize its effect when they are not avoidable. This knowledge and training is very important to excel image quality.

**Further reading:**

2. Celler, Anna, Nuclear Medicine (SPECT and PET) in Medical Imaging, Wiley, 2009: pp 101-124
Monday, October 12, 2015 – Hall 4

08.00 – 09.30  Technologist Oral Presentations 1  
Chairs: G. Testanera (Rozzano, Milan), (tba)

10.00 – 11.15  Plenary Session 2

11.30 – 13.00  Technologist Oral Presentations 2  
Chair: C. Pestean (Cluj-Napoca), (tba)

13.00 – 14.30  Technologist Interest Group Meeting

14.30 – 16.00  CTE III – Interactive: Comprehensive PET/MRI Practice  
Chair: M. Federspiel (Copenhagen), A. Ohmstede (Oldenburg)

14.30 – 15.00  MR Basics and Clinical Applications  
J. Graessner (Hamburg)

15.00 – 15.30  MR/PET: Technical Challenges and Clinical Applications  
V. Diehl (Bremen)

15.30 – 16.00  Clinical PET/MR: Where Are We After Five Years?  
A.J. Beer (Ulm)

16.30 – 18.00  CTE IV – Joint Session with Inflammation and Infection Committee:  
Infection Imaging In Nuclear Medicine  
Chair: M. Hinterreiter (Vienna), A. Signore (Rome)

16.30 – 17.00  Overview on Infection Imaging by SPECT and PET  
O. Gheysens (Leuven)

17.00 – 17.30  Overview on Inflammation/Infection and Standardized  
Cell Labelling Procedure  
E. Lazzeri (Pisa)

17.30 – 18.00  Image Acquisition and Interpretation Parameters  
for Planar, SPECT or PET  
A. Signore (Rome)
Conventional SPECT/CT is limited in its ability to deliver definitive and timely answers to clinical questions. Siemens addresses these challenges with Symbia Intevo™ and xSPECT™ technology by completely integrating SPECT and CT data during image reconstruction.

The higher resolution and clinical detail of xSPECT Bone™ supports physicians’ ability to distinguish between degenerative disease and cancer, reducing the need for follow-up exams. xSPECT Quant™ generates quantitative measurements** of disease uptake that are both accurate and reproducible, facilitating therapy planning and early modification of patient treatment to reduce costs associated with ineffective therapies.

* Symbia Intevo, xSPECT, xSPECT Bone and xSPECT Quant are not commercially available in all countries. Due to regulatory reasons their future availability cannot be guaranteed. Please contact your local Siemens organization for further details.

** For ⁹⁹mTc and LEHR only.
Technologist Oral Presentations 1

Chairs: G. Testanera (Rozzano, Milan), (tba)

OP183 18F-FDG PET-CT and Radiotherapy Planning in Lung Cancer - Technical aspects and benefits from metabolic radiotherapy planning

J. Pinto1, L. Vieira1, D. Faria1, J. Vale1, G. Fonseca1; 1Lisbon School of Health Technology, Lisbon, PORTUGAL, 2Hospital Lusíadas Porto, Oporto, PORTUGAL.

OP184 Relative renal function estimate by renal scintigraphy with 99mTc-DMSA: Influence of attenuation correction methods

A. I. Santos1, A. Amaro2, E. Carolino3, H. Silva3, L. Vieira3, T. F. Vaz2; 1Hospital Garcia de Orta, Almada, PORTUGAL, 2Escola Superior de Tecnologia da Saúde de Lisboa, Lisbon, PORTUGAL, 3Escola Superior de Tecnologia da Saúde de Lisboa & Instituto de Biofísica e Engenharia Biomédica, Faculdade de Ciências, Universidade de Lisboa, Lisbon, PORTUGAL.

OP185 The role of the Nuclear Medicine Technologists in Cyclotron related Research & Development

P. Costa1, L. Cunha1, L. F. Metello2; 1Nuclear Medicine Department, ESTSP/IPP & CADCTR, Vila Nova de Gaia, PORTUGAL, 2Nuclear Medicine Department, ESTSP/IPP & CADCTR & IsoPor SA, Vila Nova de Gaia, PORTUGAL.

OP186 Occurrence and Characterisation of Perfusion Defects on 13NH3 Myocardial PET/CT Due to Side Branch Occlusion After Ramus Descendens Anterior Stenting

H. Kan, R. J. J. Knol, S. V. Lazarenko, M. Wondergem, N. J. Hoogvorst, F. M. van der Zant; MCA, Alkmaar, NETHERLANDS.

OP187 Usefulness of simultaneous intermediate-level exercise for dobutamine stress myocardial perfusion imaging.

T. Kasai1, M. Aiga1, Y. Iwasaki1, Y. Fujita1, Y. Sasaki1, N. Tanaka1, A. Yamashina2; 1Tokyo Medical University Hachioji Medical Center, Tokyo, JAPAN, 2Tokyo Medical University, Tokyo, JAPAN.

OP188 Low-dose hybrid CCTA/SPECT image acquisition based on BMI: a case report

V. Weichselbaumer, J. Trinckauf, E. Müller, D. Benz; University hospital Zurich, Zurich, SWITZERLAND.

OP189 Impact of dynamic acquisition in dual-phase 18fluorocholine PET-CT on radiation exposure of staff and patients

J. Barbiaux, C. Chinha, C. Hasbroucq, S. Petit, M. Thelu, A. Bailliez, T. Blaire; GIE HumanitéP – Hôpital Saint Philibert, LOMME, FRANCE.

OP190 Radiation Dose to the Eye Lens: Does Positioning Really Matter?

C. Baun1, K. Falchi1, K. D. Nielsen1, S. Shanmuganathan1, O. Gerke2, P. Hoelund-Carlsen2; 1Odense University Hospital, Odense, DENMARK, 2University College Lillebaelt, Odense, DENMARK.
### Technologist Oral Presentations 2

Chair: C. Pestean (Cluj-Napoca), (tba)

<table>
<thead>
<tr>
<th>Presentation ID</th>
<th>Title</th>
<th>Authors</th>
<th>Institution</th>
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</thead>
<tbody>
<tr>
<td>OP221</td>
<td>Investigation of kidney function with a dynamic FDG-PET/MR</td>
<td>B. K. Geist, A. Staudenherz; Medical University of Vienna, Vienna, AUSTRIA.</td>
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<td>OP222</td>
<td>Wholebody Blood Pool in Bone Scintigraphy: Usefulness in the differential diagnosis of inflammatory arthritis - Preliminary Results</td>
<td>M. Casanova Martins, B. Patel, C. Humphreys, P. Ali; ABMU HB, Swansea, UNITED KINGDOM.</td>
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<tr>
<td>OP223</td>
<td>Comparison of Ga-68-DOTATATE PET/CT and In-111-octreotide SPECT/CT for the detection of neuroendocrine tumors</td>
<td>M. Kieft, E. A. Aalbersberg, M. P. M. Stokkel; NKI-AVL, Amsterdam, NETHERLANDS.</td>
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<tr>
<td>OP224</td>
<td>Phase analysis using ECG-gated myocardial FDG PET in the rat in comparison with speckle tracking echocardiography</td>
<td>A. Mizutani¹, I. Matsunari², M. Kobayashi³, K. Nishi³, W. Fujita³, S. G. Nekolla⁴, K. Kawai¹, K. Fukuchi¹; 'Osaka University, Osaka, JAPAN, 'Saitama Medical University Hospital, Saitama, JAPAN, 'Kanazawa University, Kanazawa, JAPAN, 'Nagasaki University, Nagasaki, JAPAN, 'Kanazawa Medical University, Ishikawa, JAPAN, 'Technical University Munich, Munich, JAPAN, 'Osaka UniversityKanazawa University, Kanazawa, JAPAN.</td>
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<td>OP226</td>
<td>Radionuclide therapy of metastatic melanoma with benzamide derivate I-131-BA100 after patient stratification with F-18-DOPA</td>
<td>F. O. Spohn, K. Kunze, F. Giesel, W. Mier, U. Haberkorn, C. Kratochwil; Heidelberg University Hospital, Heidelberg, GERMANY.</td>
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<td>OP227</td>
<td>Impact of syringe residual activity in SUV measurement</td>
<td>P. Felicio¹, J. Hunter¹, N. G. Dowell², T. Vaz³, F. Lucena¹; 'Lisbon School of Health Technology, Lisbon, PORTUGAL, 'Clinical Imaging Sciences Centre, Brighton and Sussex Medical School, University of Sussex, Brighton, UNITED KINGDOM.</td>
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<td>OP228</td>
<td>Protocol Optimisation of [(68Ga)]-PSMA PET/CT Imaging on a High Sensitivity Time-of-Flight Pet Scanner</td>
<td>E. A. Bailey, E. Hsiao, G. Schembri; Royal North Shore Hospital, Sydney, AUSTRALIA.</td>
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CTE Session III
Interactive: Comprehensive PET/MR Practice
MR Basics and Clinical Applications

J. Graessner (Hamburg)

The physical effect of nuclear magnetic resonance (NMR) was discovered by F. Bloch and E. Purcell in 1946, for which discovery and both were awarded the Nobel Prize in 1952. The main application for NMR since then was in analytical chemistry, until P. Lauterbur suggested in his famous paper in 1973 a technique for the acquisition of sectional images with NMR. His work with Sir Peter Mansfield was awarded the Nobel Prize in 2003.

NMR- or as today dubbed MRI (magnetic resonance imaging) - makes use of the property spin of the atomic nuclei. The nucleus of hydrogen (H-1) consists of one particle: the proton. The spin of the proton lets it behave like a bar magnet with North and South Pole. In the environment of a strong magnetic field we observe a strict alignment of these nuclear magnets. The alignment is actually a precession around the main field direction. The distribution with and against the direction of the main magnetic field is almost even with a small excess of particles pointing with the field having no compensating counterpart.

This excess portion forms the "net magnetisation" of a probe. Its size scales linearly with the strength of the external magnetic field. The higher the field, the larger the available magnetization.

Irradiating radiofrequency (RF) pulses of a certain frequency let the magnetization of the probe turn away from the direction of the main field, e.g. 90 or 180 degrees. The RF pulses drive the zillions of tiny bar magnets into a coherent alignment as they rotate around the main field direction. After the excitation, e.g. of 90 degrees, the rotating magnetization induces a signal in the receiving coils. But this signal diminishes after a short period characterized by the exponential factor T2 analogue to the radioactive decay. Parallel to the T2 decay the magnetization tends to align again with the outer magnetic field. This process is described by the exp. factor T1. Both "relaxation times" are in the range of a few milliseconds (ms) to a few seconds in living tissue. Molecular structures influence the T1 and T2 times and thereby enable different contrasts between tissue types.

The basic idea for MR imaging has been the utilization of additional magnet coils, which superimpose linearly rising field deviations in all 3 directions over the homogeneous main magnetic field. These gradient fields are necessary for slice selection and spatial encoding of the MR signals.

As in computed tomography (CT) one needs more than one projection of the object to reconstruct a full image. For an image with a 256 square matrix at least 256 recorded and encoded signals are necessary for the analysis with the Fourier Transformation (FT). The FT inspects the digitized MR signals for their frequency and phase content and their amplitude. The measurement process in MRI was initially slow. But many techniques ("pulse sequences") were developed to accelerate this procedure, producing in turn a wide range of acronyms (7).

References:
2. Hashemi, Hashman, Bradley. MRI: The Basics. LWW 2010
5. Magnets, Flow and Artefacts. Siemens 2004
7. MRI Acronyms. Siemens 2015
8. 4-7http://www.healthcare.siemens.de/magnetic-resonance-imaging/magnetom-world/publications/mr-basics
MR/PET: Technical Challenges and Clinical Applications

V. Diehl, B. Samsula, C. Franzius, M. Lentschig (Bremen)

The hybrid technology MR/PET allows the acquisition of a number of parameters within one single examination. Technically, both modalities are the same as in stand-alone scanners. The challenge of the combined technology is among others to provide an attenuation correction matrix for the PET data volume without acquisition of CT data. This is solved by calculation an attenuation correction matrix (so called m-MAP) using a MRI Dixon sequence. Using the MR/PET hybrid system, the morphological imaging technique allows an exact localization of the functional PET-information. Thereby, the diagnostic specificity and accuracy of the PET is increased.

MR/PET is used in clinical applications for only a few years now and is still in the initiation phase. A larger data basis regarding the advantages of the combined MR/PET is required. However, up to now some clinical key applications for MR/PET become apparent: This is for instance staging and therapy control of malignant diseases in children and young adults and the detection and restaging of relapse in prostate cancer. This presentation gives and comprehensive overview of the technique and application of multiparametric imaging using MR/PET.

References:

Clinical PET/MR: Where Are We After Five Years?

A. J. Beer (Ulm)

The first clinical simultaneous whole-body hybrid PET/MR system was installed in October 2010 with huge expectations following the introduction of this new hybrid imaging technique.

The first reports focused obviously on technical aspects and the general feasibility and quality of PET/MR exams versus PET/CT (1-2). In summary, PET/MR showed generally comparable results to PET/CT and its feasibility for many clinical indications could be demonstrated, like pediatric oncology, head and neck cancer, prostate cancer, carcinoma of unknown primary or lung cancer (3–5). The same holds true for neurologic and cardiovascular applications (6–8).

However, while some studies with mostly limited patient numbers also showed some advantages of PET/MR versus PET/CT, a clear “killer application” has yet to be defined (9).

In this talk, the experiences of the first 5 years of PET/MR in the clinics will be summarized with a focus on what over the years turned out to be the most interesting applications, e.g. pediatric oncology and prostate cancer imaging.

However, with the PET/MR machines currently on the market still being very expensive, only subtle advantages compared to PET/CT will probably not justify such a substantial investment for most institutions outside the academia. Thus our focus has to shift from just using PET/MR as a better PET/CT. It has to be recognized that PET/MR is not just "PET/CT 2.0", it is a completely new imaging tool, allowing for extraction of information on tissue biology and physiology, which was not possible before in this complexity within one examination. Thus we have to define novel indications for PET/MR in the clinics, and find applications we did not even think of doing with PET/CT at the moment. In the second part of this talk, the focus will be on such novel ways of using PET/MR, like multiparametric multimodal molecular imaging for response evaluation, prognostic assessment or biopsy planning.

References:


CTE Session IV
Joint Session with Inflammation & Infection Committee:
Infection Imaging in Nuclear Medicine
Overview on Infection Imaging by SPECT and PET

O. Gheysens (Leuven)

Infectious and inflammatory diseases are a heterogeneous group of disorders comprising infection, acute and chronic sterile inflammation. In addition to its heterogeneity, these diseases can either be restricted to one organ or systemic and because of multi-organ involvement whole-body imaging is often required. It is of utmost importance for the referring physician to differentiate between sterile inflammation and an infectious pathology since it may significantly alter the therapeutic management.

Upon clinical suspicion for an inflammatory or infectious disease, diagnosis is most often based on biochemical analysis in combination with conventional imaging. For many years, medical imaging has been focused on anatomical changes, which usually occur rather late during disease progression. Nowadays, a shift towards imaging the molecular/cellular bases of diseases has been observed and nuclear molecular imaging techniques can identify these biological changes before anatomical changes have occurred. Therefore, these nuclear techniques can identify disease localization earlier leading to better therapies and optimization of treatment regimens based on imaging results.

Finally, the development and clinical introduction of hybrid systems (e.g. PET-CT and SPECT-CT) has emerged as a powerful tool by combining anatomical with molecular/functional information during one single imaging session, leading to higher diagnostic accuracy. More recently, the clinical introduction of hybrid PET-MRI systems may even further enhance the diagnostic performance by providing higher soft tissue contrast but studies are warranted to exploit the additional value compared to SPECT-CT or PET-CT.

In this lecture, an overview of the clinical indications for imaging infection and inflammation will be given, focusing on hybrid imaging techniques using labeled white blood cells and FDG.
Overview on Inflammation/Infection and Standardized Cell Labelling Procedure

E. Lazzeri (Pisa)

Any organ of the human body can be affected by an infectious disease. If there is no prompt diagnosis and therapy a localized infectious disease can develop into a systemic infective condition, due to the haematogenous spread of microorganisms. Since many years the Nuclear Medicine is leading the field of imaging infection and/or inflammation through the possibility to use different radiopharmaceuticals according to the clinical condition of the patient. Autologous labelled white blood cell (WBC) represents one of the most utilized radiopharmaceuticals to diagnose infectious diseases, it is the nuclear medicine gold standard diagnostic technique of many clinical conditions as bone and prosthetic joint infection, diabetic foot infection, infective endocarditis, vascular graft infection and fever of unknown origin with high probability of infection origin. The WBC, after labelling procedure, should preserve their pathophysiologic ability, the diagnosis of infection is in fact possible when there is an accumulation overtime of WBC in the site of suspected infection disease. The labelling procedure, that follows the EANM Guidelines (the procedure can be performed using traditional method or by the use of dedicated devices), should be done according to the Good Radiopharmacy Practice and prepared with appropriate environmental requirements. This may be achieved by the provision of a workstation with a laminar flow of HEPA-filtered Grade A air in an environment conforming to at least Grade D or by the provision of Isolator workstation. There should be a written detailed procedure for all preparations and Quality Control (QC) of labelled WBC. The QC can be classified in routine and periodically, the routine QC should be done on the eluates of $^{99m}$Tc generators (Molybdenum-99 breakthrough, elution activity, aluminum ion breakthrough), labelling kits (final activity, the labelling yield and/or radiochemical purity, particulate contamination) and radiolabelled preparation (visual inspection, labelling efficiency, cell viability). The periodically QC of labelled WBC (sterility and bacterial endotoxins testing) should be performed at least once a year. After routine QC the responsible person, who should not normally be the person who prepared the product (although there may be no alternative), should take a formal, recorded decision of approval before a product is released.
Image Acquisition and Interpretation Parameters for Planar, SPECT and PET

A. Signore (Rome)

The EANM Committee on Inflammation/Infection has published several guidelines with the primary aim of standardizing the methods used in Nuclear Medicine for imaging infections. This, the first guideline was to standardize the white-blood-cell (WBC) labelling procedure, followed by a guideline on PET imaging of infection/inflammation and it is about to release the fourth guideline on image acquisition, display and interpretation when using radiolabelled WBC or radiolabelled anti-granulocyte antibodies.

The content of this new guideline will be presented in this lecture and includes:

- how images must be acquired for planar scans, whole body scans and SPECT/CT scans
- how images should be displayed and processed
- how images should be interpreted to diagnose a positive or negative patient
- how to deal with doubtful cases (semi-quantitative analysis and bone marrow scan)

The content of the lecture is therefore specifically addressed to nuclear medicine technicians that have to deal everyday with acquisition and interpretation problems.

Suggested reading:


Tuesday, October 13, 2015 – Hall 4

08.00 – 09.30  
**Technologist Poster Sessions 1, 2, 3, 4**  
Judges: M. Federspiel (Copenhagen), A. Santos (Lisbon)

**Session 1**  
Chair: M. Federspiel (Copenhagen), L. Camoni (Brescia)

**Session 2**  
Chair: A. Santos (Lisbon), N. Gulliver (London)

**Session 3**  
Chair: M. Hinterreiter (Vienna), M.C Attard (Heumen)

**Session 4**  
Chair: S. Rep (Ljubljana), P. Costa (Porto)

10.00 – 11.15  
**Plenary Session 3**

11.30 – 13.00  
**Technologist Oral Presentations 3**  
Chair: S. Rep (Ljubljana), (tba)

14.30 – 16.00  
**CTE V: LEAN Principles and Improved Departmental Management**  
Chair: P. Fragoso Costa (Oldenburg), (tba)

14.30 – 15.00  
**Making Your Department LEAN**  
D. Gilmore (Boston)

15.00 – 15.30  
**How to Implement the LEAN Concept**  
J. Löfgren (Copenhagen)

15.30 – 16.00  
**The Impact of LEAN in a PET Department**  
L. Stine, E. Saxtoft (Copenhagen)
Technologist Poster Session 1
Chairs: M. Federspiel (Copenhagen), L. Camoni (Brescia)

TP01 Radiosynovectomy as a Primary Modality of Treatment for Diffuse Pigmented Villonodular Synovitis of Elbow joint treated with Rhenium-188 labelled Tin-Colloid.
K. Kamaleshwaran, L. Babu, B. Krishnan, M. Mallia, A. Shinto; Kovai medical center and hospital limited, Coimbatore, INDIA.

TP02 Comparison Between Left Ventricular Function Parameters as Measured on 8- Versus 16-Frame ECG-Gated 13NH3 Myocardial Perfusion PET Studies
N. J. Hoogvorst; Medical Center Alkmaar, Alkmaar, NETHERLANDS.

TP03 Renal Parenchymal Analysis: 99mTc-MAG3 ‘v’ 99mTc-DMSA
T. De Sousa, D. Bailey; Guy’s and St. Thomas’ NHS Foundation Trust, London, UNITED KINGDOM.

TP04 Influence of attenuation correction in the MPI image reconstructed by the Evolution for Cardiac™ software
D. F. F. Ribeiro1, J. Vilaça1, C. Nunes1, L. Freire1, M. Pinheiro1, G. Cantinho2, E. Carolino1, E. Sousa1; 1 Escola Superior de Tecnologia da Saúde de Lisboa, Lisbon, PORTUGAL, 2 Atenmedico, Laboratório de Medicina Nuclear, Lisbon, PORTUGAL.

TP05 Influence of geometry on the measurement of an alpha emitter radionuclide, Ra-233.
K. Thongklam, P. Charoenphun; Division of Nuclear Medicine, Ramathibodi hospital, Mahidol University, Bangkok, THAILAND.

TP06 Patient satisfaction in The Department of Nuclear Medicine and PET-Centre, Aarhus University Hospital, Denmark
A. Dysterdich, V. Larsen, L. Pedersen; Aarhus Universitetshospital, Aarhus, DENMARK.

TP07 Technologist radiation exposure performing PET/CT using F18-FDG automatic dispenser
M. I. Larg, C. Pestean, M. Crisan, E. Barbus, D. Piciu; Ion Chiricuta Institute of Oncology, Cluj-Napoca, ROMANIA.

TP08 Studies on measurement of thyroid uptake rate on I-131 scintigraphy images
Y. Koshiba1, S. Abe2, S. Tsuchiya1, N. Fujita3, T. Odagawa1, K. Kato1; 1 Nagoya University Graduate School of Medicine, Nagoya-shi, JAPAN, 2 Nagoya University Hospital, Nagoya-shi, JAPAN.

TP09 Semi-quantitative 18F-NaF PET/CT in the assessment of bone mineral density (BMD): Comparison with dual-energy X-Ray Absorptiometry (DXA)
S. Haim1, F. Fitzal1, B. Saboury1, A. Alavi1, C. Schiller1, W. Langsteger1, M. Beheshti1; 1 Nuclear Medicine & Endocrinology, St. Vincent’s Hospital, Linz, AUSTRIA, 2 Breast Cancer Center, St. Vincent’s Hospital, Linz, AUSTRIA, 3 Division of Nuclear Medicine, University of Pennsylvania, Philadelphia, PA, UNITED STATES.
| TP10 | Implementation of new Hidex automatic gamma counter  
S. M. Virtaniemi, J. Laine, K. Bergström; Helsinki University Central Hospital, HUS, FINLAND. |
M. Che Nordin¹, A. Nordin¹, F. Ahmad Saad¹, H. Abdul Razak²; ¹Universiti Putra Malaysia (UPM), Serdang, MALAYSIA, ²Universiti Teknologi Mara (UiTM), Puncak Alam, MALAYSIA. |
| TP12 | Possible sources of artificial focal 18F-FDG accumulations in the lung tissue without corresponding morphological CT changes  
T. K. Lehnkov, T. A. Roholm, U. Talleruphus; Bispebjerg and Frederiksberg Hospital, Copenhagen, DENMARK. |
| TP13 | Evaluation of therapeutic response to 131I in the treatment of hyperthyroidism  
A. C. C. Caetano¹, A. P. S. Leite¹, J. J. R. Madrid², J. S. Vicente³, E. Carolino⁴, L. Vieira⁴; ¹Escola Superior de Tecnologia da Saúde de Lisboa, IPL, Lisboa, PORTUGAL, ²Hospital Infanta Cristina, Badajoz, SPAIN. |
| TP14 | Standardization analysis protocol proposal for isotopic ventriculography  
P. Borrelli¹, J. Loaiza Góngora¹, J. Vercher-Conejero¹, C. Ruiz Llorca¹, C. Iguá Sáenz¹, D. Hervás Marín¹, C. Olivás Arroyo¹, V. Vera Pinto¹, P. Olivan Sasot¹, P. Bello Arqués¹; ¹Hospital Universitario y Politécnico La Fe, Valencia, SPAIN, ²Instituto Investigación del Hospital Universitario y Politécnico La Fe, Valencia, SPAIN. |
| TP15 | Surface contamination from 99mTc-Technegas aerosols in the SPECT/CT room after lung ventilation.  
S. D. Lind, R. S. Olsen, I. L. Rasmussen, M. Lonsdale; Department of Clinical Physiology & Nuclear Medicine, Bispebjerg and Frederiksberg University Hospital, København NV, DENMARK. |
| TP16 | Clinical classification versus semiquantification with adapted reference values for 123I-FP-CIT SPECT in a Nuclear Medicine Department  
D. Silva¹, M. Queiroga¹, M. Elias¹, J. Serrano¹, J. Madrid², E. Carolino³, E. Sousa³; ¹Escola Superior de Tecnologia da Saúde de Lisboa, Instituto Politécnico de Lisboa, Lisbon, PORTUGAL, ²Nuclear Medicine Department, Hospital Infanta Cristina, Badajoz, Spain, ³Hospital Infanta Cristina, Badajoz, Spain. |
| TP17 | Elution features of sorptive generators technetium-99m.  
A. Rogov, V. Skuridin, E. Stasyuk, N. Varlamova, E. Nestwrov, V. Sadkin, L. Larionova, E. Ilina; National Research Tomsk Polytechnic University, Tomsk, RUSSIAN FEDERATION. |
| TP18 | The Evaluation of External Dose Measurements in Children and Adolescent Patients Receiving Radioiodine Therapy for Well-Differentiated Thyroid Cancer  
N. Edis, A. Ogretici, M. O. Tamam, M. Mulazimoglu; Okmeydani Training and Research Hospital, Istanbul, TURKEY. |
TP19  Radiotherapy Planning in PET/CT: The Process and Challenges  
S. A. Summers, A. Ribeiro; The Royal Marsden NHS Hospital, Sutton, UNITED KINGDOM.

TP20  Comparative study on recovery coefficients of SPECT-CT  
S. Tsuchiya¹, S. Abe², N. Fujita³, Y. Sakuragi³, Y. Koshiba³, T. Odagawa³, K. Kato³; ¹Nagoya University Graduate School of Medicine, Nagoya, JAPAN, ²Nagoya University Hospital, Nagoya, JAPAN.

TP21  Practical consequences of new indications for sentinel node procedures in breast cancer: evaluating the role of SPECT/CT and tracer reinjection  
M. Kieft, B. Pouw, D. Hellingman, W. V. Vogel, M. P. M. Stokkel; NKI-AVL, Amsterdam, NETHERLANDS.

TP22  Non-invasive quantification of the regional cerebral blood flow using I-123 IMP SPECT and phase contrast MRA; preliminary study of combination and revisit of the matured technologies.  
S. Mano, M. Tadokoro, S. Shirakawa, M. Ishiguro, H. Toyama; Fujita Health University, Toyoake City, JAPAN.

TP23  Dynamic F18-FDG studies with a dedicated breast-PET: Preliminary results.  
R. Sanchez Jurado¹, J. Ferrer Rebolleda¹, B. Kundu², S. Majewski², X. Zhang³, Y. Li³, A. González⁴, M. Garcia⁴; ¹ERESA, VALENCIA, SPAIN, ²Radiology and Medical Imaging, University of Virginia, Virginia, VA, UNITED STATES, ³Beijing Institute of Technology, Beijing, CHINA, ⁴Institute for Instrumentation in Molecular Imaging, Valencia, SPAIN.

J. Choi; Asan Medical Center, Seoul, KOREA, REPUBLIC OF.

TP25  Planar Scintigraphy vs SPECT/CT in The Visualisation of Sentinel Node(s) for Patients with Vulvar Carcinoma  
M. Brom-Attard, E. Mijnheere, M. Janssen; Radboud University Nijmegen Medical Centre, Nijmegen, NETHERLANDS.

TP26  Evaluation of a rhodamine-angiotensin conjugate as a potential breast cancer imaging agent  
S. Okarvi, I. Jammaz; King Faisal Specialist Hospital & Research Centre, Riyadh, SAUDI ARABIA.
Technologist Poster Session 2
Chair: A. Santos (Lisbon), N. Gulliver (London)

TP27 A new amyloid imaging probe 125I-EISB in PET/SPECT imaging of amyloid was developed for both brain and whole body for clinical use
S. Tsukimoto; Kumamoto University, Kumamoto, JAPAN.

TP28 Influence of Nuclear Medicine Technologists’ professional experience and visual function in the Myocardial Perfusion Gated-SPECT semi-automatic processing
A. S. Reimão1, F. Nascimento2, E. Carolina3, J. Pereira4, M. Nobre2, J. Poças2, L. Vieira2;
1Nuclear Medicine Scientific Area, Lisbon School of Health Technology – Lisbon Polytechnic Institute (ESTeSL-IPL), Lisbon, PORTUGAL & Brighton and Sussex University Hospitals NHS Trust, Brighton, UNITED KINGDOM, 2Orthoptics Scientific Area, EStEsl-IPL, Lisbon, PORTUGAL, 3Mathematics Scientific Area, ESTeSL-IPL, Lisbon, PORTUGAL, 4Nuclear Medicine Scientific Area, ESTeSL-IPL, Lisbon, PORTUGAL.

TP29 1131 Effective Half-Life in Well Differentiated Thyroid Cancer Patients
S. Saengsuda; Rajavithi hospital, Bangkok, THAILAND.

TP30 Optimizing the azeotropic drying of 18F- way to improve 18F-Fluorocholine radiochemical yields!
H. Hassan1, S. Abu Bakar2, K. Che A. Halim2, J. Idris2, A. Nordin1; 1Universiti Putra Malaysia, Serdang, Selangor, MALAYSIA, 2National Cancer Institute, Putrajaya, MALAYSIA.

TP31 The Radiation Dose Received by the Staff Responsible for the Collection and Transport of the Radioactive Waste
N. Edis, A. Ogretici, M. O. Tamam, M. Mulazimoglu; Okmeydanı Training and Research Hospital, Istanbul, TURKEY.

TP32 Additional findings above skull base on 18F-FDG PETCT: the usefulness of imaging from vertex
N. Gulliver, A. Almeida, N. Mulholland, G. Vivian, A. Eccles; King’s College Hospital, London, UNITED KINGDOM.

TP33 Technologist Radiation Exposure in Routine Clinical Practice with I-131 Administration for Ablation of Thyroid Cancer
A. Ergulen, F. Ustun, O. N. Yigitbasi, G. Durmus-Altun; Trakya University Medical Faculty, EDIRNE, TURKEY.

TP34 Comparison of capability of diagnosis supporting system between two different gamma cameras for bone scintigraphic images in diagnosing bone metastasis of cancer
K. Shimizu1, M. Hino1, K. Matsumoto2, S. Yamamoto2; 1Kobe City Medical Center General Hospital, Kobe, JAPAN, 2Kyoto College of Medical Science, Nantan, JAPAN.

TP35 Dosimetric analysis of Lu-177-DOTA-Rituximab in patients of relapsed/refractory Non-Hodgkin's Lymphoma
M. P. Yadav, S. Singla, P. Thakral, S. Ballal, S. K. Gupta, C. Bal, A. Malhotra; All India Institute of Medical Sciences, New Delhi, INDIA.
TP36  Validation of an in-house media-fill on radiopharmaceuticals compared to ready-to-use kits: a cost-effective procedure fitted on each nuclear medicine needs
M. Di Franco1, S. Valfre1, T. Scotognella1, T. Angusti1, D. Ielo1, V. Podio1; 1Ospedale San Luigi Gonzaga, Orbassano (TO), ITALY, 2Università degli Studi, Torino, ITALY, 3Policlinico Agostino Gemelli, Rome, ITALY.

TP37  Myocardial Perfusion Radiopharmaceuticals and Imaging in SPECT and PET
R. Adães1, E. Pereira2, M. Fernandes2, E. Sousa2; 1Escola Superior de Tecnologia da Saúde de Lisboa, Instituto Politécnico de Lisboa, Lisbon, PORTUGAL, 2Nuclearmed – Instituto de Medicina Nuclear, Lisbon, PORTUGAL.

TP38  Evaluation of the quality of neuroimaging features as Alzheimer's Disease biomarkers
F. Lucena1, T. F. Vaz1, J. Pé-Leve1, A. S. Ribeiro1, L. Lacerda1, N. Silva1, D. Nutt1, J. McGonigle1, H. A. Ferreira1; 1Institute of Biophysics and Biomedical Engineering of the Faculty of Sciences of the University of Lisbon / Lisbon School of Health Technology of the Polytechnic Institute of Lisbon, Lisbon, PORTUGAL, 2Institute of Biophysics and Biomedical Engineering of the Faculty of Sciences of the University of Lisbon, Lisbon, PORTUGAL, 3Centre for Neuropsychopharmacology, Division of Brain Sciences, Department of Medicine, Imperial College London, London, UNITED KINGDOM, 4Centre for Neuroimaging Sciences, Institute of Psychiatry, King's College London, London, UNITED KINGDOM, 5Institute of Neuroscience and Medicine 4, Forschungszentrum Jülich GmbH, Jülich, GERMANY.

TP39  Qualitative and quantitative analysis of 123I-DaTSCAN SPECT in the diagnosis of Parkinson's diseases: body-contouring versus circular orbit acquisition
A. Palmiei1, A. Zocco2; 1Santa Maria Nuova Hospital, reggio Emilia, ITALY, 2Università die Modena e reggio Emilia, Modena, ITALY.

TP40  Influence of disposable materials in 99mTc-MAG3 radiolabelling
M. Menzaghi, R. Lucianini; Ospedale di Circolo, Varese, ITALY.

TP41  Intraobserver and interobserver variation of myocardial perfusion SPECT results related to repeated reconstructions
M. Kraft, T. Koivumäki, M. Hakulinen, M. Kokkonen, A. Leinonen, T. Laitinen; Kuopio University Hospital, Kuopio, FINLAND.

TP42  Influence of Reconstruction Parameters for FBP in Semiquantification of Brain Studies with 123I-FPCIT
F. Alves1, R. Adães2, C. Fortes2, E. V. Sousa2; 1Alliance Medical, London, UNITED KINGDOM, 2Escola Superior de Tecnologia da Saúde de Lisboa, Instituto Politécnico de Lisboa, Lisbon, PORTUGAL.

TP43  Half-time oncologic bone scintigraphy imaging in patients with prostate and breast cancer
S. J. C. Serém1, M. I. Gomes1, W. Grootjans2, W. J. M. van den Broek2, E. P. Mijnheere2, B. F. Bulten2, L. Heijmen2, R. Hermsen2; 1Coimbra Health School, Polytechnic Institute of Coimbra, Coimbra, PORTUGAL, 2Radboud University Medical Center, Nijmegen, NETHERLANDS.
TP44  Albumin macroaggregates (MAA) kit fractionation for labeling with 99mTc: temperature and storage time influence in quality parameters
S. F. C. Mendes, B. F. Oliveira, A. G. F. Ramos, F. Lucena; Escola Superior de Tecnologias da Saúde, IPI, Lisboa, PORTUGAL.

TP45  The Study on Effect of the Image Applying to Breast Implants in Breast Specific Gamma Imaging
J. Lee1, H. Lee2, J. Kim1, H. Park1; 1Graduate school of Public Health, Yonsei University, Seoul, KOREA, REPUBLIC OF, 2Department of Nuclear Medicine, Konkuk University Medical Center, Seoul, KOREA, REPUBLIC OF, 3Department of Nuclear Medicine, Seoul Medical Center, Seoul, KOREA, REPUBLIC OF; 4Shingu College, Seongnam, KOREA, REPUBLIC OF.

TP46  Biodistribution Assessment of Sodium Pamidronate and Methylene Diphosphonate for Rats Bone Scintigraphy Images
T. S. C. Camozzato, Sr1, A. Z. P. De Souza1, M. Tizon1, S. J. Garcia1, V. F. Dutra1, T. G. Costa1; 1Instituto Federal de Educação, Ciência e Tecnologia de Santa Catarina, Florianópolis, BRAZIL, 2Universidade Federal de Santa Catarina, Florianópolis, BRAZIL.

TP47  Implementation of a New Reference values’s Database for Semiquantification in 123I-FP-CIT Brain Single Photon Emission Tomography
M. Queiroga1, D. Silva1, M. Elias1, J. Serrano1, J. Madrid2, E. Carolino1, E. Sousa1; 1Escola Superior de Tecnologia da Saúde de Lisboa, Instituto Politécnico de Lisboa, Lisbon, PORTUGAL, 2Nuclear Medicine Department, Hospital Infanta Cristina, Badajoz, Spain, Badajoz, SPAIN.

TP48  ASTRIM® Software Implementation - Complying with the Italian Current Regulations - for the Radiolabelling of Therapeutic Radiopharmaceuticals: the Role of Nuclear Medicine Technicians
N. Bartolini1, G. Di Guilmi, G. Marchi, M. Casi, F. De Lauro, M. Bartolomei; Nuclear Medicine Unit M.Bufalini Hospital, Cesena, ITALY.

TP49  5-HT1A agonist and antagonist PET radiopharmaceuticals bind differently to receptors in Alzheimer’s disease: a postmortem study
B. Vidal1, J. Sebti1, M. Verdurand1, S. Fieux1, N. Streichenberger1, T. Billard1, A. Newman-Tancredi1, L. Zimmer1; 1Université Claude Bernard Lyon 1, Lyon, FRANCE, 2CNRS, Lyon, FRANCE, 3Neurolixis, Dana Point, CA, UNITED STATES.

TP50  Introduction of a new Gallium-68 (Ga-68) DOTATATE synthesis module: a retrospective evaluation of GMP qualification and validation, radiation hygiene and organizational planning.
S. Baank, L. de Wit-van Veen, M. Jonker, E. Aalbersberg; Antoni van Leeuwenhoek Hospital, Amsterdam, NETHERLANDS.

TP51  Nuclear Medicine/PET/CT Research: The role of a technologist/radiographer
A. S. F. Ribeiro, S. Summers; Royal Marsden Hospital, Sutton, UNITED KINGDOM.
Technologist Poster Session 3
Chair: M. Hinterreiter (Vienna), M.C. Attard (Heumen)

TP52  The use of non-attenuation corrected PET images in the assessment of cardiac implantable electronic device infections
C. Abreu1, J. O’Doherty1, A. Corrigan1, S. Barrington1, J. John1; 1PET Imaging Centre, King’s College London, King’s Health Partners, St Thomas’ Hospital, London, UNITED KINGDOM, 2Department of Radiology, Maidstone Hospital, Maidstone and Tunbridge Wells NHS Trust, Kent, UNITED KINGDOM.

TP53  Performance of image evaluation due to the difference in the acquisition time using multifocal collimator with 99mTc myocardial SPECT: Evidence from a phantom study
Y. Banno1, M. Onoguchi1, K. Nakajima2, S. Matsuo3; 1Department of Quantum Medical Technology, Kanazawa University Graduate School of Medical Sciences, Kanazawa, JAPAN, 2Department of Nuclear Medicine, Kanazawa University Hospital, Kanazawa, JAPAN.

TP54  64Cu-ATSM PET studies: Are radiation protection restrictions required for patients after scan?
S. Pereira, E. Woods, J. John, A. Jacob, C. Abreu, L. Alves, L. Pike; PET Imaging Centre, St Thomas’ Hospital, King’s College London, London, UNITED KINGDOM.

TP55  The Comparison of Lesion Localization Methods in Breast Lymphoscintigraphy
Y. Joonho, H. Gunchul; Samsung Medical Center, Seoul, KOREA, REPUBLIC OF.

TP56  Clinical application of breath-hold PET/CT to improve quantitation of the NSCLC
W. Huang1, S. Tasi2, T. Pan2, J. Tseng1, K. Lin1, T. Yen1; 1Molecular Imaging Center and Department of Nuclear Medicine, Chang Gung Memorial Hospital, Taoyuan, TAIWAN, 2Department of Imaging Physics, The University of Texas M.D. Anderson Cancer Center, Houston, TX, UNITED STATES.

TP57  The Correlation of PSA and PSA kinetics to 11C-Choline Positron Emission Tomography/Computerized Tomography for recurrent Prostate Cancer after Radical Prostatectomy

TP58  FCH for detection of parathyroid adenomas in Tc-99m-sestamibi negative patients
B. M. de Jong, M. Postma, S. J. Eelkman Rooda, J. P. Esser, J. M. H. de Klerk; Meander Medisch Centrum, Amersfoort, NETHERLANDS.

TP59  Positioning of the arms is essential in reducing artefacts in PET/CT-scans
B. Christensen, P. C. Holdgaard, MD; Vejle Hospital, part of Lillebaelt Hospital, Vejle, DENMARK.
TP60  Fast or Food: a Study on Cardiac FDG Preparation Effectiveness
A. Almeida, N. Gulliver, G. Vivian, A. Eccles, N. Mulholland, B. Corcoran; King’s College Hospital NHS Foundation Trust, London, UNITED KINGDOM.

TP61  Evaluation on Artifacts by Bone Cement of PVP Performed Patients and Usefulness of CT Correction in SPECT/CT Examinations
J. Kim¹, H. Park², J. Lee³, H. Son⁴, S. Park⁵; ¹Seoul Medical Center, Seoul, KOREA, REPUBLIC OF; ²Shingu College, Seongnam-si, KOREA, REPUBLIC OF; ³Graduate School of Public Health, Yonsei University, Seoul, KOREA, REPUBLIC OF.

TP62  Whole body bone SPECT: aspects of methodology
K. Kukuts, I. Fordzyun, A. Forgács, S. Barna, I. Garai; Scanomed Ltd., Debrecen, HUNGARY.

TP63  Evaluation of 68Ge-68Ga Generator and Synthesis Module efficiency in the procedure of 68Ga-DOTATOC labelling

TP64  The devil is in the details … Radioactive Waste disposal changes
C. Voornland, M. Sonneborn, L. Janssen-Pinkse; Antonie van Leeuwenhoek Hospital, Amsterdam, NETHERLANDS.

TP65  Static Myocardial Perfusion Imaging using denoised dynamic Rb-82 PET/CT scans
M. N. M. Petersen, C. M. Hoff, H. J. Harms, K. Bouchelouché, J. Sørensen, L. P. Tolbod; Dept. Nuclear Medicine & PET-Centre, Aarhus University Hospital, Aarhus N, DENMARK.

TP66  RubiShort: Reducing scan time in 82Rb heart scans to minimize movements artifacts
J. Madsen, K. J. Vraa, H. J. Harms, K. Bouchelouché, J. Frakier, J. Sørensen, L. P. Tolbod; Dept. Nuclear Medicine & PET-Centre, Aarhus University Hospital, Aarhus N, DENMARK.

TP67  Comparison of absolute myocardial blood flow with 13N-NH3 cardiac PET determined by different compartmental models and softwares
B. Olsson¹, S. Akiil¹, F. Hedeer¹, H. Engblom¹, C. Hindorf²; ¹Clinical Physiology and Nuclear medicine, LUND, SWEDEN, ²Radiation Physics, LUND, SWEDEN.

TP68  Assessing left ventricular dysfunction by the use of three distinct molecular imaging techniques
J. Reis¹, L. Cunha¹, P. Costa¹, D. Neves², T. Oliveira², A. Ferrer-Antunes³, M. Faria João³, L. Metello³; ¹Nuclear Medicine Department, ESTSP/IPP, Porto, PORTUGAL, ²Nuclear Medicine Department, DIATON SA, Leiria, PORTUGAL.

TP69  Strategies to reduce Radiation Dose from Myocardial Perfusion Imaging:
A. Ghilardi, G. Medolago, L. Pozzi, M. Caloiero, C. Bianchi, E. Iampietro, A. Bruno; Papa Giovanni XXIII, BERGAMO, ITALY.
TP70  Impact of attenuation and scatter corrections in the quantification of SPECT brain images  
S. Chaves¹, T. S. Vieira¹, J. G. Pereira¹, F. Caramelo¹, N. C. Ferreira¹; ¹Centro Hospitalar S. João, Porto, PORTUGAL, ²Instituto Biomédico de Investigação de Luz e Imagem (IBILI – FMUC), Coimbra, PORTUGAL.

TP71  Validation of a New Reference Values’s Database for Semiquantification of 123I-FP-CIT SPECT scans in one Nuclear Medicine Department  
M. Elias¹, M. Queiroga¹, D. Silva¹, J. Serrano², J. Madrid², E. Carolino¹, E. Sousa¹; ¹Escola Superior de Tecnologia da Saúde de Lisboa, Instituto Politécnico de Lisboa, Lisbon, PORTUGAL, ²Nuclear Medicine Department, Hospital Infantil Cristina, Badajoz, Spain, Badajoz, SPAIN.

TP72  PET-CT Determinants of Achievement Experience  
C. D. R. Oliveira¹, C. Pacheco¹, A. Grilo¹, L. Vieira¹, L. Vieira², D. Faria¹, D. Faria⁴, J. C. A. Farto³, M. C. Vázquez³; ¹Escola Superior de Tecnologia da Saúde de Lisboa, Lisboa, PORTUGAL, ²Faculdade de Ciências da Universidade de Lisboa, Lisboa, PORTUGAL, ³Hospital Las Hurdes de Badajoz, Badajoz, Spain, Badajoz, SPAIN.

TP73  Comparison of GFR estimation methods in chemotherapy Monitoring  
V. Rangarajan, V. Kumar, N. Purandare, S. Shah, A. Agrawal, J. Bajpai; Tata Memorial centre, Mumbai, INDIA.

TP74  Therapy planning and dose prescription in radioiodine-131 therapy for hyperthyroidism using radioiodine-123 SPECT/CT imaging  
K. Hanaoka, M. Hosono, M. Otsuka, Y. Asai, M. Okumura, K. Ishii, T. Murakami; Kinki University, Osaka Sakai-city, JAPAN.

TP75  Emerging role of Bremsstrahlung SPECT/CT imaging in yttrium-90 radiosynovectomy  
A. Atabaki, R. Mansberg, R. Russo, S. Gunaratne; Concord Hospital, Sydney, NSW, AUSTRALIA.

TP76  Nuclear Medicine therapies applied to small animals  
D. F. F. Ribeiro, F. Lucena; Escola Superior de Tecnologia da Saúde de Lisboa, Lisbon, PORTUGAL.
Technologist Poster Session 4

Chair: S. Rep (Ljubljana), P. Costa (Porto)

TP77 Comparative retrospective study of peptide receptor radionuclide therapy (PRRT) with Y-90-DOTATOC and Y-90-DOTATATE in neuroendocrine tumours (NET)
M. Marx, H. Plagge, C. Winkler, Y. Zhao, U. Lützen, M. Zuhayra; Universitätsklinikum Schleswig-Holstein, Kiel, GERMANY.

TP78 Development of a new quantification method of dopamine transporter density with 123I-ioflupane
S. Okumiya, A. Ofuji, S. Ito; Kumamoto University, Kumamoto, JAPAN.

TP79 To Manual Handle, or to NOT Manual Handle?
C. Vroonland, S. Baank, M. Stokkel; Antonie van Leeuwenhoek Hospital, Amsterdam, NETHERLANDS.

TP80 Evaluation of CZT-SPECT system for nuclear cardiology: comparison with conventional Anger SPECT
T. Niimi1, M. Sugimoto1, M. Nanasato1, H. Maeda2; 1Nagoya Daini Red Cross Hospital, NAGOYA, JAPAN, 2Nagoya University, NAGOYA, JAPAN.

TP81 Post therapeutic 131I Scan Total Body after a successive therapy (WBS) in Patients (Pts) affected by metastases of thyroid cancer (DTC) and 18F-FDG PET/CT (PET): usefulness of PET for staging and evolution recurrence in Pts with elevated Thyroglobulin (Tg)
L. Bertolazzi, L. Di Ciolo, V. Barbetti, C. Cananzi, M. Gaffuri, E. Piccardo, C. Motta, G. Agnese, P. Moresco; Azienda Ospedaliera Santa Corona, PIETRA LIGURE (SV), ITALY.

TP82 One pot synthesis of [18F]labelled Benzyl Chloride for asymmetric nucleophilic synthesis of 6-[18F]Fluoro-L-Dopa
V. Orlovskaja1, O. Fedorova1, E. Studentsova1, A. Golovina1, R. Krasikova1; 1N.P.Bechereva Institute of Human Brain Russian Academy of Science, St.-Petersburg, RUSSIAN FEDERATION, 2Saint-Petersburg State Institute of Technology, St.-Petersburg, RUSSIAN FEDERATION.

TP83 Comparison of 2 Methods for Reduction of Infra-Cardiac Activity in Myocardial Perfusion Imaging
M. Schalken1, L. Rutten - Vermelfoot1, J. de Jong1, M. Brink-Weringa2; 1Institute Verbeeten, Tilburg, NETHERLANDS, 2Elisabeth-TweeSteden Ziekenhuis, Tilburg, NETHERLANDS.

TP84 DMSA scintigraphy: Do we really need to perform geometric mean assessment?
TP85  The technologist role in 177Lu dosimetry for PRRT (Peptide Receptor Radionuclide Therapy)
E. Leoni, A. Filice, A. Palmieri, G. Ghiraldini, F. Fioroni, E. Grassi, S. Cola, A. Versari;
ASMN, Reggio Emilia, ITALY.

TP86  18F-Fluoride PET for quantification of axial and peripheral lesions in adjuvant-induced arthritis in Lewis rats.
R. Ouichka¹, A. Derrien¹, C. Henrionnet¹, F. Maskali², G. Karcher², P. Gillet¹, D. Loeuille¹, A. Pinzano¹; ¹University of Lorraine, Vandoeuvre-Les-Nancy, FRANCE,
²NANCY-COTEP, Vandoeuvre-Les-Nancy, FRANCE, ³Department of Rheumatology, Hospital of Brabois, Vandoeuvre-Les-Nancy, FRANCE.

TP87  Our experiences with reinjections for non-visualisation in sentinel lymph node procedures for penile cancer
G. A. Ebbens, B. Pouw, D. Hellingman, M. L. Donswijk, M. P. M. Stokkel; Antoni van Leeuwenhoek, Amsterdam, NETHERLANDS.

TP88  Prone versus supine breast F18-FDG PET acquisition in breast cancer
R. Sanchez-Jurado¹, J. Ferrer Rebolleda¹, M. Córò Santiago¹, R. Sanz Llorens¹, J. Aguilar Barrios¹, E. Blanco Pérez¹, C. Fuster Diana¹; ¹ERESA, Valencia, SPAIN,
²University General Hospital, Valencia, SPAIN.

TP89  The effectiveness of dopamine transporter volume estimated by C-11 PE-2I PET in diagnosing Parkinsonism-Novel parameter for quantifying the total amount of dopamine transporter
S. Nagamachi¹, R. Nishi¹, Y. Mizutani¹, Y. Umemura³, R. Ohkubo³, H. Takashima³, T. Hirai¹; ¹Miyazaki University, Miyazaki, JAPAN,
²Fujimoto Hayasuzu Hospital, Miyakonojou, JAPAN, ³Kagoshima University, Kagoshima, JAPAN.

TP90  Simplified and reliable quality control analysis method of 18F-Fluorocholine for a small scale hot lab
H. Hassan¹, S. Abu Bakar², K. Che A. Halim², J. Idris²; ¹Universiti Putra Malaysia, Serdang, Selangor, MALAYSIA, ²National Cancer Institute, Putrajaya, MALAYSIA.

TP91  Histopathological correlation of 123-I metaiodobenzylguanidine (MIBG) Scintigraphy finding in pediatric patients with suspected neuroplastoma
S. M. Nieves Maldonado, J. Lopez Urdaneta, P. Fierro Vazquez, I. Dominguez Prado, M. C. Pombo Passin, A. Ruibal Morell; Hospital Clínico Universitario de Santiago de Compostela, Santiago de Compostela, SPAIN.

TP92  Nodal Visualisation in Sentinel Node Imaging
A. Vaz; St Barts Hospital, London, UNITED KINGDOM.

TP93  Preliminary Study of Multicenter Nuclear Medicine Imaging Quality Assurance by ACR Phantom in Taiwan
C. Lo, Esq., P. Kao; Chnuq-Shan University Hospital, Taichung, TAIWAN.
TP94 Influence of the application of post-filter, variation of the number of iterations and attenuation correction in the tomographic image quality
A. A. Santos¹, A. F. Fernandes¹, H. R. Martins¹, E. Pereira¹, L. Vieira¹; ‘Escola Superior de Tecnologia da Saúde de Lisboa - IPL, Lisboa, PORTUGAL, ¹Escola Superior de Tecnologia da Saúde de Lisboa- IPL, Lisboa, PORTUGAL, ²Hospital Particular de Almada / Escola Superior De Tecnologia Da Saúde de Lisboa - Instituto Politécnico de Lisboa, Lisboa, PORTUGAL, ³Área Científica de Medicina Nuclear, Escola Superior de Tecnologia da Saúde de Lisboa-IPL/ Instituto de Biofísica e Engenharia Biomédica, Faculdade de Ciências da Universidade de Lisboa, Lisboa, PORTUGAL.

TP95 Reference Range in Blood-Pool and Liver SUV for 18F-FDG PET/CT
Y. Parlak, D. Goksoy, G. Gumuser, E. Bilgin; Celal Bayar University, MANISA, TURKEY.

TP96 Appropriate time interval of dynamic 201TI SPECT-MPI data acquisition for quantitative myocardial blood flow analysis on cardiac dedicated ultrafast SPECT camera
G. Ogushi, S. Kudo, R. Matsuda, S. Tomiguchi, S. Shiraishi, Y. Yamashita; Kumamoto University, Kumamoto, JAPAN.

TP97 Analysis and discussion of CT attenuation correction on apical muscular of in myocardial perfusion imaging
Y. Wang; Nuclear Medicine, Huashan Hospital, Fudan University, Shanghai, CHINA.

TP98 Investigation of Methods to Reduce Staff Whole Body Radiation Exposure in a PET-CT Department
L. Alves, E. Woods, A. Jacob, C. Abreu, S. Pereira, R. Cabral, J. John; King’s College London and Guy’s and St Thomas’ NHS Fundation Trust, London, UNITED KINGDOM.

TP99 Occupational radiation exposure of nursing staff in PET facility in association with performance status of patients
M. Hosono, N. Takahara, Y. Yakushiji, K. Sakaguchi, Y. Yamada, C. Hosokawa, K. Ishii; Kinki University Faculty of Medicine, Osaka-Sayama, JAPAN.

TP100 Obtaining medical isotope 99mTc by extracting and chromatography
A. Rogov¹, V. Skuridin¹, E. Stasyuk¹, E. Nestwrov¹, E. Illina¹, V. Sadkin¹, V. Chernov², R. Zelchan³, L. Larionova³; ‘National Research Tomsk Polytechnic University, Tomsk, RUSSIAN FEDERATION, ¹FSBI,RI Cardiology” SB RAMS, Tomsk, Tomsk, RUSSIAN FEDERATION, ²Cancer Research Institute of Siberian Branch of the Russian Academy of Medical Sciences, Tomsk, Tomsk, RUSSIAN FEDERATION.

TP101 New system for production of reactor medical radionuclides tested with Lu-176
D. Seifert, M. Kropáček, M. Tomeš, J. Kučera, O. Lebeda; Nuclear Physics Institute of the CAS, v. v. i., Rež, CZECH REPUBLIC.

TP102 First Danish experiences of Radium-223 treatment to patients with prostate cancer and bone metastases. Is it safe for the staff?
A. K. Cortsen, A. K. Cortsen; Rigshospitalet, Copenhagen, DENMARK.
Technologist Oral Presentations 3

Chair: S. Rep (Ljubljana), (tba)

OP411 Adaptation of 13N-NH3 and 18F-FDG Imaging Protocols for sarcoidosis for new scanner technology
C. Abreu¹, J. O’Doherty¹, S. Barrington¹, S. Pereira¹, L. Alves¹, J. John¹, P. Schleyer²;
¹PET Imaging Centre, King’s College London, King’s Health Partners, St Thomas’ Hospital, London, UNITED KINGDOM, ²PET Imaging Centre, King’s College London, London, UNITED KINGDOM.

OP412 Benign Iodine-131 Treatment - Passing tasks from physician to technologist
H. C. Larsen, L. F. Grønnemark, P. C. Holdgaard, MD; Department of Nuclear medicine, Vejle Hospital - Part of Lillebaelt Hospital, Vejle, DENMARK.

OP414 Methods for preparing and acquiring PET/CT exams with 18F-Fluorodeoxyglucose and 18F-Fluoromethyloholine
R. Sanco, M. Zappalà, V. Arnoldo, L. Memo, E. Zaramella, A. Carraro, L. Evangelista; Istituto Oncologico Veneto I.R.C.C.S., PADOVA, ITALY.

OP415 SPECT Myocardial Perfusion Imaging Quantification in Obese Subjects: Influence of Attenuation Correction with Computed Tomography Attenuation Maps
O. Stakhiv¹, M. Clarke², M. Aplin², N. Singh³, K. Day³, S. Dizdarevic³, M. Jessop³, E. Sousa¹; ¹Escola Superior de Tecnologia da Saúde de Lisboa, Instituto Politécnico de Lisboa, Lisbon, PORTUGAL, ²Nuclear Medicine, Department of Imaging, Brighton and Sussex University Hospital NHS Trust, Brighton, UNITED KINGDOM.

OP416 [18F]-FDG SUV of reference regions in PET/MRI following standard MR-based attenuation correction
I. Haidinger¹, I. Rausch¹, M. Mayerhöfer¹, M. Hartenbach¹, T. Beyer¹;
¹Centre for Medical Physics and Biomedical Engineering, Medical University of Vienna, Vienna, AUSTRIA, ²Division of Radiology, Department of Biomedical Imaging and Image-guided Therapy, Medical University of Vienna, Vienna, AUSTRIA.

OP417 Do Metal Objects in the Topogram Influence the Patient Dose?
K. Falch¹, C. Baun¹, S. ShanmuGANathan¹, M. Nikolajsen², O. Gerke², P. Hoeilund-Carlsen³; ¹Odense University Hospital, Odense, DENMARK, ²University College Lillebaelt, Odense, DENMARK.

OP418 The Effect of Type of Collimation, Duration of Image Acquisition and Scatter Correction in Heart-to-Mediastinum Ratio of I-123-MIBG Scintigraphy
S. Chaves, T. Vieira, A. Sá Pinto, V. Alves, A. Fernandes, J. G. Pereira; Centro Hospitalar de São João, Porto, PORTUGAL.
CTE V

Lean Principles and Improved Departmental Management
Making Your Department LEAN

D. Gilmore (Boston)

Lean is the newest theory in process improvement. Lean dates back to the 1970s and was capitalized on by Toyota. Since this time, LEAN has become the single standard approach to many manufacturing industries. The airline industry is one industry that has adopted LEAN and made significant process improvements. Womack and Jones published *Lean Thinking* and stated that lean thinking is a perspective that is important and that “The endless transformation of waste into value from the customer’s perspective.” The goal of LEAN is to improve a process that adds value to the “product”, but eliminates the “waste” in the process.

In health care, this product can be translated to care of the patient and the waste can be everything from wasted time to errors to products. In medical imaging, the focus is on the quality of the image or study as the product or ways to reduce costs. The waste can be the inefficiencies such as waiting times or duplication of efforts. However, a process improvement requires a cultural change and that everyone involved has to be brought into the process as a participant to make it a success. LEAN is a different way to think about process and is all about a change in thinking versus a focus on doing.

Spears defines the four rules of LEAN. They are to understand how people work, how people connect, how processes are constructed, and how to improve. To start the process, one must understand what is the goal, who is the customer, what is value-added, and what is the non-value added. The process is based on the PDCA cycle–Plan, Do, Check, Act. The 5 S’s are required in LEAN to make the process sustainable. The 5 S’s are: sort, straighten, shine, standardize, and sustain. The first process is to create a value stream map. This requires observing all of the actions one takes to create the final product. For example, this could be from getting a unit dose to injecting the patient. Every single step a technologist takes to get the dose, check the activity, changing the needle, to injecting the patient must be documented. Every step should be mapped to show a visible map. From here, plans can be made to get to the ideal state. Can steps be reduced? Can time be saved? Can items be placed in different location to reduce steps for the technologists? These are all questions that must be addressed in the LEAN process. Reducing waste, increases quality!

References:
How to Implement the LEAN Concept

J. Löfgren (Copenhagen)

LEAN is one of the latest management imports to the healthcare sector. The term ‘lean thinking’ is based on the production philosophy which origins at Toyota Motor Corporation in Japan in the 1950’s and its transfer to the West during the 1970’s. The emphasis of the Toyota Production System is thought by many to focus upon eliminating non-value adding activities known collectively as ‘waste’ or ‘muda,’ in order to increase the percentage of value added activity in any process [1]. LEAN is maximizing value for the customer. Toyota itself highlights ‘just-in-time’ (‘what is needed, when it is needed, and in the amount needed’) and ‘jidoka’ (‘automation with a human touch’) as two important aspects (http://www.toyota-global.com/company/vision_philosophy/toyota_production_system).

The basic principles of LEAN in healthcare are focus on the customer/patient and constant improvement which is driven by the employees themselves. The goal is to optimize flows and eliminate all those activities that don’t create any value for the patient. Whether making a car or a healthier patient, the approach fundamentally is about eliminating waste – from paperwork and inventory to waiting-room delays.

As Poksinska [2] barriers, challenges, enablers, and outcomes of implementing Lean production methods in health care. DESIGN/METHODOLOGY/APPROACH: A comprehensive search of the literature concerning the implementation of Lean production in health care was used to generate a synthesis of the literature around the chosen research questions. FINDINGS: Lean production in health care is mostly used as a process improvement approach and focuses on 3 main areas: (1) points out in her review “The first barrier that needs to be overcome in Lean implementation is to convince staff that Lean can work in a healthcare setting… the usual reaction is that patients are not cars and health care organizations have completely different organizational settings than the automotive industry.” There are no specific methods for implementing LEAN in hospitals and there is no universal model of LEAN that can be directly applied but in the last 15 years Lean has been increasingly adapted and adopted in healthcare [3]. For example in 2011, 90% of Swedish public hospitals had implemented LEAN to some degree [4].

In healthcare, specifically, there are abundant case summaries of lean implementation in the literature however there has been almost no systematic research on how LEAN is implemented across dissimilar contexts within and between organizations [5]. Often LEAN is introduced in just a small part of the organization but a general opinion is that to gain the full potential of LEAN the whole organization has be involved and work hard for years.

This introduction should be considered as an appetizer or inspiration for you to think LEAN. The presentation will focus on examples of successful implementation of lean thinking in healthcare and personal experience of working with the LEAN concept. I will present a couple of tools and some good examples which you hopefully could relate to and thereby get you started thinking on how you and your colleagues could get your mind set to continuous improvement.

References:
The Impact of LEAN in a PET Department
L. Stine, E. Saxtoft (Copenhagen)

One of the particularly meaningful missions of our department is to provide and maintain optimal care for our patients and give them an excellent experience of PET/CT scanning. We strive to not analyze this process, thus ensuring the wellbeing of the patient and the staff. The demands on our clinical department have, however, been increasing over the last few years and we have chosen to evaluate our busy department practices by using LEAN principles. LEAN is a very valuable and widespread tool within our department. The process consists of, first, identifying and second, changing inefficient or ineffective working practices. The implementation of LEAN benefits both our patients and the staff by creating a positive environment, where we still maintain a high quality standard of care for the patient, satisfying workplace for the staff, and general cost reductions due to more efficient workflows. LEAN principles are a simple matter of cultural changes and our department has easily adopted this new way of thinking, acting and working. These positive changes continually motivate the staff to appreciate the value of working smarter. By saving time and energy we can improve turnaround, where less efficient routines are changed into better workflows. Going LEAN has at least two beneficial aspects: the effect of maximizing cost reduction but also a better and smarter way of performing routine procedures. The concept of LEAN is definitely not only applicable for the automotive industry, but also for the improvement of any modern healthcare facility. Its power and impact have already been proven by Nuclear Medicine departments in Denmark and other Scandinavian countries. The ultimate purpose of introducing LEAN in our department was to maximize the clinical value of the examination for the patient and at the same time to reduce waste of resources by ineffective time management. In standard LEAN practice every minute is utilized, but in Nuclear Medicine we do not consider that to be a realistic goal since our customer/product is the patient, and the patient is often very unpredictable. In many cases, interactions with patients lead to unexpected time consuming situations and here following LEAN principles become a challenge that leads to improvisation and replanning of routines.
The introduction of LEAN:
Our department established a team consisting of employees from every professional group in order to make a realistic map of the workflows. Furthermore, a LEAN consultant participated as an observer analyzing our work routines and following us throughout our daily tasks. The staff was afterwards interviewed and asked to answer questionnaires which all together led to an implementation plan for our department.

a- Some of the most remarkable outcomes:
b- Secretaries book patients to arrive 15 min earlier than previously.
c- First booking of the day is a “double booking” which means a whole body and brain examination patients arrive at the same time.
d- Patients receive a questionnaire with their information letter by mail.
e- FDG is prepared and loaded into a fully automatic injector prior to release so it is ready for infusion.
f- Oral contrast is placed next to the patients before giving FDG injection. The patient is asked to drink the contrast while resting.

Furthermore, we introduced a weekly LEAN board meeting where everyone is standing. At this meeting all professionals have the opportunity and possibility to present any kind of clinical proposals and solutions related to daily practice. We have for instance been given synchronized tablets for each scanner in order to save time when searching for examination protocols, tracer release time, mutual appointments or patient transport follow-up. Many new actions have been established since LEAN was introduced to our department. It took some time changing old behaviors and some ideas appeared to be silly in the beginning, but eventually many of the ideas turned out to be very useful and efficient. The adoption of LEAN is the adoption of a new work culture and this has resulted in an improved workflow and a better experience for the patient. We are a group of professionals, who have become even more creative and better to support each other. We appreciate the value of LEAN and we have mutually made it to become a success. We have changed our mindset in many ways, even though it was not easy in the beginning.

References:
Wednesday, October 14, 2015 – Hall 4

**09.30 – 10.45**  
**CTE VI – Imaging Protocols in Radionuclide Therapy**  
Chair: C. Pestean (Cluj Napoca), (tba)

**09.30 – 09.55**  
**Imaging Aspects in Peptide Receptor Radionuclide Therapy**  
L. Bodei (Milan)

**09.55 – 10.20**  
**Selective Internal Radionuclide Therapy-Imaging and Therapy**  
J. de la Roche (Oldenburg)

**10.20 – 10.45**  
**Radioimmunotherapy – The Importance of Imaging**  
P. A. Erba (Pisa)

**11.45 – 12.00**  
**Awards Ceremony**

**12.00 – 13.00**  
**Highlights Lecture**

**13.00 – 13.15**  
**Closing Ceremony**
CTE VI

Imaging Protocols in Radionuclide Therapy
Imaging Aspects in Peptide Receptor Radionuclide Therapy

L. Bodei (Milan)

Peptide Receptor Radionuclide Therapy (PRRT) is an established effective therapeutic modality in the treatment of inoperable or metastatic gastroenteropancreatic, bronchopulmonary and other neuroendocrine tumors (NETs) and has been used for two decades. Standard clinical protocols of PRRT consist in the systemic administration of a suitably radiolabeled synthetic somatostatin analogue (SSA), fractionated in sequential cycles (usually 4–5) every 6 to 9 weeks, until the intended total amount of radioactivity has been delivered. The precise amount administered depends mainly on the limitations imposed by renal and bone marrow irradiation. To reduce the irradiation to the kidneys, patients receive the co-infusion of positively charged amino acids, which competitively inhibit the tubular reabsorption of the radiopeptides. The two most commonly used compounds, [90Y]-octreotide and [177Lu]-octreotate are well tolerated and provide objective response rates of 15-35%, which impact on survival.

According to the theranostics concept, patients are selected for PRRT and subsequently followed up, basing on somatostatin receptor imaging. Techniques available include [111In]-pentetreotide and, more recently PET/CT with [68Ga]-DOTA-SSA. These, particularly the PET techniques, exhibit optimal diagnostic sensitivity for primary and metastatic NETs and demonstrate a clinical impact in terms of modification of the therapeutic strategy. A pre-therapeutic somatostatin receptor imaging showing high tumor uptake (e.g. higher than the one of the normal liver) has an important prognostic value for predicting the efficiency of PRRT. However, the exact correspondence between the SUVmax of the pre-therapeutic [68Ga]-PET and the uptake at [177Lu]-scan is still debated.

In recent years, following to the demonstration of a prognostic value in G1-G2 NETs, the role of [18FDG] PET/CT has been reconsidered, and it’s presently being inserted in the preliminary work-up of NETs in many centers.

During PRRT, particularly with [177Lu]-peptides, patients can be studied with a post-therapeutic scan, to provide an image of the distribution of the therapeutic radiopeptide, assess the disease status, ascertain the correctness of the therapy from a technical point of view, and perform a dosimetric study. Bremsstrahlung imaging after [90Y]-peptidescan be of difficult interpretation, due to the quality of their construction of the activity distribution. This frequently leads to the co-administration of [111In]-labeled peptides, particularly for dosimetry purposes. On the other hand, images after [177Lu]-peptides are clear, more easily interpretable and routinely obtained in the various centers. The sequential imaging after [177Lu]-peptides gives the possibility of assessing the course of the disease during therapy and can guide further imaging, if deemed necessary. Moreover, the modification of the uptake during PRRT is presently the only predictor of objective response.

References

Selective Internal Therapy – Imaging and Therapy

J. de la Roche (Oldenburg)

Abstract not submitted
Radioimmunotherapy – The Importance of Imaging

P.A. Erba (Pisa)

Radionuclide therapy is a systemic treatment that aims to deliver cytotoxic radiation to cancer cells. Due to their properties, antibodies have been considered as suitable agents for the delivery of therapeutic radioisotopes, radioimmunotherapy (RIT).

This lecture aims to provide an overview of new approaches for imaging and therapy of solid cancer with particular attention to the role of imaging in identifying patients most likely to benefit from RIT by using a “teragnostic” approach.

The inclusion of a diagnostic radiopharmaceutical with identical or similar pharmacokinetic characteristics as the therapeutic compound, followed by a diagnostic scan to reveal the compound accumulation at the cancer lesion is a preferred and effective strategy to guide the selection of the most suitable patient for successful RIT. The in vivo determination of target expression using molecular imaging is useful to circumvent several limitations of conventional immunohistochemistry and serum assays. Alternatively used to screen target expression, the introduction of hybrid cameras changes the paradigm of imaging. By SPECT/CT and PET/CT it is possible to obtain better identification and delineation of the target and better prediction of dosimetric estimates. In this regard, the lecture will discuss the advantages of the use of SPECT/CT and Immuno PET to improve the understanding of in vivo behavior and efficacy of antibodies. In immuno PET, the antibody is labeled with a positron emitter to enable visualization with a PET camera. In the past decade, crucial breakthroughs have been made that allow for broad-scale application of immuno PET, both in clinical and research settings. For Immuno PET, 2 positron emitters are especially well suited for labeling intact mAbs: zirconium-89 and iodine-124. With their relatively long half-lives, these nuclides are ideal for obtaining maximum information when imaging is carried out several days after injection. In addition, using imaging it is possible to confirm the effective delivery of the radionuclide antibodies after therapy.

Imaging is also fundamental for a better prediction of dosimetric estimates. Indeed, diagnostic activities would thereby serve as support for dose estimation and impact the rationalization of treatments based on dose-effect relationships. These diagnostic scans anticipate on potential adverse effects of the therapy and are helpful to monitor therapy responses in follow-up studies and can be repeated in order to monitor eventually changes of target expression which may occur during target-therapy or cancer progression. The possibility of achieving reliable quantification by 3D PET or SPECT imaging, result in the production of 3D arrays that describe the voxel by voxel distribution of activity in the patient’s body.
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