Pre-Congress Symposium 5
Dosimetry + Physics Committee
Saturday, October 12, 09:00-12:00

Session Title
Dosimetry from Image Reconstruction with Monte Carlo Modelling

Chairpersons
Pablo Minguez Gabiña (Barakaldo, Spain)
Michael Ljungberg (Lund, Sweden)

Programme

09:00 - 09:30	Johan Gustafsson (Lund, Sweden): Statistical Reconstruction Methods - Principles
09:30 - 10:15	Michael Ljungberg (Lund, Sweden): An Introduction to Monte Carlo Calculations for Imaging and Dosimetry
10:15 -10:45	**Coffee Break**
10:45 - 11:20	Pablo Minguez Gabiña (Barakaldo, Spain): Problems Related to Dosimetry for Therapy Based on Quantitative SPECT Imaging
11:20 - 11:50	Hugo W. A. M. de Jong (Utrecht, Netherlands): Examples of the Usefulness of Monte Carlo Modelling within a Reconstruction Process
11:50 - 12:00	Discussion and Concluding Remarks

Educational Objectives
1. Highlight the principles and properties of statistical reconstruction methods regarding quantitative imaging for therapy applications.
2. Highlight problems for SPECT imaging that are related to the camera and radiation physics to the use in therapy applications.
3. Highlight how these problems can be modeled within the reconstruction methods and from this compensate for the negative effects.
4. Highlight the potentials of Monte Carlo-based statistical reconstruction in different imaging applications for radionuclide therapy including radionuclides with complex decay schemes.

Summary
Statistical reconstruction methods are today the most common methods to obtain tomographic images from SPECT measurements. The methods are based on modeling the camera systems and thereby iteratively find a good estimate of the internal radionuclide distribution from the similarity of the calculated and measured projection data. The main advantage is that if physical problems, associated with the measurement of the radiation, such as, heterogeneous photon attenuation, contribution from scattered photons, partial volume problems due to collimator resolution, septal penetration, etc, can be modeled accurately then this effect naturally comes out as a compensation if the processes are accurately modelled. How this works will be described in the first part of the course together with an introduction of how the radiation transport of both photons and electrons can be simulated. During the second part of the program, the use of quantitative SPECT imaging with specific isotopes and applications in radionuclide therapy will be discussed.

Key Words
SPECT, Reconstruction, Monte Carlo, quantitation, Dosimetry, Corrections