Session Title
Calibration of Instrumentation for Dosimetry

Chairperson
Rie Strand Olsen (Copenhagen, Denmark)

Programme
09:00 - 09:20  Laurence Beels (Kortrijk, Belgium): Calibration of Instrumentation for Dosimetry - Principles and Applications
09:20 - 09:54  Kristof Baete (Leuven, Belgium): Calibration of the Non-Imaging Instrumentation for Dosimetry
09:54 - 10:28  Jonathan Gear (London, United Kingdom): Calibration of the Imaging Instrumentation for Dosimetry

Educational Objectives
1. Overview the applications where calibration of the instrumentation is needed
2. Discuss crosscalibration
3. Highlight the importance of the activity meter calibration
4. Explain the value of the calibration of the portable radiation detector
5. Describe the calibration of the gamma well counter for quantitative measurements on samples.
6. Discuss the most commonly used phantoms for calibration of the imaging instrumentation
7. Explain the calibration method of the SPECT/CT and PET/CT scanner

Summary
Personalized radiation dosimetry for routine clinical practice and for use in research protocols in radionuclide therapy procedures with different isotopes, requires calibration of the nuclear medicine instrumentation.

The aim of dosimetry in radionuclide therapy is to determine the absorbed dose in tumours, target organs and healthy tissue resulting from internal radiation by the radiopharmaceutical. Proper calibration of the instrumentation has to be implemented to interprete the results of the measurements.

Calibration of the activity meter for the used isotope in the same geometry is needed to calculate the calibration factor. This is the first essential step for dosimetry procedures; the activity meter is used to determine the activity administered to the patients but also to determine the activity used for further cross-calibration of other nuclear medicine instrumentation.

If the dosimetry requires the measurement of blood and or urine samples on the gamma well counter, a reference standard with a well-known activity has to be measured to calculate the calibration factor. From that moment on, the measured counts in the samples can be converted into activity values.
Portable radiation detectors can be used to determine the whole body activity during the hospitalization of the patient. In this case, a calibration based on phantoms/standards has to be done.

Phantoms with a well-known activity, measured in the calibrated activity meter are needed to determine the calibration factor on the PET/CT and SPECT/CT scanner. The choice of an ideal concentration of the activity will be crucial.

Once the calibration of the instrumentation has been done, the dosimetry can be performed by use of images, whole body activity measurements and/or activity measurements in blood/urine samples on several time points. Standardization, harmonisation and metrology is needed to ensure the determination of activity.

**Key Words**
Dosimetry, calibration, activity meter, gamma well counter, PET/CT, SPECT/CT