Joint Symposium 14
Dosimetry + Radiation Protection Committee / International Commission on Radiological Protection (ICRP)
Monday, October 14, 14:30-16:00

Session Title
Radiological Protection in Therapy with Radiopharmaceuticals

Chairpersons
Wesley Bolch (Gainesville, United States of America / ICRP)
Mark Konijnenberg (Rotterdam, Netherlands)

Programme

14:30 - 15:00 Wesley Bolch (Gainesville, United States of America / ICRP): ICRP framework for Individual Absorbed Dose Estimation

15:00 - 15:30 Glenn Flux (Sutton/United Kingdom): Justification and Optimisation of Protection in Radiopharmaceutical Therapy Patients

15:30 - 16:00 Mark Konijnenberg (Rotterdam, Netherlands): EANM Framework for Individualized Treatment Planning and Dose Verification

Educational Objectives
1. Learn the ICRP methods for patient dosimetry and for radiation protection dosimetry of staff and caregivers in radiopharmaceutical therapy (RPT).
2. Learn the assets in patient care and radiation protection by treatment planning in RPT
3. Learn and discuss the practical options in performing RPT treatment planning and verification of absorbed doses delivered to patients

Summary
The use of radiopharmaceuticals for therapy using novel radionuclides, compounds, tracer molecules, and the administration techniques is increasing for the treatment of various tumours. The goal of radiation therapy, including therapy with radiopharmaceuticals, is to optimise the relationship between the probability of control of tumour/target tissue and complications in normal tissue. Essential to this optimisation is ability to quantify radiation dose to both tumour/target tissue and normal tissue. The ICRP has written a report that provides a framework for calculating radiation doses for various treatment approaches. In radiopharmaceutical therapy, the absorbed dose in an organ or tissue is governed by the radiopharmaceutical uptake, retention in and clearance from the various organs and tissues of the body, together with radionuclide physical half-life. These biokinetic data are based on measurements made using techniques that vary in complexity and the required accuracy will depend on the specific application. For treatment planning, absorbed dose calculations are performed prior to therapy using a trace-labelled diagnostic administration, or post-therapy on

the basis of the therapy administration. Uncertainty analyses provide additional information about sources of bias and random variation and their magnitudes; these analyses show the reliability and quality of absorbed dose calculations. Effective dose can provide a measure of lifetime risk of detriment attributable to the stochastic effects of radiation exposure, principally cancer, but effective dose does not apply to short-term deterministic effects associated with radiopharmaceutical therapy. Accident prevention in radiation therapy should be an integral part of the design of facilities, equipment, and administration procedures. Optimisation of staff exposures includes consideration of equipment design, proper shielding and handling of sources, and personal protective equipment and tools, as well as education and training to promote awareness and engagement in radiation protection. The decision to hold or release a patient after radiopharmaceutical therapy should take account of estimates of possible radiation dose to members of the general public and carers from residual activity in the patient. In these situations, specific radiation protection guidance should be provided to patients and caregivers.

Key Words
Absorbed dose, treatment planning, radiation protection, radiopharmaceutical therapy, therapy patient isolation measures