CME 13 (Dosimetry/Radionuclide Therapy/Radiation Protection)
Wednesday, October 25, 08:00-09:30

Session Title
Treatment Planning for Radionuclide Therapy, How Simple Can it Be?

Chairs
Nicolas Chouin (Nantes)
Stephan Walrand (Brussels)

Programme

8:00 - 8:05 Introduction

8:05 - 8:25 Laurine Keulemans (The Hague): Legal Requirements for Nuclear Medicine Therapy Imposed by the BSS as Implemented in the Dutch Law

8:25 – 8:45 Barbara Godthelp (The Hague): Radiation Protection and Waste Management in Radionuclide Therapies

8:45 - 9:05 Samer Ezzidin (Homburg): Are Traditional Fixed Activity Schedules Appropriate for Advancing in Personalised Medicine?

9:05 – 9:20 Katarina Sjögreen Gleisner (Lund): Examples of Workflow and Requirements for Patient-Specific Dosimetry-Guided Treatments

9:20 – 9:30 Wrap-up and Discussion

Educational Objectives
1. Learn the legal responsibilities for prospective treatment planning of radionuclide therapy
2. Acknowledge the possible consequences of new regulations in radiation protection and radioactive waste disposal for the nuclear medicine practice
3. Understand how the traditional way of fixed activity dosing schemes based on safe dose cohorts can be still considered to be part of a personalized treatment
4. Comprehend the steps involved in a dosimetry guided treatment planning model that lead to a patient-specific therapy

Summary

In all radiotherapy, including therapeutic application in nuclear medicine, patient exposures should be individually planned and appropriately verified taking into account that doses to non-target volumes and tissues shall be as low as reasonably achievable and consistent with the intended radiotherapeutic purpose of the exposure. This article from the revised Basis Safety Standards in EC directive 2013/59 will change the current clinical practice in radionuclide therapy considerably. These changes will have to be implemented very soon as the national legislations in the EU are rewritten according to this directive and will be enforced by February 6, 2018. The main change in the BSS is that the radiological protection recommendations are applied according to ICRP publication 103 (2007). This has several consequences for the definition of effective dose, but also operational limits like the eye lens dose limit is set at 20 mSv instead of the current 150 mSv.

The position of the EANM is bivalent; it is important to keep the current nuclear medicine therapy practice alive and some guidance is needed to help initiating optimised patient-specific dosimetry. Radionuclide therapy treating patients with fixed activity possibly adjusted to weight does not lead to overt toxicity. Safe maximum tolerable activities have been determined in phase 1 trials for typical patient cohorts, or are based on decades of experience. This is comparable to the customary practice in cytotoxic chemotherapy, with the advantage that patients can be selected by imaging with a theranostic companion drug and that the delivery in most cases can be verified post-therapy.

Radionuclide therapies should be administered at the highest tolerance level. Dosimetry can help to define the thresholds at a patient-specific level, either by a pre-therapeutic assessment or in between treatment cycles. Treating at a maximum tolerable threshold dose will maximise the dose to the target, even when it is not observable like in most metastasized disease. Implementation of patient-specific treatment planning could be the next step to improve outcome, although evidence by prospective clinical trials is needed. Simple dosimetry to minimally comply to the requirement of treatment planning or implementation of a full comprehensive patient-specific treatment planning protocol is the choice by which the burden of another regulation can turn into an opportunity.

Key Words

Dosimetry, patient-specific treatment planning, radionuclide therapy, EC directive 2013/59/Euratom, Basic Safety Standards, Medical Physics Expert, MIRD scheme