Educational Course Outlines
International Symposium on Standards, Applications and Quality Assurance in Medical Radiation Dosimetry (IDOS)

IAEA Vienna, 9-12 November, 2010

There will be 3 courses given at this year's IDOS symposium. The description of the courses can be found below.

If you would like to participate in one or more of these courses, please let us know by 31 October, 2010 (Dosimetry-Symposium.Contact-Point@iaea.org).

IDOS COURSES

(1) Formalism for internal dosimetry	(Wednesday, Nov 10, 8:00-8:50)
(2) Clinical dosimetry paediatric Imaging	(Thursday, Nov 11, 8:00-8:50)
(3) Beyond TG-43 to improve brachytherapy dosimetry	(Friday, Nov 12, 8:00-8:50)

LOCATIONS TO BE ANNOUNCED AT A LATER DATE

Course 1 - Formalism for internal dosimetry
Wednesday, Nov 10, 8:00-8:50

Lecturer: George Sgouros, Ph.D.

The objectives of the course are to:

1. Describe the new, unified dosimetry formalism
2. Explain the appropriate use of equivalent dose and effective dose quantitites and units
3. Discuss the requirements of radiopharmaceutical therapy and the MIRD Committee's proposals to address these requirements.

Content:

The initial formalism for internal dosimetry of radiopharmaceuticals was established by the Medical Internal Radiation Dose (MIRD) Committee in Pamphlet 1, which was published in 1968 and updated in 1973. Using notations and nomenclature appropriate to radiation protection in occupational, environmental and medical applications, this basic formalism was also adopted by the International Commission on Radiological Protection (ICRP). In 2009, with the publication of MIRD Pamphlet 21, the nomenclature and notation were unified so that a single set of equations and quantities can be used for both radiopharmaceutical and occupational internal dosimetry. In recognition of the increasing use of radiopharmaceuticals for therapy and the potential for confusing stochastic endpoints with deterministic end-points, Pamphlet 21 also clarifies the use of equivalent dose and effective dose in radiopharmaceutical dosimetry and alludes to the need for quantities and units applicable to deterministic radiation effects for radiopharmceutical therapy dosimetry.

Course 2 - Clinical dosimetry paediatric Imaging
Thursday, Nov 11, 8:00-8:50

Moderator: Alberto Torresin, Ph.D.
Lecturers: Keith Faulkner, Ph.D., John Boone, Ph.D., Wesley Bolch, Ph.D.

The objectives of the course are to:

Inform medical physicists and metrologists about the appropriate methodologies, issues and controversies associated with paediatric dosimetry.

Content:

1. Advice to the clinician: the role of dosimetric determination (10 min)
Lecturer: Keith Faulkner, Ph.D.

- Scheme of dose determination from physicist / risk assessment based on radiation biology and epidemiological evidence –
- Referral pathways, patient information and confirmed consent
- Critical information needed for dosimetric evaluation

2. Paediatric CT dosimetry (20 min)
Lecturer: John Boone, Ph.D.

- Moving from equipment output measurements to patient organ doses
- Patient modelling for paediatrics
- Differences between adult and child dosimetry
- Methodologies with references for appropriate software

3. Paediatric dosimetry in Nuclear medicine (including PET CT) (20 min)
Lecturer: Wesley Bolch, Ph.D.

- Moving from activity measurements to patient organ doses
- Patient modelling for paediatrics
- Differences between adult and child dosimetry
- Methodologies with references for appropriate software

Course 3 - Beyond TG-43 to improve brachytherapy dosimetry (Friday, Nov 12, 8:00-8:50)

Lecturer: Firas Mourtada, Ph.D.

The objectives of the course are to:

1. Identify the clinical limitations of the current TG‐43 formalism.
2. Review current development of advanced dose calculation algorithms for brachytherapy.
3. Summarize the proposed AAPM TG‐186 efforts to guide the transition brachytherapy practice beyond TG‐43.

Content:

The current standard of practice for brachytherapy absorbed dose calculations relies on the American Association of Physicists in Medicine (AAPM) Task Group No. 43 (TG‐43) report, which has been in clinical use for over 15 years. TG‐43 provides a useful and practical dose calculation methodology, but has known limitation primarily based on the inability of the TG‐43 formalism to account for two key effects: (a) radiation scatter conditions and (b) radiological influence of material heterogeneities differing from liquid water. A growing body of literature has shown that accepted clinical dosimetry can be over‐ or under‐estimated by >10% in certain situations using the current TG‐43 approach. Prostate low dose rate (LDR) seed implants, breast brachytherapy (high dose rate (HDR) sources and LDR seeds), eye plaque treatments (LDR seeds), and HDR brachytherapy with shielded applicators have been the most widely studied cases.

In the last decade, external beam radiotherapy treatment planning adopted heterogeneities‐based dose modelling using model‐based dose calculation (MBDC) algorithms such as collapsed‐cone, superposition‐convolution, and Monte Carlo methods. Recently, advanced MBDC algorithms for sealed sources brachytherapy dose calculations have been introduced to the radiation oncology community. The AAPM formed a new task group, TG‐186, to provide a thorough literature review of this field and guidance regarding the early adoption of model‐based calculation algorithms.