IAEA Supports Training in Internal Dosimetry

Many of the world's leading experts in internal dosimetry joined the faculty of a 5-d International Atomic Energy Agency (IAEA)–International Centre for Theoretical Physics (ICTP) advanced school of internal dosimetry for medical physicists specializing in nuclear medicine. The event took place April 12–16 at the Abdus Salam ICTP, outside Trieste in northern Italy. The school was sponsored jointly by the IAEA and ICTP and took a comprehensive approach to reviewing the principles of internal dosimetry, with particular emphasis on dosimetry for therapeutic nuclear medicine.

The drive for more accurate and patient-specific dosimetry comes mainly from the increasing availability and use of therapeutic radiopharmaceuticals. Such treatments deliver high doses of radiation to specific targets, with the intent of providing a curative or palliative effect. However, the resulting absorbed dose to both the target and healthy organs is several orders of magnitude higher than that received from a diagnostic scan. The urgency for more accurate and patient-specific internal dosimetry grows accordingly. The tools available today for calculating absorbed dose have matured from earlier techniques, becoming more sophisticated and covering the spectrum from estimating whole-body dose to evaluating specific radiation energy deposited in single cells. An adequate understanding of the underlying principles involved in internal dosimetry calculations is imperative for their application—the methods and tools are based on assumptions and are largely dependent on a user accurately calculating and inputting proper descriptions of the "true" biodistribution of a radiopharmaceutical. When applied correctly, the methods can be used to estimate patient-specific dosimetry.

The chair of the SNM Medical Internal Radiation Dose committee, George Sgouros, PhD, teamed with several members of the dosimetry committee of the European Association of Nuclear Medicine, including Manuel Bardies, PhD, Carlo Chiesa, PhD, Glenn Flux, PhD, Michael Lassmann, PhD, and Lidia Strigari, PhD, to provide lectures for the course. Additional lecturers from Italy included Faustino Bonutti, PhD, and Onelio Geatti, MD. Practical sessions at the nuclear medicine section of the nearby Azienda Ospedaliero Universitaria "Ospedali Riuniti" di Trieste were led by Mario de Denaro, PhD, and Maria Rosa Fornasier, PhD. The European Federation of Organizations for Medical Physics also cosponsored the event, and its secretary general, Renato Padovani, PhD, served as co-director for the school. Padovani also led a successful visit to the PET center at Azienda Ospedaliero Universitaria Santa Maria della Misericordia di Udine.

ICTP operates under a tripartite agreement among the Italian government; the United Nations Educational, Scientific, and Cultural Organization; and the IAEA. The coordinator for medical physics at the ICTP is Luciano Bertocchi, PhD. Thirty participants were selected out of 130 applications from all parts of the world. The school gave participants a unique opportunity to interact with the global internal dosimetry community. Attendees met with colleagues from 28 countries in Africa, Europe, Latin America, North America, and Asia. Medical physics for

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Attendees at the IAEA–ICTP school on internal dosimetry, held in Trieste, Italy. Courtesy: Roberto Barnaba, ICTP Photo Archives.

on surgery. The study included 85 children referred for newly diagnosed brain lesions, 35 in whom MR imaging was unable to identify accurate biopsy targets and 50 in whom MR was unable to delineate tumors for optimal resection. All patients underwent either ^{18}F-FDG PET or ^{11}C-MET PET imaging. The PET data were found to influence surgical decisions or procedures in all cases and with a wide range of benefits. The authors concluded that "PET has a significant impact on the surgical decisions and procedures for managing pediatric brain tumors" and called for further studies to identify effects on outcomes.

Journal of Neurosurgery. Pediatrics

Verifying Remission in RA

Tishler and colleagues from the Assaf Harofe Medical Center (Zrifin, Israel) reported on April 28 ahead of print in *Clinical and Experimental Rheumatology* on a study comparing clinical data with results from ^{99m}Tc-nanocolloid joint scintigraphy in patients with rheumatoid arthritis (RA) who were considered to be in remission. The study included 40 patients (29 women, 11 men; mean age, 60.8 ± 13.5 y, range, 22–86 y) with RA who were determined to be in clinical remission according to conventional clinical criteria. The group had a mean disease duration of 13.4 ± 7.7 y (range, 2–23 y) and mean duration of remission of 22.2 ± 5.2 mo (range, 11–36 mo). Each patient underwent ^{99m}Tc-nanocolloid spot scanning of the skeleton, with SPECT/CT of the wrists and hands. Scanning was scored as positive when at least 1 hand joint showed tracer uptake. Scintigraphy results were negative in 14 (35%) and positive in 26 (65%) patients. Of the 14 negative patients, 1 was seronegative; of the 26 positive patients, 24 were seropositive. No correlation was identified between type of treatment used, time that elapsed in remission, or laboratory parameters and the scintigraphic results. The authors concluded that these results suggest that "the clinical criteria used for remission in RA are not consistent with the actual inflammatory activity in the joints," particularly in the subgroup of seropositive patients.

Clinical and Experimental Rheumatology

REVIEWS

Review articles provide an important way to stay up to date on the latest topics and approaches and provide valuable summaries of pertinent literature. The Newsline editor recommends several reviews accessioned into the PubMed database in late April and May. These include "Criteria for evaluation of disease extent by ^{123}I-metaiodobenzylguanidine scans in neuroblastoma: a report for the International Neuroblastoma Risk Group (INRG) Task Force" by a consortium of nuclear medicine physicians and oncologists, published in the April 27 issue of the *British Journal of Cancer* (2010;102:1319). After an extensive review of the literature and consensus development, the group concluded that "metaiodobenzylguanidine [mIBG] scans are the most sensitive and specific method of staging and response evaluation in neuroblastoma, particularly when used with a semiquantitative scoring method" and that "use of the optimal techniques for mIBG in staging and response, including a semiquantitative score, is essential for evaluation of the efficacy of new therapy." Other noteworthy reviews included "Nanoparticles as a potential cause of pleural and interstitial lung disease" by Bonner from North Carolina State University (Raleigh, NC), published in the *Proceedings of the American Thoracic Society* (2010;7:138–141); "Advances in cardiovascular molecular imaging for tracking stem cell therapy" by Ransohoff and Wu from the Stanford University School of Medicine (CA), e-published on May 10 ahead of print in *Thrombosis and Haemostasis*; "In vivo molecular imaging using nanomaterials: general in vivo characteristics of nano-sized reagents and applications for cancer diagnosis" by Rosenblume et al. from the National Cancer Institute (Bethesda, MD), e-published on May 10 ahead of print in *Molecular Membrane Biology*; and "Viral nanoparticles as platforms for next-generation therapeutics and imaging devices" by Steinmetz from the Scripps Research Institute (La Jolla, CA), e-published on April 27 ahead of print in *Nanomedicine: Nanotechnology, Biology, and Medicine.*

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nuclear medicine is a small but growing field, and internal dosimetry expertise is becoming increasingly important for these specialists. The consensus among the lecturers—also reflected in the participants' evaluation forms—was that the school successfully addressed the need to master internal dosimetry techniques. Many presentations will be available at www.ictp.it, and recorded lectures will be available on the IAEA Web resource for health professionals, to be launched in September 2010 (humanhealth.iaea.org).

Leaving the event proved to be challenging, with virtually all departure flights canceled because of volcanic ash. Many assisted in this situation, but in particular Suzie Radosic went much beyond her responsibilities as course secretary in assuring that all participants and lecturers were looked after until they could leave Trieste.

Each year, the Dosimetry and Medical Radiation Physics section of the IAEA organizes 1 or 2 joint IAEA–ICTP advanced schools on medical physics topics. Proposed for 2011 are a school on advanced radiotherapy techniques, with emphasis on imaging and treatment planning, and an advanced course on mammography. If prioritized, it may be possible to repeat this internal dosimetry course in the 2012–2013 time period.

Stig Palm, PhD
Medical Physicist (Nuclear Medicine)
Dosimetry and Medical Radiation Physics Section
International Atomic Energy Agency