

Update on NIST Beta-Particle Dosimetry Standards and Calibrations

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Standards Development

A new medical-protocol ISO Working Group has been started within Technical Committee 85 (Nuclear Energy), Subcommittee 2 (Radiation Protection). The name of the new working group is Ionizing Radiation Dosimetry and Protocols in Medical Applications, and it has been divided into two Sub Groups: SG1 "Dosimetry and Protocols in Clinical Radiation Protection, Project: Model of Dosimetry Evaluation in Paediatric Computed Tomography Examinations," Project leader B. Aubert; and SG2 "Clinical Dosimetry in Radiation Therapy Project: Clinical Dosimetry - Beta Radiation Sources for Brachytherapy," Project leader C. Soares. The convenor is B. Aubert of the IRSN in France and the co-convenor is C.G. Soares of the NIST. There have now been five full meetings of the WG22; one was held in Paris at the IRSN in Fontenay-aux-Roses on October 13-15, 2004, the second on March 17-18, 2005 in Gaithersburg, MD USA at the NIST, the third October 12-14, 2005 in Delft at the Technical University of Delft, the fourth June 19-21, 2006 in Ottawa, and the most recent on December 11-13 in Berlin at the BEBIG company. At the Paris meeting, the draft document "Clinical Dosimetry - Beta Radiation Sources for Brachytherapy" was considered in detail by SG2 members representing France, the US, Germany and the Netherlands, and a list of possible additional members that the project leader has contacted about participation in the Sub Group was also prepared. A second meeting of ISO TC85/SC2/WG22/SG2 was held in Gaithersburg, MD USA at the NIST on March 17-18, 2005. Members present represented the US, Germany, France, Sweden, the Netherlands, and Mexico. The revised draft (version 2) was discussed at length, including comments emailed by members who could not be present. The draft is still thought to be too long and to contain too much detail on intravascular brachytherapy relative to ophthalmic applications. Major rearrangements of the structure were agreed upon, and assignments were made so as to have a draft ready for vote after the next scheduled meeting in Delft. In Ottawa the comments from the CD vote were considered, and final decisions of the required changes were reached in the meeting in Berlin. The document was submitted for DIS vote on March 15, 2007, and another meeting has been scheduled for December of 2007 to consider the comments raised in the DIS vote. It was also resolved in Berlin that there would be a New Work Item Proposal submitted by the US on clinical dosimetry with radiochromic film. This NWIP was submitted on March 20, 2007.

C.G. Soares has also been named to chair the ANSI working group revising ANSI/HPS N13.11, "Personnel Dosimetry Performance - Criteria for Testing," which is the basis for personal-dosimetry performance testing in the United States. Now in its third edition, this standard has been in place since 1983. Testing under this standard is administered by the National Voluntary Accreditation Program (NVLAP), and accreditation of dosimetry processors under this program is required by US Nuclear Regulatory Commission (NRC) regulations. The US Department of Energy (DOE) also maintains a testing program for its laboratories and contractors, administered by the Department of Energy Laboratory Accreditation Program (DOELAP). A focus in recent years has been the modification of ANSI/HPS N13.11 to allow acceptance by both testing programs in order to bring harmonization to US personal-dosimeter processing testing. The testing philosophy of ANSI N13.11 has always combined elements of type testing and routine performance testing and is thus different from the testing philosophy used in the rest of the world.

Comparisons

The NIST has completed participation in a EUROMET-sponsored protection-beta-particle dosimetry comparison coordinated by the PTB and involving 8 NMIs. The comparison was completed in 2006 and the report is currently being generated by the PTB. In addition, a bilateral comparison with the NMI on beta-brachytherapy dosimetry is ongoing, and the NIST has completed another comparison with the PTB on beta-brachytherapy dosimetry. The results of this latter comparison are being presented at the AAPM meeting in July 2007.

Gel dosimetry

The NIST is beginning investigations with a novel laser-based optical CT scanner for three-dimensional dosimetry of beta-particle and low-energy photon sources. The device was purchased from MGS (New Haven) and promises resolution of under 0.5 mm in three dimensions for 25 mm fields of view. The reader uses the laser to interrogate BANG-2 gels in a number of special geometries suited for the dosimetry of seed and line sources, as well as concave ophthalmic applicators.