

Background

The ICRP has recently developed a new generation of more realistic internal dosimetry models, including the Human Respiratory Tract Model (HRTM, ICRP Publication 66) and recycling systemic models for actinides (ICRP 67 and 69). The 3rd European Intercomparison Exercise on Internal Dose Assessment considered the effects of the new models and the choice of input parameter values on the assessment of internal doses from monitoring results. Results were received from 50 participants, and it was by far the largest exercise of this type carried out. Most participants attempted more than half of the cases. The results in terms of intake and committed effective dose were log-normally distributed with the geometric standard deviation ranging from 1.15 for the cases dealing with ³H and ¹³⁷Cs, up to 2.4 for the cases dealing with ²³⁹Pu. These figures reflect the large differences in the individual results, which varied in the worst cases over a range of five orders of magnitude. Reasons for the differences in the results were identified, including different assumptions about the pattern of intake, and the choice of model. The most important conclusion of the exercise was the need to develop agreed guidelines for internal dose evaluation procedures in order to promote harmonisation of assessments between organisations and countries. This is especially important in the EU because of the mobility of workers between member states.

Objectives

This project addresses specific problems and issues encountered in the nuclear industry, and other users of radioactive materials, in the area of internal dose assessment. The innovative aspects relate mainly to the development and application of new methods, rather than the acquisition of new knowledge or information on biokinetics and internal dosimetry. The project has three main scientific/technological objectives: (1) the creation of a database of well-documented cases, and the filling during and after the project to provide a source of basic information about internal exposure for a large number of radionuclides; (2) the development of a general philosophy for the evaluation of monitoring data from the practical experience of the scientific community; (3) the definition of general guidelines according to the general philosophy.

Principal results

The IDEAS project is divided into Work Packages (WP), one for each of the five major tasks.

Work package 1 (*Collection of incorporation cases*) was devoted to the collection of data both by means of bibliographic research (survey of the open literature) and collecting data from specific organisations. This included the use of information from existing databases on incorporation cases (e.g. RBDATA, which is co-ordinated by a member of the IDEAS consortium). All the participants in the project were involved in collecting data from these and other sources of information. Two databases (the bibliographic database and the internal contamination database) were prepared and some reference cases for the performance of Work Package 3 were selected.

In Work Package 2 (*Preparation of evaluation software*) an existing code was improved by means of a new algorithm for data interpretation. The software was then provided to the partners for the evaluation of the reference cases. In this WP, new methods of data interpretation were studied and compared, the pilot program unit was developed and tested, the procedure of input and output data from the incorporation cases database (WP1) was implemented and advice on the use of the code was given to the partners.

Work Package 3 dealt with the *Evaluation of incorporation cases* by means of the software provided by WP2 and using the reference cases from WP1. Some cases were evaluated by at least two partners. The evaluations were compiled in a database, pointing out common assumptions for similar scenarios, applied models and parameters and procedures to assess uncertainties, the handling of outlying data and measurements below the limit of detection. We produced a report on the basic principles to use in dose assessment based on the general features used by internal dose assessors during the evaluation.

In Work Package 4, which was the core of the project (*Development of the general guidelines*), the partners derived a common strategy for the evaluation of monitoring data. A first draft of the Guidelines was distributed to experts involved in internal dosimetry for comments by means of a so-called Virtual Workshop on the Internet (www.ideas-workshop.de). The consortium discussed the comments and a revised draft was produced in close co-operation with the ICRP Committee 2 Task Group on Internal Dosimetry (INDOS).

Work Package 5 (*Practical testing of general guidelines*) provided a practical test of the draft guidelines by means of a dose assessment intercomparison exercise conducted in collaboration with the IAEA. Six cases were prepared and distributed over the Internet with the guidelines, and the participants were invited to use

them in the assessment of the incorporation cases. Most partners were involved in the preparation of the intercomparison exercise, evaluation of the answers from participants, and drafting the report on the intercomparison. A Workshop (open to all the intercomparison participants) was held (Vienna, April 2005) to discuss the results and any improvements to the draft guidelines identified. The last step of WP5 was the publication of the final version of the general guidelines and their submission to national and international bodies for approval.

Future work

In the frame of CONRAD (A Coordinated Network for Radiation Dosimetry, Contract no. FP6-12684, 6th FP EURATOM, PRIORITY RAD PROT-2004-3.3.5.1-1, Protection in the Workplace) future work will consist in:

- investigation of the uncertainties associated with the assessment of doses after intakes of radionuclides;
- refinement of the IDEAS general guidelines for internal dose evaluation after their initial use by internal dosimetry services.

Main contact person

Christian Hurtgen, christian.hurtgen@sckcen.be

Main reference

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