

Background

The aim of the IDEAS project was to develop General Guidelines for the Assessment of Internal Dose from Monitoring Data. The project was divided into 5 Work Packages for the major tasks.

Work Package 1 entitled *Collection of incorporation cases* was devoted to the collection of data by means of bibliographic research (survey of the open literature), contacting and collecting data from specific organisations and using information from existing databases on incorporation cases. To ensure that the guidelines would be applicable to a wide range of practical situations, a database of cases of internal contamination including monitoring data suitable for dose assessment was compiled. The IDEAS Bibliography database and the IDEAS Internal Contamination database were prepared and some reference cases were selected for use in Work Package 3.

The other Work packages of the IDEAS Project (WP-2 *Preparation of evaluation software*, WP-3 *Evaluation of incorporation cases*, WP-4 *Development of the general guidelines* and WP-5 *Practical testing of general guidelines*) have been described in detail elsewhere and can be found on the IDEAS website.

(www.bologna.enea.it/attivita/ideas.html)

Objectives

A search for reference from the open literature, which contained information on cases of internal contamination from which intake and committed doses could be assessed, has been compiled into a database. The IDEAS Bibliography Database includes references to papers which might (but were not certain to) contain such information, or which included references to papers which contained such information.

This database contains the usual bibliographical information: authors' name(s), year of publication, title of publication and the journal or report number. Up to now, a comprehensive "Bibliography Database" containing 563 references has been compiled. Not surprisingly more than half of the references are from Health Physics and Radiation Protection Dosimetry Journals.

The next step was for the partners of the IDEAS project to obtain the references, determine whether or not they contained monitoring data suitable for dose assessment, and if so, extract the relevant information for transfer to the Internal Contamination Database.

Principal results

The Internal contamination database was built using Microsoft Access™ and contains three main tables: one for the case, one for the monitoring results and one for the assessed intake and dose.

In the table "Case", each incorporation case includes a case number, a main contaminant and a type of intake plus a full description of the incident or accident. This ideally should contain the following information:

date of event, work area, characteristics of work, initiating event, action taken, element and main radioisotope involved, chemical form and physical characteristics and any comments.

Some of the incorporation cases found in the literature are well described but some others contain little if any information. This table contains also a field "Reference number" relating to the reference in the IDEAS Bibliography database.

The table "Monitoring Results" contains: case number, monitoring type (Urine, Faeces, Whole Body, Lungs, Organ, Nose-blow, Nose-swab, PAS, Thyroid or Wound), day (after the date of event) and/or date of monitoring, isotope measured or element, monitoring results and if available uncertainty, MDA (minimum detectable amount), unit of measurement, urine volume (ml), gram of creatinine, gram of faecal ash and remarks on the monitoring

The units of measurement are in SI units. This means that all information found in the literature expressed in Ci or dpm have been converted to Bq. Information expressed as per litre or per day (/L or /d) has not been changed. The data from this table can be easily extracted to be used in dose assessment software.

The table "Dose" contains information about the assessed intake and dose for the case. Most of the cases in the database do not have assessed doses. There are two sorts of dose assessment recorded here; those assessed by the author of the paper or those assessed during an intercomparison exercise. For the latter the geometric and arithmetic means are given and the number of participants to that intercomparison exercise. The user of the database should be aware of the year of the dose assessment. In the last twenty years, the weighting factors have changed and hence the dose coefficients have also changed. This is also true for the assessed intake, where a new Human Respiratory Tract Model has been introduced and some biokinetic models have been modified.

At this time, the IDEAS Internal Contamination database contains 238 cases. Some of the cases are extensively described and contain numerous monitoring data (the maximum is more than 200 data), others are scarcely described and contain only two monitoring results.

The great majority of intakes concerns inhalation cases but the other routes of intake are also represented.

The cases cover about 40 radionuclides ("Main contaminant"). Most of them are alpha emitters such as uranium, plutonium, americium and curium radionuclides.

Beta and gamma emitters are also present such as ^3H , ^{90}Sr , ^{60}Co , ^{137}Cs , ^{125}I and other activation or fission products. There are also some unusual radionuclides e.g. ^{207}Bi , ^{202}Tl .

All the different monitoring types are observed in the database. In decreasing number of occurrence these are: urine, faeces, whole-body, lungs, organ, thyroid, air monitoring, wound, PAS, nose-swab, breath and nose-blow.

The IDEAS Internal Contamination database has several potential applications, including:

- training,
- testing biokinetic models,
- testing software for calculating intakes and doses from bioassay data,
- comparison of data from a new accidental intake with that from previous exposures to similar materials.

The IDEAS Internal Contamination database has been made available to the internal dosimetry community through the IDEAS website.

Type of intake found in database

| Type of intake | Number of occurrences | Number of occurrences | Contaminants | | |
|-------------------------------------|-----------------------|-----------------------|---|--|------------------------------|
| Inhalation | 158 | 43 | Uranium | <i>Main contaminants found in database</i> | |
| Ingestion | 23 | 41 | Plutonium | | |
| Wound | 21 | 7 | Plutonium - Americium | | |
| Chronic Intake | 17 | 23 | Americium or Curium | | |
| Unknown | 10 | 34 | ^{60}Co (+ FP) | | |
| Injection | 6 | 15 | ^{90}Sr | | <i>FP = Fission products</i> |
| Skin contamination, Trans-cutaneous | 3 | 14 | Other activation product | | |
| | | 14 | Other FP (^{95}Zr , ^{137}Cs ...) | | |
| | | 13 | ^{125}I | | |
| | | 11 | ^{203}Pb | | |
| | | 10 | ^{203}Hg , ^{226}Ra | | |
| | | 8 | ^3H | | |
| | | 4 | ^{32}P , ^{207}Bi , | | |
| | | 3 | Other (^{192}Ir , ^{210}Po , ^{231}Pa) | | |
| | | 1 | ^{202}Tl | | |

Future developments

The database is by no means complete, and this presentation is also an appeal for internal contamination cases to extend and update the database.

If you know some references not found in the IDEAS Bibliography database, please send them to the database manager.

If you have some internal contamination case not found in the IDEAS Internal Contamination database, please contact the database manager

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Main

reference

Doerfel H., Andradi A., Bailey M., Blanchardon E., Cruz-Suarez R., Berkovski V., Castellani C.-M., Hurtgen C., LeGuen B., Malatova I., Marsh J., Stather J., and Zeger J. *General guidelines for the assessment of internal dose from monitoring data: Progress of the IDEAS project.* Radiat Prot Dosimetry, 2006; doi: doi:10.1093/rpd/ncl132

Hurtgen C., Andradi A., Bailey M., Blanchardon E., Berkovski V., Castellani C.-M., Doerfel H., Jourdain J.-R., LeGuen B., Malatova I., Marsh J., Puncher M. *IDEAS Internal Contamination Database: A compilation of published internal contamination cases. A tool for the internal dosimetry community.* Radiation Protection Dosimetry 2006; doi: 10.1093/rpd/ncl124