EURADOS Working Group 7
Internal Dosimetry

Motivation

The Internal Dosimetry community dealing with occupational exposures is currently focused on:

- The harmonization of methods and tools to obtain the "best estimate" of the intake and dose due to the incorporation of radionuclides into the body (ICRP, IDEAS Guidelines);
- Networking and coordination of research to promote collaboration of internal dosimetry experts, laboratories and services;
- Normalization for the establishment of Standards for appropriate quality assurance programs that guarantee reliability of the results of monitoring and dose E(50) and permit accreditation of internal dosimetry laboratories and
- Dissemination of knowledge, education and training.

Aims

Working Group 7 (WG7) within EURADOS acts as a network of scientists, services, regulators and laboratories collaborating for the coordination of research and the dissemination of knowledge for the assessment of doses due to intakes of radionuclides. EURADOS WG7 "Internal Dosimetry" program of work (2014-2016) is presented as follows:

- TECHREC Project (EC-DG ENER, 2014-2016) to elaborate "Technical recommendations for Monitoring Individuals for Occupational Intakes of Radionuclides" in Europe.
- Harmonization on internal dose assessments (e.g. IDEAS Guidelines V2, EURADOS Report 01-2013, Technical recommendations for Monitoring and dose assessments – TECHREC project)
- Implementation & quality assurance of reference biokinetic models (e.g. from ICRP/OIR Reports)
- Application of Monte Carlo (MC) methods and voxel phantoms to in-vivo monitoring (collaboration with WG6 "Computational Dosimetry").
- Individual monitoring of internal exposures for Emergency scenarios (e.g. Emergency In-vitro Bioassay intercomparison, EURADOS survey of individual monitoring data of foreigners due to Fukushima NPP accident).
- Education and training on internal dosimetry (e.g. Fundamentals, MC for in-vivo monitoring,…)
- Internal Microdosimetry (collaboration with WG6 "Computational Dosimetry").
- Study of biological dosimetry vs. internal dosimetry in cases of accidental internal exposures (collaboration with WG10 "Retrospective Dosimetry").

Actions

Completed

- EURADOS/IAEA *Training Course* on Advanced Methods for Internal Dose Assessment. Application of IDEAS Guidelines and dissemination of CONRAD internal dosimetry results (CTU-Prague, 2-6 February 2009).
- MC Intercomparison of ^{241}Am in knee (**Task 7.4 + WG6)**
- Monte Carlo Intercomparison of enriched Uranium in the lungs of a Livermore Torso Phantom
- In-vivo/MC Intercomparison for determination of ^{241}Am in a USTUR leg phantom.
- Update of IDEAS Guidelines and IDEAS Databases(**Task 7.1**)
- In vivo monitoring Intercomparison of Am-241 in 3 skull phantoms (**Task 7.4**)
  - MC Intercomparison of Am-241 in 3 skull phantoms (**Task 7.4 + WG6**).
  - EURADOS/KIT Training Course on MC calibration of Body Counters (**Task 7.4 + WG6)**
  - Emergency In vitro Bioassay Intercomparison (**Task 7.4**).
- EURADOS Survey of individual monitoring data and dose assessments of foreigners exposed in Japan due to the Fukushima Daiichi NPP accident (**Task 7.4**).

Ongoing and planned

- Guidance for the application of ICRP/OIR biokinetic models. EURADOS Report (**Task 7.2**)
- Towards a DTPA Therapy model (**Task 7.2/Task 7.3**)
- Monte Carlo (MC) applications to in-vivo measurements of radionuclides (**Task 7.4+WG6)**
- Uncertainty Studies on Internal Dose Assessments (**Task 7.5**).
- Training Courses on Internal Dosimetry. Fundamentals. (**Task 7.6**).
- TECHREC Project, EC DG ENER (**Task 7.6**).
- Internal Microdosimetry (**Task 7.7**).
- Biodosimetry vs. Internal Dosimetry in case of accidental internal exposures (**Task 7.8 + WG10**).

Contact

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Task Coordinators

- Task 7.1– Update of IDEAS Guidelines. C.M. Castellani (ENEA,Italy)
- Task 7.2/Task 7.3– Application/QA of Biokinetic Models. D. Nosske (BfS, Germany)
- Task 7.4– Application of Monte Carlo Methods to in-vivo monitoring of radionuclides.
  D. Franck/D. Broggio (IRSN, France) and A.L. Lebacq (SCK-CEN, Belgium)
- Task 7.5– Uncertainty Studies. E. Blanchardon (IRSN, France)
- Task 7.6– Training actions on internal dosimetry. TECHREC Project. G. Etherington (HPA, UK)
  Task 7.7– Internal Microdosimetry W. Hofmann (Univ. Salzburg, Austria) & W. Li (HMGU, Germany)

Publications - Dissemination of knowledge

- EURADOS Intercomparison on Emergency Radiobioassay. *Chunsheng Li, Paolo Battisti, Philippe Berard, Alain Cazoulat, Antonio Cuellar, Rodolfo Cruz-Suarez, Xiongxin Dai, Isabella Giardina, Derek Hammond, Carolina Hernandez, Stephen Kiser, Raymond Ko, Sheila Kramer-Tremblay, Yannick Lecompte, Eva Navarro, Cristina Navas, Baki Sadi, Inmaculada Sierra, Freddy Verrezen, Maria A Lopez.* **Radiation Protection Dosimetry, 2015**. Doi: 10.1093/rpd/ncu366
- EURADOS ^{241}Am in vivo skull measurement intercomparison. *P. Nogueira, W. Rühm, M.A. Lopez,T. Vrba, W. Buchholz, P. Fojtík, G. Etherington, D. Broggio, J. Huikar9, O. Marzocchi, T. Lynch, A. Lebacq, C. Li, J. Ośko, I. Malátova, D. Franck, B. Breustedt, D. Leone, J. Scott, A. Shutt, B. Hauck, K. Capello, B. Pérez-López, J. F. Navarro-Amaro, T. Pliszczyński, K. Fantínová, S. Y. Tolmachev.* **Radiation Measurements 2015 (in press).**
- Counting Am-241 in the BfS skull phantom on contact – evaluation in the Human Monitoring Laboratory. *Chunsheng Li, Barry Hauck, Kevin Capello, Pedro Nogueira, Maria Lopez, Gary Kramer.* **Health Physics 2015**
- Developing a physiologically based approach for modeling plutonium decorporation therapy with DTPA. *M. Kastl, A. Giussani, E. Blanchardon, B. Breustedt, P. Fritsch, C. Hoeschen, M.A. Lopez.* **International Journal of Radiation Biology 2014 May 21: 1-6**
- EURADOS Survey on in-vivo monitoring data of exposed foreigners in Japan obtained in their respective countries at early stage after the nuclear accident of Fukushima Daiichi NPP. International Expert's meeting on Radiation Protection after the Fukushima Daiichi NPP accident. *M.A. Lopez, P. Fojtik, D. Franck, J. Osko, A.L. Lebacq, C. Li, I. Malatova, S. Holm, J. Huikari, M. Muikku, P. Bérard, B. Breustedt, U. Gerstmann, C. Scholl, V. Kamenopoulou, K. Potiriadis, I. Balásházy, P. Zagyvai, B. Lind, R. Kierepko, J.W. Mietelski, T. Pliszczynski,,J.F. Navarro, T. Navarro, B. Perez, L. Del Risco, G. Etherington, J.E. Scott, V. Vasylenko.* **IAEA, Vienna, Austria. February 17-21, 2014**.
- Developing a physiologically based approach for modeling plutonium decorporation therapy with DTPA. *Giussani A, Blanchardon E, Breustedt B, Fritsch P, Hoeschen Ch, Lopez M.A.* Presentation at the HEIR2013 (Health Effects of Ionizing Radiations) Conference held in San Francisco, USA, October 13-17, 2013. **International Journal of Radiation Biology 2014 May 21: 1-16.**
- Parameter uncertainty analysis of a biokinetic model of caesium. *Li W.B, Klein W., Blanchardon E, Puncher M, Leggett R.W, Oeh U., Breustedt B, Noßke D. and Lopez. M. A.* **Radiation Protection Dosimetry (2014), pp. 1–21** doi:10.1093/rpd/ncu055
- EURADOS intercomparison exercise on MC modelling for the in-vivo monitoring of Am-241 in skull phantoms (Part I*). Vrba T., Nogueira P. Broggio D, Caldeira M. Capello K. Fantínová K. Figueira C, Hunt J. Leone D. Murugan M. Marzocchi O. Moraleda M. Shutt A. Suhl S. Takahashi M.Tyminska K. Lopez M.A. Tanner R.* **Radiation Physics and Chemistry, December 2013.** Presentation at 1st International Conference on Dosimetry and its Application, Prague, Czech Republic, June 23-28, 2013.
- IDEAS Guidelines (version 2) for the Estimation of Committed Doses from Incorporation Monitoring Data. EURADOS Report 2013-01. *Castellani C.M, Marsh J.W, Hurtgen C, Blanchardon E, Berard P, Giussani A, Lopez M.A.* Braunschweig, March 2013. ISSN 2226-8057. ISBN 978-3-943701-03-6. **EURADOS Report 2013-01.**
- Modeling of DTPA decorporation therapy – still puzzling after all these years. *Breustedt, B., Blanchardon, E., Berard, P., Fritsch, P., Gremy, O., Giussany, A., Lopez, M.A.,* Presentation and Paper at the 13th International Congress of the International Radiation Protection Association **(IRPA 13),** Glasgow Scotland, May 13-18, 2012. (paper available at www.irpa13glasgow.com).

- Monte Carlo modelling for the in vivo lung monitoring of enriched uranium: Results of an international comparison. *D. Broggio, J. Bento, E. Cardenas-Mendez, J. Farah, T. Fonseca, L.Freiree, C. Konvalinka, L. Liu, M. Caldeira, K. Capello, P. Cowan, J-A. Cruzate, J-M. Gómez-Ros, S. Gossio i, B. Heide, J. Huikari, J. Hunt, S. Kinase, G.H. Kramer, O Kurihara, A. Kyrielis, A-L. Lebacq, D. Leone, J. Li, C. Li, L-C. Milhailescu, M. Moraleda, C. Oliveira, N. Puerta, U. Reichelt, C. Simões, D. Sommer, M. Takahashi, P. Teles, F. Vanhavere, T. Vrba, D. Franck, G. Gualdrini, M-A. Lopez.* **Radiation Measurements 47 (2012) 492-500.**
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- Comparison of two leg phantoms containing ^{241}Am in bone. *G. H. Kramer, M. A. Lopez, D. Broggio, K. Capello, E. Cardenas-Mendez, El-Faramawy, D. Franck, A. C. James, , T. P. Lynch, J. F. Navarro, T. Navarro, B. Perez, W. Rühm, S. Y. Tolmachev and E. Weitzenegger.* **Health Physics Vol. 101, pp 248-258, 2011.**
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- Results of an Internal Dose Assessment Intercomparison Exercise after a EURADOS/IAEA Training Course. *C.M. Castellani, M. A. Lopez, A. Luciani, J. W. Marsh, T. Vrba, R. Cruz-Suarez.* **Radiation Protection Dosimetry Vol 114, No 1-4, pp 592-595, 2011***; doi:10.1093/rpd/ncq344.*
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- The CONRAD Approach to Biokinetic Modeling of DTPA Decorporation Therapy. *B. Breustedt, E. Blanchardon, P. Berard, P. Frittsch, A. Giussani, M.A. lopez, A. Luciani, D. Nosske, J. Piechowski, J. Schimmelpfeng, A-L Serandour.* **Health Physics 99(4): 547-552; 2010**
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Additional information

WG07_AM2015_Progress Report