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 (2018-2020) is presented as follows:

- Harmonization on internal dose assessments, intercomparison exercises with case studies
- Implementation & quality assurance of reference biokinetic models
- 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
- Uncertainties on internal dose assessments, Accuracy Requirements
- Education and training on internal dosimetry
- 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

- ICIDOSE 2017: Intercomparison on internal dose assessment (2017-2018) (**Task 7.1**)

- EURADOS Survey of individual monitoring data and dose assessments of foreigners exposed in Japan due to the Fukushima Daiichi NPP accident (**Task 7.4**).
- EURADOS Intercomparison on Lifetime Dose Assessment (**Task 7.5**)
- EURADOS Training Course on the Application of Voxel Models for dosimetry of ionizing radiation (Collaboration with WG6) – March 2018 at KIT, Karlsruhe (**Task 7.6**)
- Study of biological dosimetry vs. internal dosimetry in cases of accidental internal exposures (collaboration with WG10 "Retrospective Dosimetry", **Task 7.8**).
- Review on Internal Microdosimetry of Alpha-Emitting Radionuclides (**Task 7.7**)

Ongoing and planned

- Update of IDEAS Database of Cases, Organisation of Intercomparison in internal Dose assessment (**Task 7.1**)
- 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)**
- In-vivo monitoring and calibration phantom intercomparisons (**Task 7.4**)
- Uncertainty Studies on Internal Dose Assessments (**Task 7.5**).
- Training Course on Technical Recommendations for Monitoring Individuals for Occupational Intakes of Radionuclides. (**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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Publications – Dissemination of knowledge

- Technical recommendations for monitoring individuals for occupational intakes of radionuclides, *Etherington, G., Bérard P., Blanchardon, E., Breustedt, B., Castellani, C.M., Challeton-de Vathaire, C., Giussani, A., Franck, D., Lopez, M.A., Marsh, J.W., Nosske, D.*, European Commission, **Radiation Protection Series N°188, 2018**
- Preliminary Results of the ICIDOSE 2017 International Inter-comparison on internal Dose Assessment. Castellani C.-M., Andrasi, A., Giussani, A., Pazmandi, T., Roberts, G., **Radiat. Prot. Dosimetry, 2018.** [epub ahead of print doi:10.1092/rpd/ncy1690]
- Thyroid phantom measurements in joint EURADOS-LLNL intercomparison exercise. *Hickman, D. P., Collins, L., Didier, F., Harding N. R., Jeffers,L. K., López Ponte M. A., I. Tai. I. L.,* **Radiat. Prot. Dosim. 178(2), 152-159, 2018**

- The work programme of EURADOS on internal and external dosimetry. *Rühm W, Bottollier-Depois JF, Gilvin P, Harrison R, Knežević Ž, Lopez MA (CIEMAT), Tanner R, Vargas A, Woda C.* **Annals of the ICRP, 47(3-4) 20-34. 2018**
- EURADOS work on internal dosimetry. *Breustedt, B., Blanchardon, E., Castellani, C-M., Etherington, G., Franck, D., Giussani, A., Hofmann, W., Lebacq, A-L., Li, W.B., Noßke, D., Lopez, M.A.* **Annals of the ICRP, 47(3-4), 75-82, 2018**.
- Special Issue on "Internal Dosimetry for Radiation Protection and Medicine" - - 10thEURADOS Winter School "Internal dosimetry for radiation protection and medicine" 2ndMarch 2017-EURADOS Annual Meeting AM2017. TullaHörsaal KIT Campus Süd.(Karslruhe, Germany). **Radiation Measurements Journal Volume 115, 2018**
  - How to assess internal doses for epidemiological studies and for emergency response? An overview of differences with routine operational radiation protection approach *Davesne, E., Laurent, O., López, M.A.,* **Pages 20-28.**
  - Microdosimetry and nanodosimetry for internal emitters. Li, W., Hofmann, W., Friedland, W. **Pages 29-42.**
  - Internal dose assessments – Concepts, models and uncertainties. *Breustedt, B., Giussani, A., Noßke, D.* **Pages 49-54**
  - Recommendations and standards for monitoring individuals for occupational intakes of radionuclides. *Bingham, D., Etherington,* G. **Pages 69-76**
- Uncertainties in internal dose assessment: Lifetime dose assessment for three example workers occupationally exposed to uranium - Analysing the intercomparison results, *Davesne, E., Bull, R., Anderson, J.L., Bingham, D., Birchall, A., Castellani, C.M., Challeton-de Vathaire, C., Fernandez, M.L., Froning, M., Giomi, A., Lebacq, A.L., Ośko, J., Gomez Parada, I., Pántya, A., Rojas, A.G., Rojo, A., Takahashi, M., Tani, K., and Blanchardon, E.,*. **EURADOS 2017-3, Neuherberg: EURADOS, 2017**
- The EURADOS-kit training course on Monte Carlo methods for the calibration of body counters. *Breustedt, B., Broggio, D., Gomez-Ros, J. M., Leone, D., Marzocchi, O., Poelz, S., Shutt, A., Lopez, M. A.*, **Radiat. Prot. Dosim.170, 446-450, 2016**
- IDEAS Guidelines (Version 2) for the estimation of Committed Doses from incorporation monitoring data. Castellani, C. M., Marsh, J. W., Hurtgen, C., Blanchardon, E., Bérard, P., Giussani, A., Lopez, M. A., **Radiat. Prot. Dosim.170, 17-20, 2016**
- Technical Recommendations for monitoring individuals for occupational intakes of radionuclides. *Etherington, G., Bérard P., Blanchardon, E., Breustedt, B., Castellani, C.M., Challeton-de Vathaire, C., Giussani, A., Franck, D., Lopez, M.A., Marsh, J.W., Nosske, D.*, **Radiat. Prot. Dosim.170(1-4), 8-12, 2016.**
- 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.* **Radiat. Prot. Dosimetry, 2015**.
- 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.**
- 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.**
- Lessons learned from the EURADOS survey on individual monitoring data and internal dose assessments of foreigners exposed in Japan following the Fukushima Daiichi NPP accident. *Lopez, M.A., Fojtik, P., Frank, D., Osko, J., Gerstmann, U., Scholl C., Lebacq A.L., Breustedt, B., del Risco Norrlid, L.,* **Radiat. Prot. Dosim. 170, 402-406, 2016.**
- 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, 163, 37-57, 2015.**

Additional information

WG07_Progress_Report