

EURADOS Working Group 12

Dosimetry in Medical Imaging

Motivation

Medical procedures using ionising radiation constitute by far the largest contribution to people by man-made sources. Although the benefit for the patients exposed will normally outweigh the risk associated with the radiation, there is concern that patients may undergo radiological examinations that will not have any impact on their health, or that unnecessary high doses could be delivered with regard to the diagnostic outcome. Moreover, the increasing use of ionising radiation in the medical sector has also an impact on occupational exposures, and there are concerns that practices such as interventional procedures may cause high individual doses. Furthermore, the recent decrease in the eye lens limit for the occupationally exposed personnel sets stricter scenery in individual monitoring from a technical and regulatory point of view. That means that it is essential to foster the implementation of the basic principles in radiation protection, justification and optimisation, and for occupational exposures also dose limitation.

Aims

- EURADOS started to give input to the EMAN, the European Medical ALARA Network. WG12 would focus on patient and staff dosimetry in the medical field, excluding radiotherapy.
- The radiation exposures in the medical field are getting more and more attention on all levels. Also the members of EURADOS are extremely active in this field, as proven by the several projects with EURADOS participants, and the interest shown for this WG12. Through WG12, EURADOS can position itself as the expert organisation concerning dosimetric aspects both for patients and staff in medical applications.
- The aim of the WG12 will be focussing on harmonization, intercomparisons, literature reviews, overviews through collecting data, set-up measurements campaigns, etc. Through the work of WG12 and its members EURADOS is becoming more and more visible in the medical sector. Part of the results are spread in typical medical conferences and journals.

Actions

- **Staff dosimetry (SG1):** Eye lens dosimetry:
 - Task 1 a: State of the art: This task is finished
 b: Hospital questionnaire for eye lens monitoring: This task is finished
 - Task 2: Data collection and measurements: Action in progress
 - Task 3: Protection means (lead glasses): Task finished
 - Task 4: Intercomparison of eye lens dosimeters for medical applications (IC2016eye):
 Final list of 22 participants. Final certificates sent to participants in June 2017.
 Paper in preparation - Action in progress
 - Task 5: Eye lens dosimetry: guidelines/double dosimetry: A thorough literature was
 performed. Action in progress
 - Task 6: Active personal dosimeters in hospitals: 5 subtasks - Actions in progress

- **Patient dosimetry (SG2):** Dosimetric basis for organ dose and risk estimation (all modalities)
 - Task 0: Continuation of previous SG2 + dose mapping systems: IR: This task is in final phase
 - Task 1: Skin dose mapping
 - Task 2: CBCT
 - a: Flat detectors CBCT
 - b: Dental CBCT
 - c: On board imaging CBCT (joint work between WG9 and WG12)
 - Task 3: European DRLs for interventional cardiology - database
 - Task 4: Size specific dose estimates: This task is put *ON HOLD*

Members

Chairperson

- Željka Knežević Ruđer Bošković Institute, Croatia
Email: zknez@irb.hr

Full members

➤

Corresponding members

➤

SG1: Staff dosimetry in medical imaging

SG2: Patient dosimetry

Publications

E. Carinou, P. Ferrari, O. Ciraj Bjelac, M. Ginjaume, M. Sans Merce, U. O'Connor, Eye lens monitoring for interventional radiology personnel: dosimeters, calibration and practical aspects of Hp(3) monitoring. A 2015 review. J. Radiol. Prot. 35 (2015) R17–R34.

H. Järvinen et al. EURADOS Report 2015-3 : Technical aspects on DAP calibration and CT calibration

E. Carinou, M. Ginjaume, U. O'Connor, R. Kopec, M. Sans-Merce, Status of eye lens radiation dose monitoring in European hospitals. J. Radiol. Prot. 34 (2014) 729–739

R. Kopec, L. Novák , E. Carinou , I. Clairand , J. Dabin , H. Datz , C. De Angelis, J. Farah, C. Huet, Z. Knezevic , H. Järvinen, M. Majer , F. Malchair, A. Negri ,S. Haruz Waschitz , T. Siiskonen, A. Szumska, A. Trianni , F. Vanhavere, Intercomparison of Gafchromic films, TL detectors and TL foils for the measurements of skin dose in interventional radiology. Radiat. Meas. 71 (2014) 282-286.

Ž. Knežević, M. Ginjaume, E. Carinou, I. Clairand, O.Ciraj Bjelac, M. Sans Merce, J. Daures, Overview of the activities on Occupational Dosimetry within EURADOS WG 12, Dosimetry in medical imaging International Conference on Occupational Radiation Protection:Enhancing the Protection of Workers —Gaps, Challenges and Developments, Vienna, Austria 1–5 December 2014,

J Farah, A Trianni, E Carinou, J Dabin, C De Angelis, J Domienik, C Huet, H Järvinen, Ž Knežević, R Kopec, M. Majer, F Malchair, A Negri, L Novák, T Siiskonen, F Vanhavere and I Clairand,

Measurement of maximum skin dose in interventional radiology and cardiology and challenges in the set-up of European alert thresholds. *Radiat. Prot. Dosim.* 2015 Apr; 164 (1-2)

J. Farah, A. Trianni, O. Ciraj-Bjelac, I. Clairand, C. De Angelis, S. Delle Canne, L. Hadid, C. Huet, H. Jarvinen, A. Negri, L. Novák, M. Pinto, T. Siiskonen, M. J. Waryn, and Ž. Knežević, Characterization of XR-RV3 GafChromic® films in standard laboratory and in clinical conditions and means to evaluate uncertainties and reduce errors. *Medical Physics* 42, 4211-4226 (2015)

I. Clairand, M. Ginjaume, F. Vanhavere, E. Carinou, J. Daures, M. Denozziere, E. Honorio da Silva, S. Principiand and L. Van Rycheghem. First EURADOS intercomparison exercise of eye lens dosimeters for medical applications. *Radiat. Prot. Dosim.* 2015 accepted for publication (doi: 10.1093/rpd/ncv368)

E. Carinou, P. Ferrari, O. Ciraj-Bjelac, M. Ginjaume, M. Sans Merce, U. O'Connor, Eye lens monitoring for interventional radiology personnel: calibration and practical aspects of Hp(3) monitoring. A 2015 review. *J. Radiol. Prot.* 35 R17-R34 (2015)

EURADOS WG12 Report. H. Järvinen et al. Technical aspects on DAP calibration and CT calibration (2012)

O. Ciraj-Bjelac, E. Carinou, P. Ferrari, M. Ginjaume, M. Sans Merce, U. O'Connor, Occupational exposure of the eye lens in interventional procedures: how to assess and manage radiation dose. Accepted for publication in the *Journal of the American College of Radiology* (2016)

Additional information

See EURADOS web site (www.euroados.org).