Workshop on X-ray imaging dosimetry

Programme: 2024-11-04 (subject to minor changes)
Place: Helsinki university hospital, Finland
When: 20 – 22 November 2024
Workshop hotel: Scandic Meilahti
Linked with the EURAMET 22NRM01 TraMeXI -project
More information: https://tramexi.com/workshop/

Wednesday: 20 November 2024

X-ray dosimetry fundamentals and codes of practice

Lunch (not included)

12:00 – 12:10 Welcome

- Dosimetry as a bridge to overall beam characterisation (10 min)
  Mika Kortesniemi HUS and Paula Toroi, HUS/STUK, Finland

12:10 - 13:15 Dosimetry equipment principles and operation

- 12:10 – 12:30 Ionization chambers (ICs) and X-ray multimeters (XMMs) (20 min)
  Stefan Pojtinger, PTB, Germany
  - Principles, performance
- 12:30 – 12:50 Quantities and parameters beyond air kerma (20 min)
  Milos Zivanovic, VINS, Serbia and Markus Borowski, SKBS, Germany
  - Usage of XMMs
  - Measurement of tube voltage related quantities
  - Other quantities
- 12:50 – 13:05 Calibration and metrology (15 min)
  Leon de Prez, VSL, the Netherlands
  - Primary standards, calibration conditions, assumptions, certificate
- Discussion (10 min)

Coffee break 13:15-13:45

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13:45 – 15:00 Introduction on imaging modality specific measurement procedures

- 13:45 – 14:10 Overall introduction (25 min)
  Luigi Rinaldi, OPBG, Italy
  - General measurement protocols, TRS-457
  - Conventional projection X-ray
  - What will change when XMMs are used instead of IC
- 14:10 – 14:30 Interventional (including C-arms, CBCT), (20 min)
  Jouni Uusi-Simola, HUS, Finland
- 14: 30 – 14:50 CT (including wide beams) (20 min)
  Mika Kortesniemi, HUS, Finland
- Discussion (10 min)

Break 15:00 - 15:20

15:20 - 17:00 Developments in mammography dosimetry

- 15:20 – 16:20 New CoP: EFOMP-AAPM breast dosimetry protocol (60 min)
  Ioannis Sechopoulos, the Netherlands
  - Dosimetry model
  - Measurement of air kerma
    - Standard, contrast-enhanced and tomosynthesis
  - Determination of AGD
- 16:20 - 16:40 Novel radiation qualities and spectra measurements (20 min)
  Elisabeth Salomon, PTB, Germany
  - Range of radiation qualities
  - Spectrometry methods
  - XMM results
- 16:40 – 16:50 XMM results in mammography (10 min)
  Andrea Kojic, VINS, Serbia
- Discussion (10 min)

17:00 – 18:00 Dosimetry companies presenting their products

- Presentations from sponsors: IBA, PTW, RaySafe and RTI
- Discussion 10 min

Social event 19:00 –

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Thursday: 21 November 2024
Practical approach and uncertainties

9:00 – 10:30 Patient specific dosimetry

- 9:00 – 9:20 What is patient dose? (20 min)
  Bente Konst, Vestfold, Norway and Linköping, Sweden
  - Measurable quantity vrs. Organ doses
- 9:20 – 9:50 MC simulations: skin dose in interventional radiology (30 min)
  Jonas Andersson, University of Umeå, Sweden
- 9:50 – 10:20 Use of AI in dosimetry (30 min)
  Satu Inkinen, HUS, Finland
- Discussion (10 min)

Coffee break 10:30-11:00

11:00 – 12:30 Uncertainties

- 11:00 – 11:20 Theory and practice for air kerma and HVL (20 min)
  Aino Tietäväinen, STUK, Finland
- 11:20 – 11:40 Practical example for clinical measurements (20 min)
  Niko Kiiskinen, HUS, Finland
- 11:40 – 12:00 Practical example for skin dose (20 min)
  Jonas Andersson, University of Umeå, Sweden
- 12:00 – 12:20 How to use calibration certificates in clinical practice (20 min)
  Paula Toroi, STUK/HUS, Finland
- Discussion 10 min

Lunch break 12:30 – 14:30

- Long lunch break with a walk outside

14:30 – 18:00 Practical exercises

- 14:30 – 17:00 Practical exercises (live video connection+other material)
  - Measurement group: 1 with camera, 2 persons measuring.
    - 14:40 – 15:20 Conventional 25 min video+15 min for the analysis of results
      Juha Peltonen, Jenna Tarvonen, 5 backstage participants
    - 15:25 – 16:05 Mammography 25 min video+15 min for the analysis of results
      Anne-Mari Vitikainen, Jenna Tarvonen, 5 backstage participants
    - 16:10 – 16:50 Interventional 25 min video+15 min for the analysis of results
      Touko Kaasalainen, Jenna Tarvonen, 5 backstage participants
  - Moderators: *Paula Toroi* (at lecture room), *Mika Kortesniemi* (at site)
  - Short breaks between

- 17:00 – 18:00 Practical: calculation of uncertainties
  Paula Toroi, Aino Tietäväinen, Niko Kiiskinen
  - Using the data collected in the practical session
  - Additional data from TraMeXI group

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Friday: 22 November 2024
Plans for future: targets and aims

9:00 – 9:50 Current status of dosimetry

- 9:00 – 9:20 Short introduction to current situation with clinical measurements (20 min)
  Markus Borowski, SKBS, Germany
  - Why we do dosimetry?
  - How we use dosimetric data?
  - What are current target uncertainties and why?
  - What is expected clinically?
- 9:20 – 9:40 Short introduction to current situation with calibrations (20 min)
  Miloš Živanović and Nikola Kržanović, VINS, Serbia
  - Why we do calibrations?
  - What is currently provided by the manufacturers and calibration laboratories?
  - Current performance of XMMs
  - Challenges related to limited number of reference radiation qualities.
- 9:40 – 9:50 Discussion 10 min

Short break 09:50 – 10:00

10:00 – 11:00 Deep learning-powered multimodality medical imaging

- Invited lecture
  Prof. Habib Zaidi, Geneva, Switzerland

Coffee break 11:00 - 11:15

11:15 – 12:15 New aim for the future

- 11:15 – 11:35 Update of Code of Practice (20 min)
  Miloš Živanović, VINS, Serbia and Luigi Rinaldi, OPBG, Italy
  - How the calibration and measurement procedures should be updated?
  - Summary of discussions on practical sessions
- 11:35 – 12:00 Discussion (25 min)
  Moderators: Miloš Živanović, VINS, Serbia and Markus Borowski, SKBS, Germany
  - Feedback on update of protocols (to TraMeXI consortium)
  - What should be the target uncertainty?
  - What is clinically needed?
  - What is expected for different purposes (QA, research, optimization)?
- 12:00 – 12:15 Conclusions and Farewell (15 min)

Mika Kortesniemi HUS and Paula Toroi, HUS/STUK, Finland

12:15 – 13:00 Group photo and Raptor visit

The workshop ends.

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The workshop is organized in collaboration with:

NACP
Nordic Association for Clinical Physics
Radiological Physics Committee

The workshop is endorsement by:

EFOMP
EUROPEAN FEDERATION OF ORGANISATIONS FOR MEDICAL PHYSICS

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