

EURADOS: Overview of actions and initiatives in radiation protection in medicine

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EURADOS:

- Carries out projects and network activities to
 - Advance the scientific understanding of the dosimetry of ionising radiation
 - Promote the technical development of dosimetric methods and instruments and their implementation in routine dosimetry
 - Assist partners and stakeholders in achieving compatibility of dosimetric procedures used within the EU
- by promoting collaboration between European laboratories

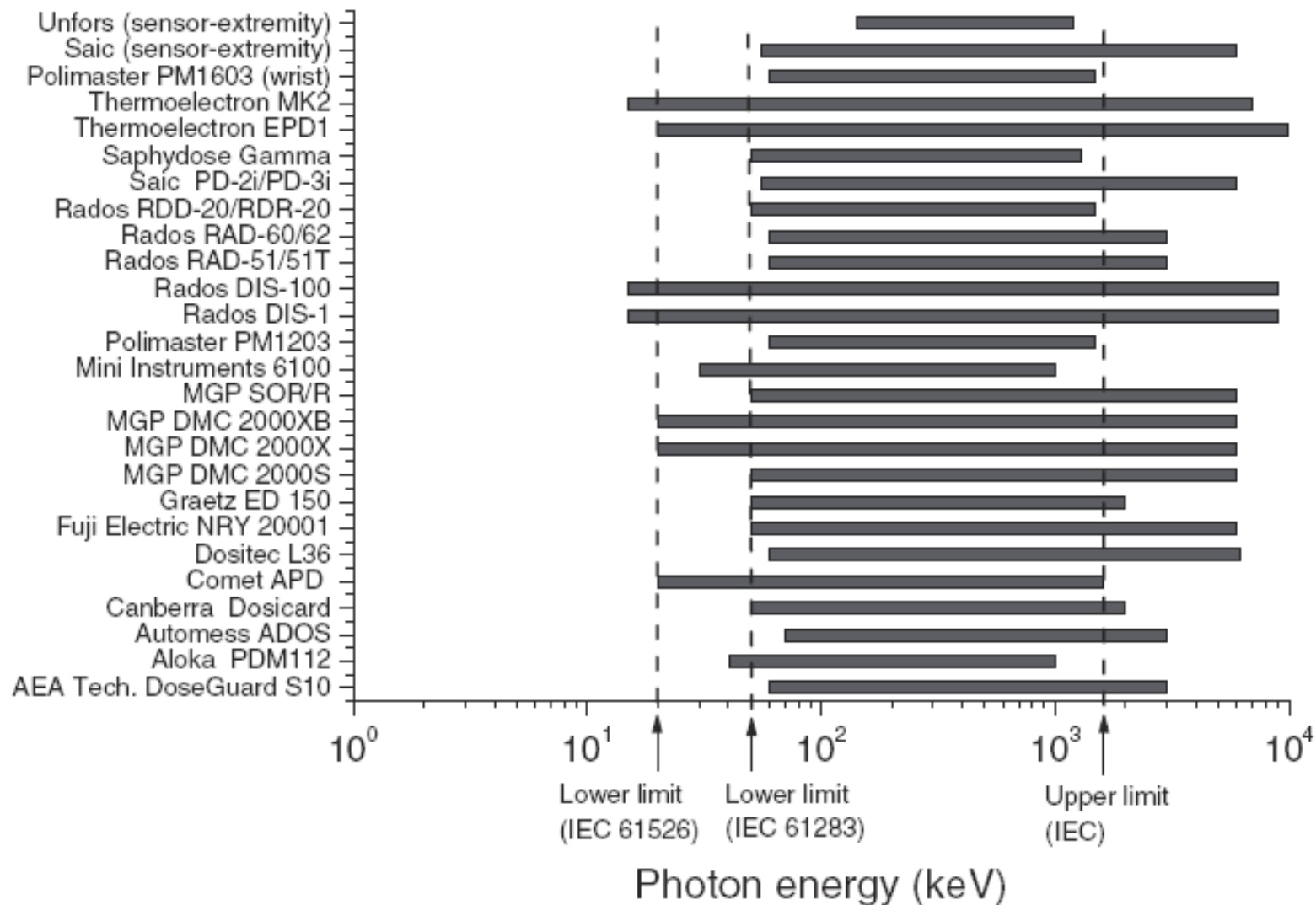
- EURADOS:
 - Founded in 1981
 - Currently 57 voting members (=institutes)
 - Council: 12 persons
 - Chairperson: Helmut Schuhmacher (PTB)
 - Vice chair: Elena Fantuzzi (ENEA)
 - Treasurer: Joao Alves (ITN)
 - Secretary: Filip Vanhavere (SCK-CEN)
 - Associate members: individual scientists (more than 300)
 - Newsletter: e-mail to large database (600)
 - Supported by FP3-4-5-6
 - In 2008 transformation to German e.V.
 - Income from sponsoring institutes, projects, training courses, intercomparisons, meetings,...

- **EURADOS operates by setting up Working Groups:**
 - **WG2:** Harmonization + intercomparisons (J. Alves)
 - **WG3:** Environmental dosimetry (S. Neumaier)
 - **WG6:** Computational dosimetry (G. Gualdrini)
 - **WG7:** Internal dosimetry (M.A.Lopez)
 - **WG9:** Radiation Protection dosimetry in medicine (R. Harrison)
 - **WG10:** Retrospective dosimetry (P. Fattibene)
 - **WG11:** High energy radiation fields (W. Ruhm)
 - **WG12:** Medical ALARA network (F. Vanhavere)
- **Other activities**
 - Workshops initiation (Individual Monitoring, Neutron Dosimetry,...)
 - EURADOS publications
 - General assembly + winter school + workshop
 - Organisation of training programs,

- Different working groups cover different radiation protection aspects in medicine:
- **WG2: Harmonization + intercomparisons**
- Mostly aimed at personal dosimetry services: important for monitoring of medical staff
 - Series of intercomparisons for dosimetry services:
 - also typical medical fields are included
 - Revision of EC technical recommendations for individual monitoring was done: RP 160 publication
 - also here special attention to medical staff
 - QA/QC, approvals, dose reporting, dissemination of RP160 practices...

- Past WG2 work: the use of Active Personal Dosemeters
 - Catalogue of APD's was published, comparing their characteristics with the standards
 - Questionnaire to end-users
 - Assess the use of APD's as legal dosemeter
 - Published in Rad. Prot. Dosim.
 - Joint intercomparison of APD's with the IAEA: Tecdoc 1564
 - Assess capabilities of APD to measure $H_p(d)$ in photon and beta radiation fields
 - Compared to IEC 61526 standard
 - In realistic fields

Relevant standards



- Different working groups cover different radiation protection aspects in medicine:
 - WG6: Computational dosimetry
 - Monte Carlo techniques
 - Many different topics
 - Design and dosimetry assessment of a LINAC facility
 - VOXEL Phantoms development
 - WG7: Internal dosimetry
 - Internal dose assessment
 - Biokinetic models
 - WG11: High energy radiation fields
 - Determine instrument response to high energy, pulsed fields: links to hadron therapy

- Different working groups cover different radiation protection aspects in medicine:
- WG9: Radiation protection of medical staff:

FP6 CONRAD project

The working group covered three specific area's within the CONRAD project:

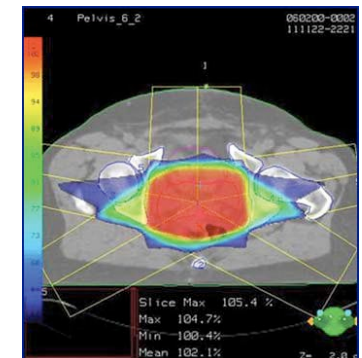
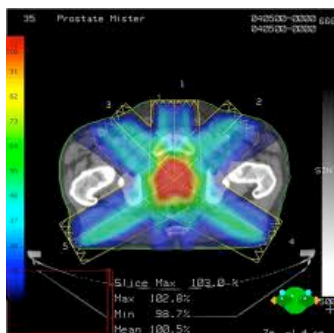
- **Extremity dosimetry** for medical staff in nuclear medicine and interventional radiology: *literature review, dose data, intercomparison*
- The practice of **double dosimetry** for staff wearing a lead apron: *comparison different algorithms*
- The use of **active personal dosimeters** in interventional radiology: *intercomparison (1 set-up)*

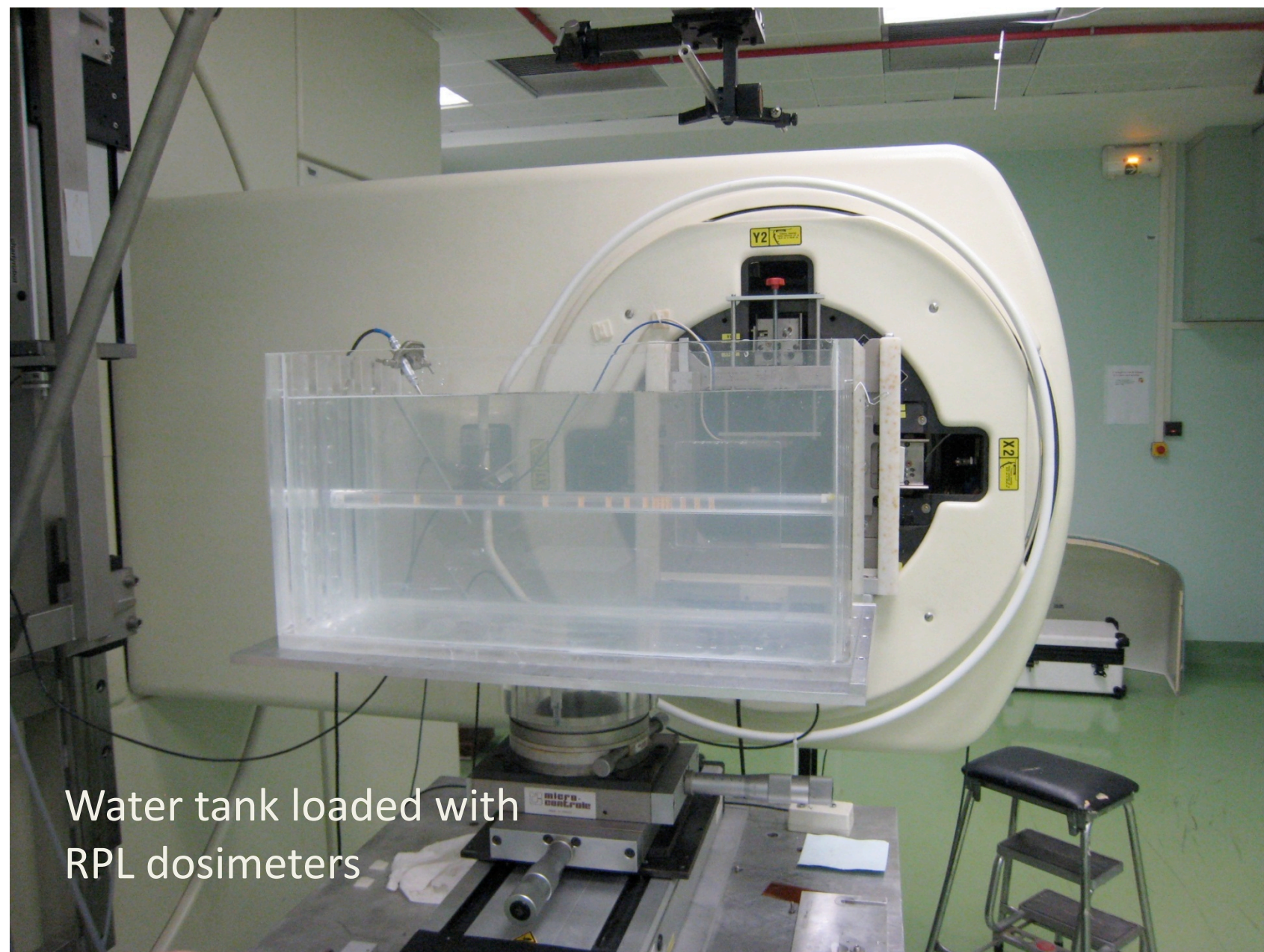
Conclusion CONRAD



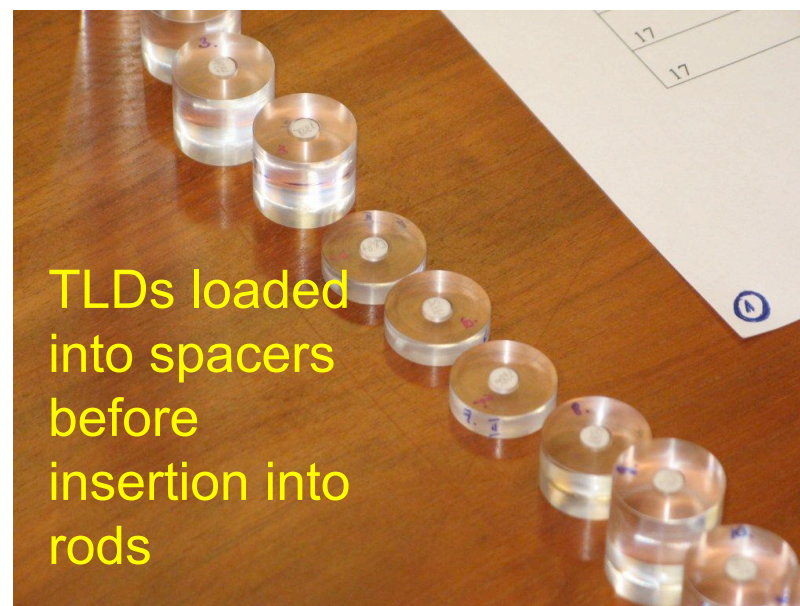
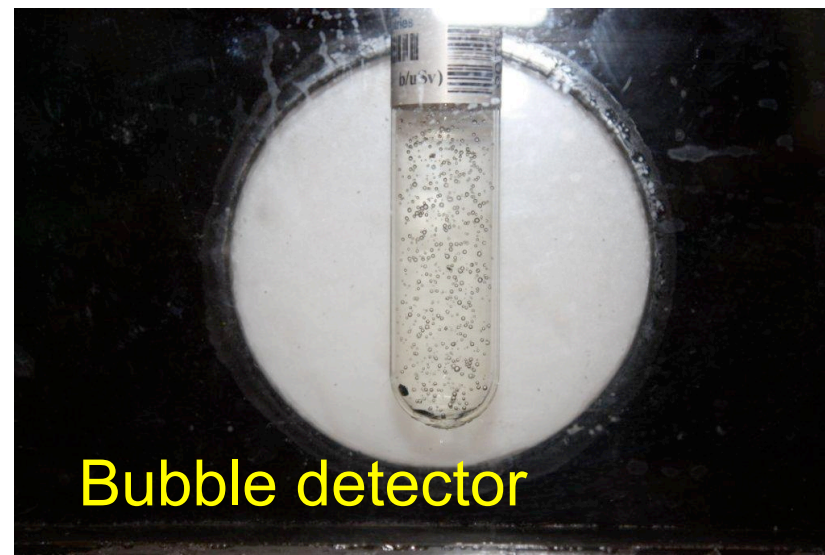
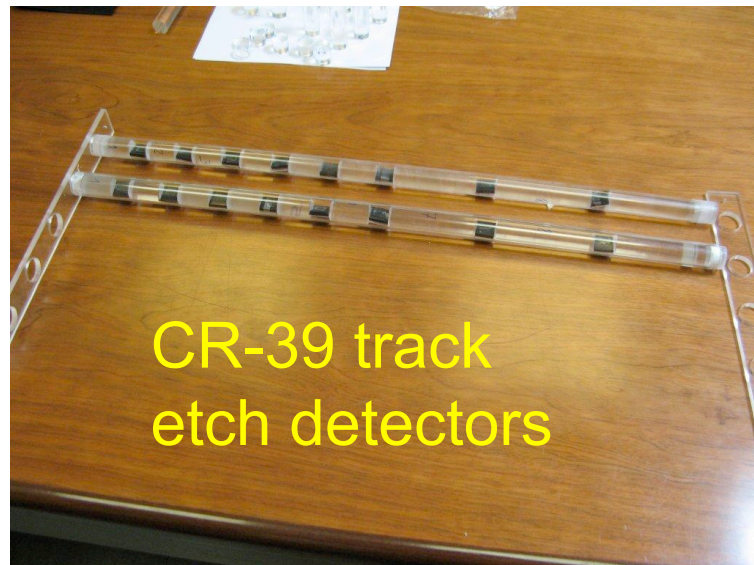
- It was found that:
 - problems to measure the extremity doses:
 - measurement at the highest dose point?
 - low energy beta's and positrons
 - routine measurements low compared to dedicated studies
 - Double dosimetry:
 - many algorithms available
 - no international guidance
 - can underestimate or strongly overestimate the effective dose.
 - Active personal dosimeters:
 - difficulties in measuring the pulsed radiation
- Work was continued in the FP7 ORAMED project

- Now, focuss of WG9 has shifted to peripheral doses in radiotherapy
- Improved survival rates > increased incidence of second cancers
- Objectives
 - Generate a dataset of out-of-field doses to be used as a benchmark dataset for the development and testing of treatment planning system algorithms
 - Select a range of dosimeters to be used for photon and neutron out-of-field dosimetry, together with a common measurement protocol.
 - Calibrate and compare the dosimeters
 - Simulate the measurements by Monte Carlo calculations to analyze further the experimental results
 - Apply this methodology to particle therapy dosimetry





Water tank loaded with
RPL dosimeters



- Different working groups cover different radiation protection aspects in medicine:
- [WG12: Medical ALARA network](#)
- Set-up to provide input for EMAN
 - EURADOS is partner in EMAN
- Meet twice a year, about 40 members
- Also other specific topics are handled
- 3 subgroups working on different topics
 - SG1: CT fluoroscopy staff dosimetry
 - Frank Becker
 - SG2: trigger levels + accident handling in IR/IC
 - Annelisa Trianni
 - SG3: technical aspects on DAP calibration and CT calibration
 - Hannu Jarvinen

- Literature review : Write a review paper for publication
- Simulations
- Validation
 - First step PMMA-CT-Phantom
 - Individual Phantom: Hand + Body (KIT-Phantoms)



SG 2: Trigger levels in interventional radiology/cardiology



- Trigger level: level at which skin lesions can occur (patient dosimetry)
- Questionnaire to know the status of implementation of trigger levels in Europe
 - Questions on
 - Is there a database on patient dose?
 - How it is maintained?
 - Are DAP meters used?
 - Need for European guidance on trigger levels?
 - Criteria for accidents/what is maximum skin dose ?
 - Follow up of over exposures?
- Draft a guidance document

- Structure guidance document:
 1. Introduction: why do we need trigger levels
 1. References ICRP 85, medical directive, ...
 2. Which dose indicators (DAP, FT, CDI,...)
 3. How to measure skin doses (TLD, film,...)
 1. uncertainties
 4. Comparison of literature values
 5. Trigger level determination
 1. How to determine trigger level (statistical issues)
 2. Construct one big database for 3 selected procedures
 1. Is a European trigger level possible?
 6. Conclusions on trigger levels
 7. Accident handling, how to organise patient follow up

SG 3: Technical aspects on DAP calibration and CT calibration



- KAP meter intercomparison by circulating a KAP meter (lab)
 - RQR radiation qualities
 - Combine with an IAEA and EUROMET intercomparison
- Comparison of field calibrations of KAP meter
 - Two realistic clinical conditions
 - Following the IAEA CoP
- CT dosimetry
 - Presently based on CTDIvol and DLP in standard PMMA phantoms
 - Problems with this approach
 - Recent new approaches by IEC, ICRU, AAPM
 - SG3: reviewing of these different approaches

Conclusion

EURADOS

- Very much alive
- Broad network of scientists
 - More than 300 persons from more than 60 European institutes active in 8 working groups
- Different topics
 - Some related to medical aspects
- Close link to EMAN
- ‘Specialists’ in dosimetry aspects
 - Staff dosimetry
 - Patient dosimetry
- Interested new persons are always welcome...



Thank you....

