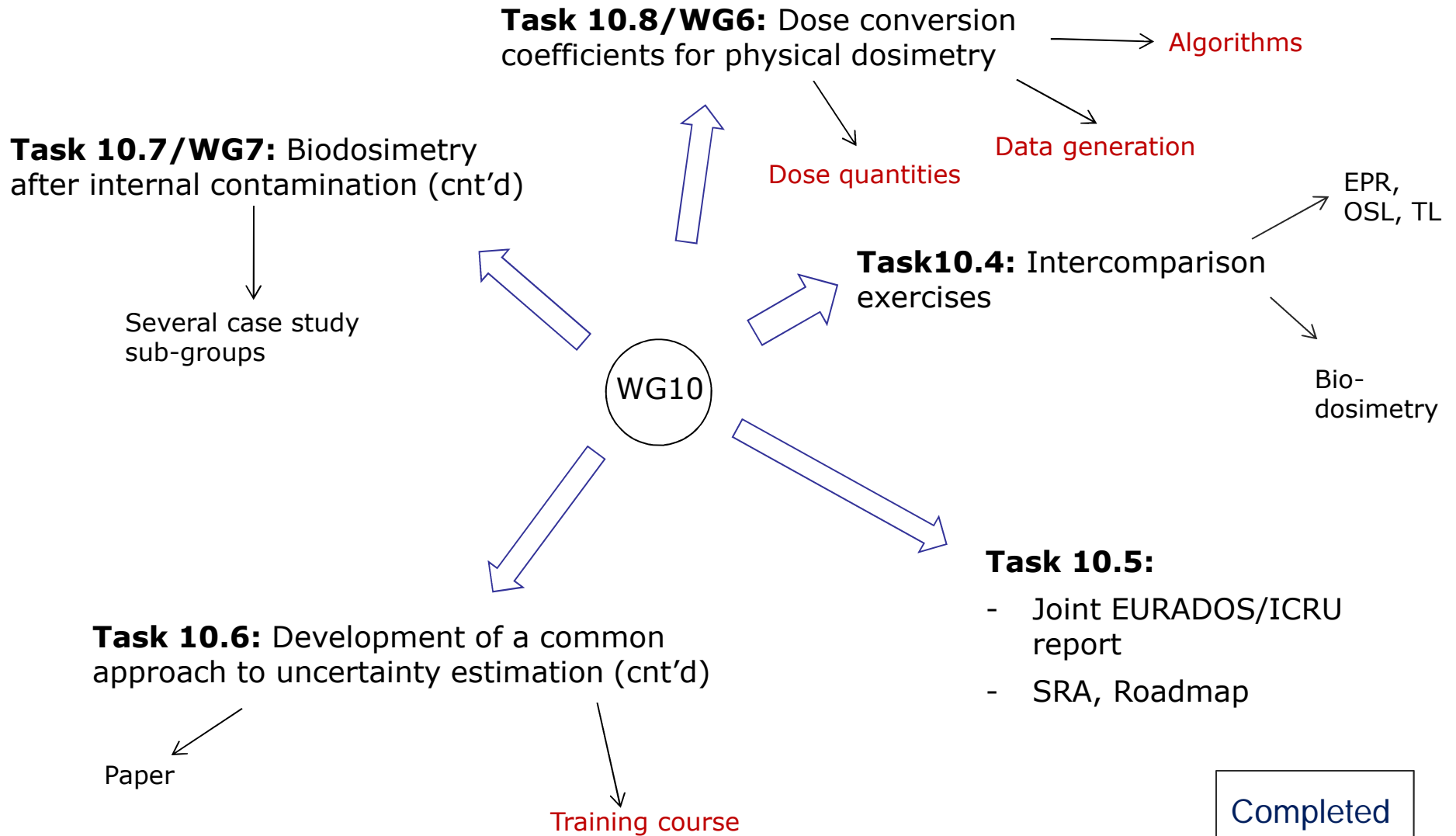

WG10- Retrospective dosimetry

Progress Report

EURADOS General Assembly
Lisbon, Portugal
February 7th, 2018

C. Woda

WG10 Tasks



Completed
In progress
Future



Tasks in progress

TG10.4 Intercomparison exercises

Task chairs: L. Ainsbury, C. Woda



Joint EURADOS/RENEB ILC in 2017 :

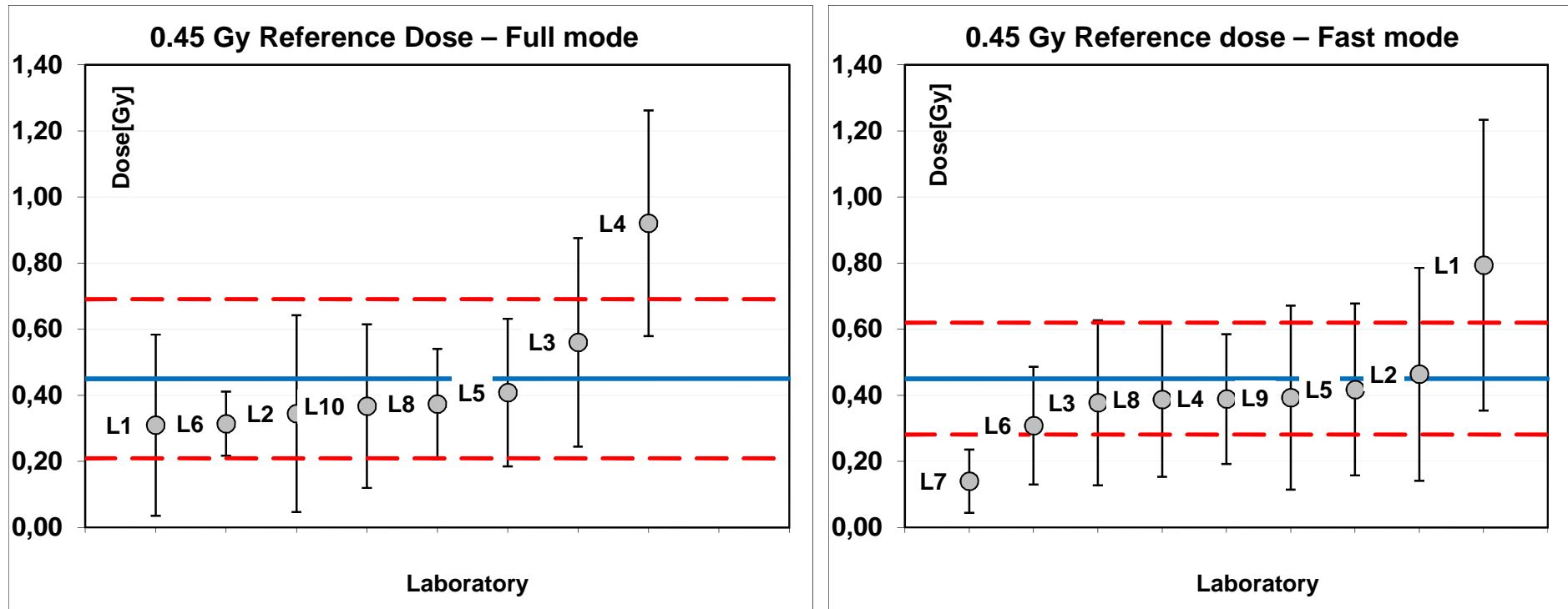
- 36 biological labs (Dic, MN, PCC, gH2AX, GE), 12 physical retrospective dosimetry labs (Phones: OSL/TL on resistors, TL on glass)
- different irradiation setup but same doses for biological and physical retrospective dosimetry, all irradiations done at IRSN
- Use ISO norm 13528 for statistical analysis of all assays

Design of the ILC for TL/OSL:

- Three phones (high dose, low dose, sham irradiation). Labs provide own samples for sham and high dose, same model (bought) will be used for low dose.

10.4 Inter-laboratory comparison

Example: OSL on resistors, two protocols



Main results: 1. Two protocols for OSL on resistors perform at a comparable level, 2. Increasing the time between calibration dose and measurement does not lead to an increase in precision, 3. Etching significantly improves the precision for TL on glass

10.4 Inter-laboratory comparisons

- Outlook 2018: Field test in Sweden (T. Geber, LUND University)
 - Aims: Intercomparison of biological and physical retrospective dosimetry in a small-scale accident scenario with heterogeneous exposure (localized irradiation).



TG 10.5 – Joint ICRU/EURADOS report

Commission Sponsors:

- Søren Bentzen
- Elena Fantuzzi

Members:

- Stephen McKeever, Co-Chairman
- Clemens Woda, Co-Chairman (WG10)



- Paola Fattibene (WG 10)
- Alexander Romanyukha
- Horst Romm (WG 10), until Sept. 2016
- Antonella Testa (WG10), since Sept. 2016
- Steven Simon
- François Trompier (WG 10)
- Ruth Wilkins

• 3 Meetings:

- 2 x Bethesda (Jan. 2016, Sept. 2017)
- Rome (Sept. 2016)

TG 10.5 – Joint ICRU/EURADOS report

- Title: “Methods for Initial-Phase Assessment of Individual Doses following Acute Exposure to ionizing Radiation”
- Main emphasis: biodosimetry, EPR, TL/OSL, experiences from accidents
- Also sections on neutrons and NA, dose mapping, bioassays and quantities
- Recommendations for quantities:
 - absorbed dose in initial-phase dose assessment for individuals
 - absorbed dose to the material (biological or inert) for large scale accidents
 - for small scale: organ dose assessment may be possible
- A draft of approximately 2/3 of the report has been written
- Expected completion date (submission to ICRU): second half of 2019

TG10.6

Development of common approach to uncertainty estimation

(TG chairs: F. Trompier; E. Ainsbury)

Aims:

To survey, compare and assess techniques of uncertainty analysis for physical and biological retrospective dosimetry

Deliverables:

- A paper surveying and comparing uncertainty evaluation methods used within WG10 members
- Organize a training school in uncertainty estimation (2017)

To date:

- Paper submitted June 2017 to RPD, published September 2017
- Training school as a CONCERT Short Course (19-23 June 2017)

Uncertainty analysis for retrospective dosimetry and associated research

June 19-23, 2017
IRSN, Paris, France

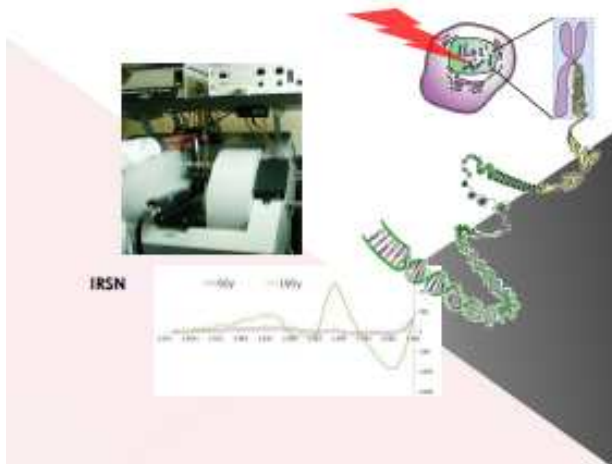
Organized by



&



Sponsored by



- General description of retrospective dosimetry
- General methodology
- Introduction to GUM, Monte Carlo and Bayesian statistics
- Emphasis on practical sessions
- 21 participants (only few from WG10)
- Overall very positive feedback
- Suggestions for improvements:
 - More time for Bayesian statistics
 - More time for exercises

Organizers: S. Ancelet (IRSN), F. Trompier (IRSN), L. Ainsbury (PHE)



General Assembly , 7 February 2018

TG10.6

Development of common approach to uncertainty estimation

(TG chairs: F. Trompier; E. Ainsbury)

Aims:

To survey, compare and assess techniques of uncertainty analysis for physical and biological retrospective dosimetry

Deliverables (new):

- A common approach to estimate the detection limit
- Organize a second training school in uncertainty estimation (2019), in the framework of CONCERT E&T call, taking into account lessons learned from the first TC :
 - less MC
 - more Bayesian & practical sessions
 - new: Bootstrap and Detection limit

TG 10.7

Biodosimetry in internal exposure scenarios

TG chair: A. Testa

Aims

To establish the usefulness and limitations of cytogenetic dosimetry in cases of internal and mixed internal/external exposures

Deliverable:

Paper to a peer reviewed journal (probably REB)

To date:

- Joint meetings with WG 7 (2013-2018, 2 x per year).
- Agreement on organizing the work in case studies, agreement on the structure of the review
- Nomination of contact persons for each scenario /and each WG

Actual status and next steps

- (1) Main focus on scenarios involving incorporation of single radionuclide (much easier to describe and to find correlation between biodosimetry and internal contamination data)
- (2) and some case studies of complex scenarios involving more radionuclides.
- (3) Decisions have been made on:
 - which scenarios are consistent
 - how to make the presentation of data more homogeneous
 - input from WG7 and WG10 colleagues collected and harmonized
- (4) Paper near completion (40+ pages)
- (5) Foreseen submission mid 2018

TG10.8

Dose conversion coefficients for physical dosimetry

(TG chairs: J. Eakins; M. Discher)

- Cross-cutting activity with WG6

Aims:

To develop the means for relating the dose measured by a retrospective dosimeter to the detriment to the individual

Definition of three subtasks:

- Development of conversion algorithms for use in emergency / retrospective scenarios (webtool hosted at IRSN)
- Generation / harmonization of conversion data, plus associated limitations / uncertainties
- Exposition into the correct dose quantity for use in emergency scenarios

TG10.8

Dose conversion coefficients for physical dosimetry

Pre-TG10.8:

- Eakins & Kouroukla data converting resistor doses to 'whole body dose' as function of phone position, orientation and exposure conditions:
 - Chest, leg, hip and back pocket phone locations
 - AP, PA, LLAT, RLAT, ISO, ROT and ground contamination exposures
 - ^{137}Cs , ^{60}Co and ^{192}Ir radionuclide sources
- Discher generated analogous data for mobile phone screen glass

TG10.8:

- Since expanded conversion datasets for both resistors and glass:
 - Range extended to 100 keV photons
 - Isotropic point sources (^{137}Cs) at:
 - 1, 3, 5, 7.5, 10, 12.5 or 15 m from body
 - Locations to front, rear, left and right of body
 - Isotropic ^{192}Ir point source data in support of CATO / Cochabamba incident *
- Have developed template MCNP input file to easily calculate new conversion data
- Have developed analysis software to rapidly extract and process MCNP output dose data

Dissemination

- Ainsbury et al. Uncertainty of radiation doses estimated by biological and retrospective physical methods, Radiat. Prot. Dosim. In press (Task 10.6)
- Three presentations at EPRBiodose Conference in Munich:
 - Giussiani et al. Biological dosimetry in case of internal exposure (10.7 & WG7)
 - Della Monaca et al. Planning of a new EPR ILC on tooth enamel: a EURADOS WG10 proposal (10.4)
 - Ainsbury et al. A network of networks in biodosimetry – EURADOS WG10 and RENEb interaction
- Publication forecast 2018/2019:
 - 3 MS on the intercomparison results 2015 and 2016 (10.4), including voxel phantom calculations (10.8)
 - MS on biodosimetry after internal contamination (10.7)