

“Challenges and developments in the field of therapeutic radiopharmaceuticals”

Ramona Bouwman, member of EURADOS working group 7 and task group leader of the task
“internal dosimetry of therapeutic radiopharmaceuticals”

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Working groups (WG)

The core of EURADOS activities is aimed at promoting scientific and technical research and development in the field of ionizing radiation. EURADOS maintains a network of experts in the scientific field of dosimetry, who are organized within a variable number of EURADOS Working Groups.

WG 2: Harmonisation of individual monitoring

WG 3: Environmental dosimetry

WG 6: Computational dosimetry

WG 7: Internal dosimetry

WG 9: Radiation dosimetry in Radiotherapy

WG 10: Retrospective dosimetry

WG 11: High energy radiation fields

WG 12: Dosimetry in medical imaging

Pilot Group: Dosimetry in nuclear medicine (new in 2021)

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Visions for radiation dosimetry

The strategic research agenda (SRA) is used to direct the research of the EURADOS Working Groups
Last update: August 2020

- serves as an input to European research under the Concert umbrella (MEENAS)
- Consists of 5 Visions
 - Specific challenges and research lines

www.eurados.org

EURADOS
European Radiation Dosimetry Group e. V.

EURADOS Report 2020-04
Neuherberg, August 2020

Visions for Radiation Dosimetry over the Next Two Decades - Strategic Research Agenda of the European Radiation Dosimetry Group: Version 2020

Jean-François Bottollier-Depois, Isabelle Clairand, Elena Fantuzzi, Paola Fattibene, Roger Harrison, Oliver Hupe, Pawel Olko, Veronika Olšovcová, Werner Rühm, Marco Silari, Rick Tanner, Filip Vanhavere

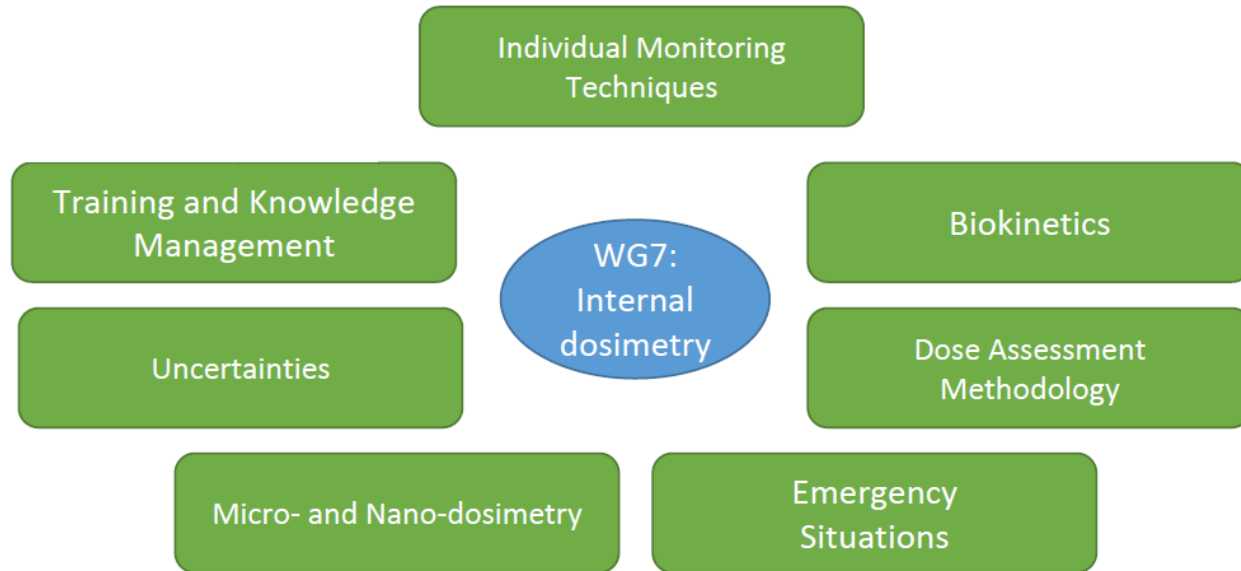
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WG 7: Internal dosimetry

Lead by Bastian Breustedt, Kerntechnische Entsorgung Karlsruhe (KTE), Germany

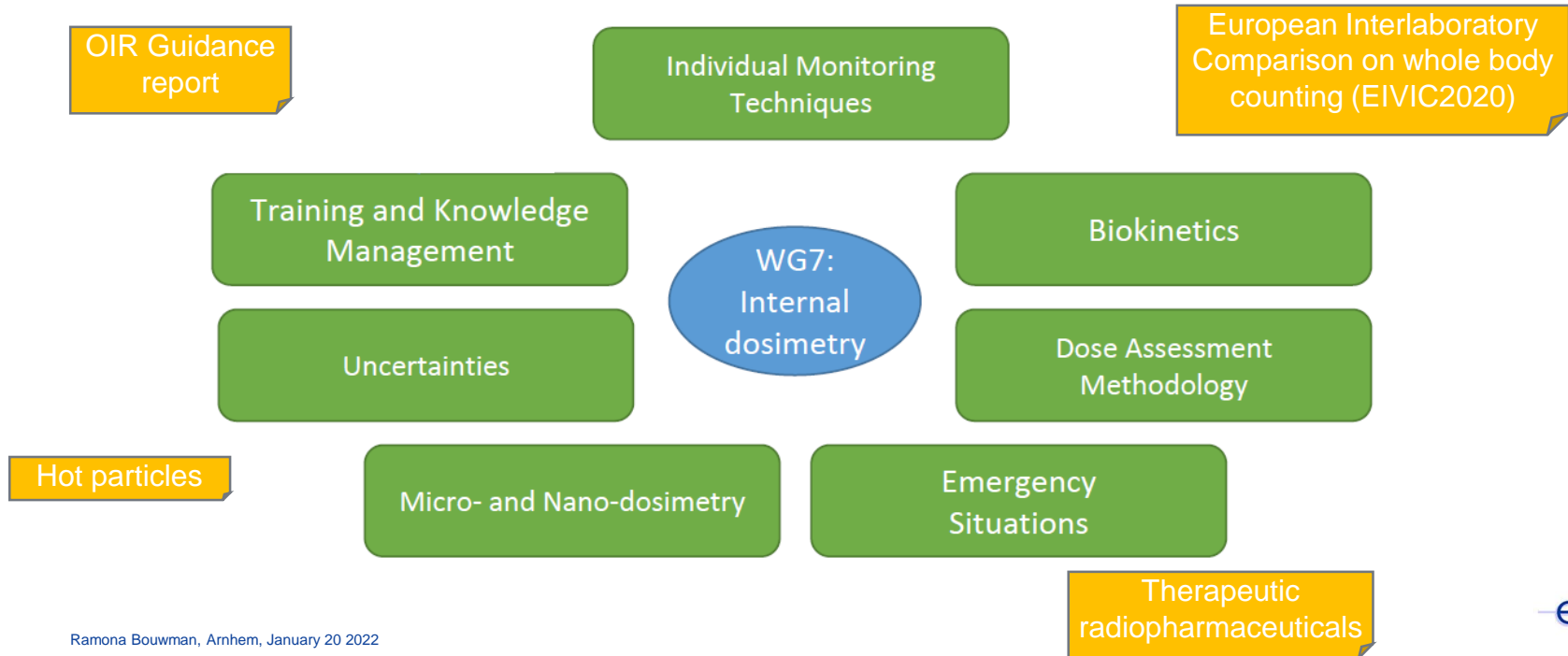
WG 7: Internal dosimetry

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WG 7: Internal dosimetry

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Towards a roadmap for internal dosimetry for therapeutic radiopharmaceuticals

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Nuclear. For life.

—EURADOS—

Content



Background of the task

Goal of the task

Review organisation

Review results and future perspective

Background of the task

August 2020: publication of the new EURADOS SRA containing specific visions related to internal dosimetry of therapeutic radiopharmaceuticals.

Vision 4: Towards integrated personalized dosimetry in medical applications

- Challenge 4.2: Improving patient dosimetry in nuclear medicine
 - Research line 4.2.1: Internal dosimetry with pre-clinical development and evaluation of RPs emitting alpha, beta and auger radiation
 - Research line 4.2.2: Implementation of internal dosimetry in clinical MRT

Background of the task

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Vision 4: Towards integrated personalized dosimetry in medical applications

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How can we contribute to this vision?

- Starting point for this task: review



Goal of the task

Vision 4: Towards integrated personalized dosimetry in medical applications

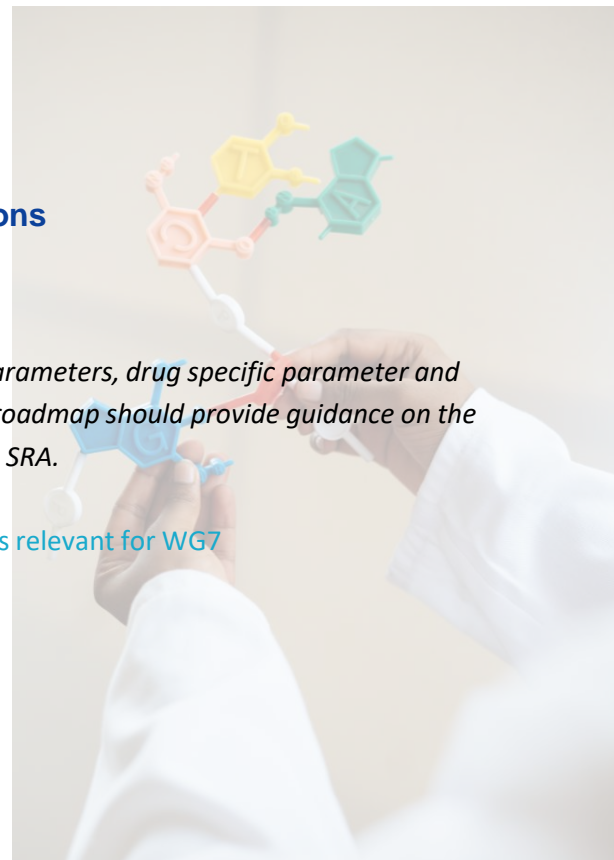
- Challenge 4.2: Improving patient dosimetry in nuclear medicine

Towards a roadmap for dosimetry in MRT based on individual physiological and biokinetic parameters, drug specific parameter and dose estimates on local (sub) cellular level to provide a patient specific estimate of dose. This roadmap should provide guidance on the role of EURADOS to address challenge 4.2 of the EURADOS SRA.

Step 1: conduct a review to determine the current status and knowledge with a focus on topics relevant for WG7

- Biokinetics
- Dosimetry
- Dose effects

Search for collaboration with other umbrella/expert/network organisations



Review organisation



Picture from Vanessa Garcia via Pexels

Chapter 1: Challenges and developments
by Mario Medvedec and Siria Medici

Chapter 2: Biokinetic modelling
by Kerstin Hürkamp and Ramona Bouwman

Chapter 3: Dosimetry
by Weibo Li

Chapter 4: Dose effect in therapy
by David Broggio and Balázs Madas

Conclusion and summary

Chapter 1: Challenges and development

Lead by Mario Medvedec and Siria Medici

- History and developments in dosimetry for radionuclide therapy
- Developments and challenges for today's clinic
- Physical and biological properties of radiopharmaceuticals
- Development and challenges in the production of radiopharmaceuticals



Chapter 1: Challenges and development

Lead by Mario Medvedec and Siria Medici

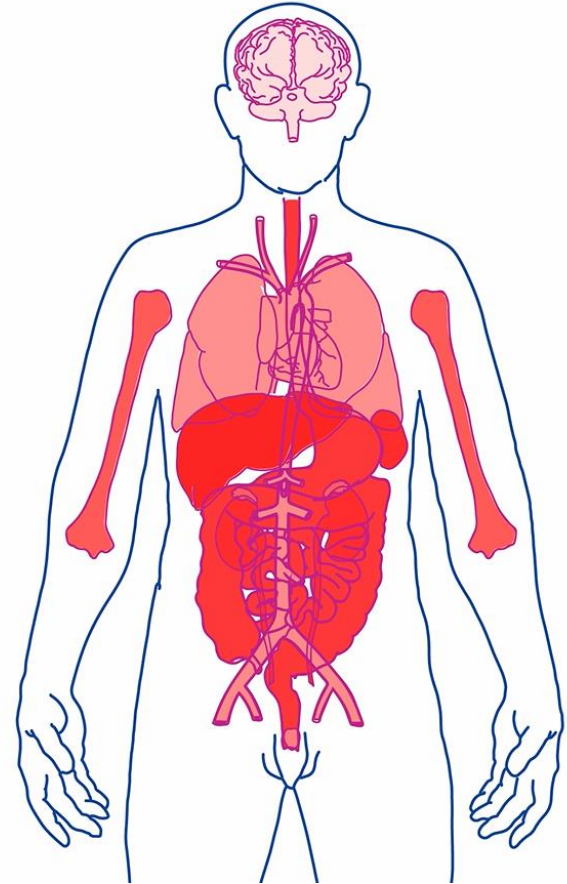
- History and developments in dosimetry for radionuclide therapy
- Developments and challenges for today's clinic
- Physical and biological properties of radiopharmaceuticals
- Development and challenges in the production of radiopharmaceuticals
- EURADOS is not focussing on production: invite several experts to share their vision on production of novel radiopharmaceuticals



Chapter 2: Biokinetic modelling

Lead by Kerstin Hürkamp and Ramona Bouwman

- Introduction to biokinetic modelling
 - Explaining the purpose, ICRP and MIRD models
- Current approaches in biokinetic data collection
- PBPK modelling



Chapter 3: Dosimetry

Lead by Weibo Li

- Generalized formalism for dosimetry in nuclear medicine
 - Absorbed dose (ICRP, MIRD) and development
- Dosimetry at different scales
 - From whole body, to organ and sub-tissue towards cellular (microdosimetry) and molecular (nanodosimetry)
- Methodologies for patient specific dosimetry
 - MIRD, Voxel wise approaches and 3D MC-methods
- Tools and software

Chapter 4: Dose effects in therapy

Lead by David Broggio and Balázs Madas

- Dose response-model in external radiotherapy
 - The linear quadratic model, tumour and tissue response models
- What makes radionuclide therapy different
- Dose driven radionuclide therapy: pros and cons

Conclusion and summary

Work in progress

Results: EURADOS report providing and overview on current status and knowledge on internal dosimetry of therapeutic radiopharmaceuticals and advise on how we as EURADOS can contribute to these challenges.

Expected time line:

- Drafting text: summer 2022
- Constructing report: autumn 2022
- Finalizing report: winter 2022

Review results and future perspective

How to proceed after finalising the review

Disseminate the results and search for consortia and collaboration to proceed the proposed research.

Thank you

Please feel free to contact me if you have any comment:

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Internal dosimetry of therapeutic radiopharmaceuticals

My time is funded by the Dutch Pionier project



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