

Implications of Medical Low Dose Radiation Exposure (MEDIRAD)

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Background/introduction

The evolution of medical science and the growing pace of innovation and deployment of medical technology have led to a situation where most of the artificial ionising radiation exposure of the European population is due to medical procedures. Though most exposures result in low to moderate doses in most tissues, there is a need to evaluate their health effects and optimise dose reduction practices and dose evaluation tools.

MEDIRAD aims to enhance the scientific bases and clinical practice of radiation protection in the medical field and thereby address the need to better understand and evaluate the health effects of low-dose ionising radiation exposure from diagnostic and therapeutic imaging and from off target effects in radiotherapy (RT).

This 4-year project started on June 1, 2017 and brings together 33 partner institutions from 14 European countries. The multi-disciplinary consortium includes clinical experts, scientists and policy makers in the fields of medical, radiation protection and nuclear research from hospitals, universities and major research centres across Europe.

MEDIRAD is led by the European Institute for Biomedical Imaging Research - EIBIR (AT). Prof. Guy Frija (Paris Descartes University, FR; chair of EuroSafe Imaging), acts as Clinical Coordinator and Prof. Elisabeth Cardis, (ISGlobal, ES), as Scientific Coordinator of the project.

Description of activity and work performed

The MEDIRAD Project consists of six interdependent and complimentary work packages (WP), each of which contains tasks and deliverables vital to the project's success. MEDIRAD work includes:

- Developing a tool to determine image quality to maximise optimisation of RP in medical imaging;
- Improving and developing new individual organ/anatomical structure dosimetry from chest CT, I131 administration, fluoroscopy guided procedures, hybrid imaging, and radiotherapy (RT) for breast cancer and interlinks with image quality measures;
- Conducting epidemiological studies of the consequences of RT and CT scanning;

- Identifying potential novel imaging and circulating biomarkers and mechanisms of radiation effects and radiation sensitivity;
- Developing innovative risk models;
- Developing and implementing a European repository of patient dose and imaging data for the first time;
- Developing science-based recommendations building on the scientific results of MEDIRAD and other related national and international activities;

The first months of the project have particularly focused on preparatory work for the MEDIRAD studies related to the impact of low dose radiation exposure from I-131 radioiodine (NaI) ablation of thyroid cancer, breast radiotherapy and secondary cardiovascular risks, as well as possible health impacts of paediatric scanning (e.g. study protocols, ethical approvals, patient recruitment, etc.). In addition, the set-up of the project governance and management has been a high priority to overcome the complexity of the project and to facilitate the successful execution of the MEDIRAD project.

Also, various communication and dissemination activities about the project have taken place. MEDIRAD was presented at various conferences, like the ICRP International Symposium on the System of Radiological Protection (October 2017, Paris, FR) and the IAEA International Conference on Radiation Protection in Medicine (December 2017, Vienna, AT).

The ambitious MEDIRAD project is still at the start phase. However, the consortium is confident to carry out all tasks as envisaged and therewith to significantly improve the science base and practice of radiation protection in the medical field.

Images for this section:



Fig. 1: EU emblem

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Fig. 2: MEDIRAD logo

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Fig. 3: MEDIRAD kick-off meeting in Barcelona, ES, in June 2017

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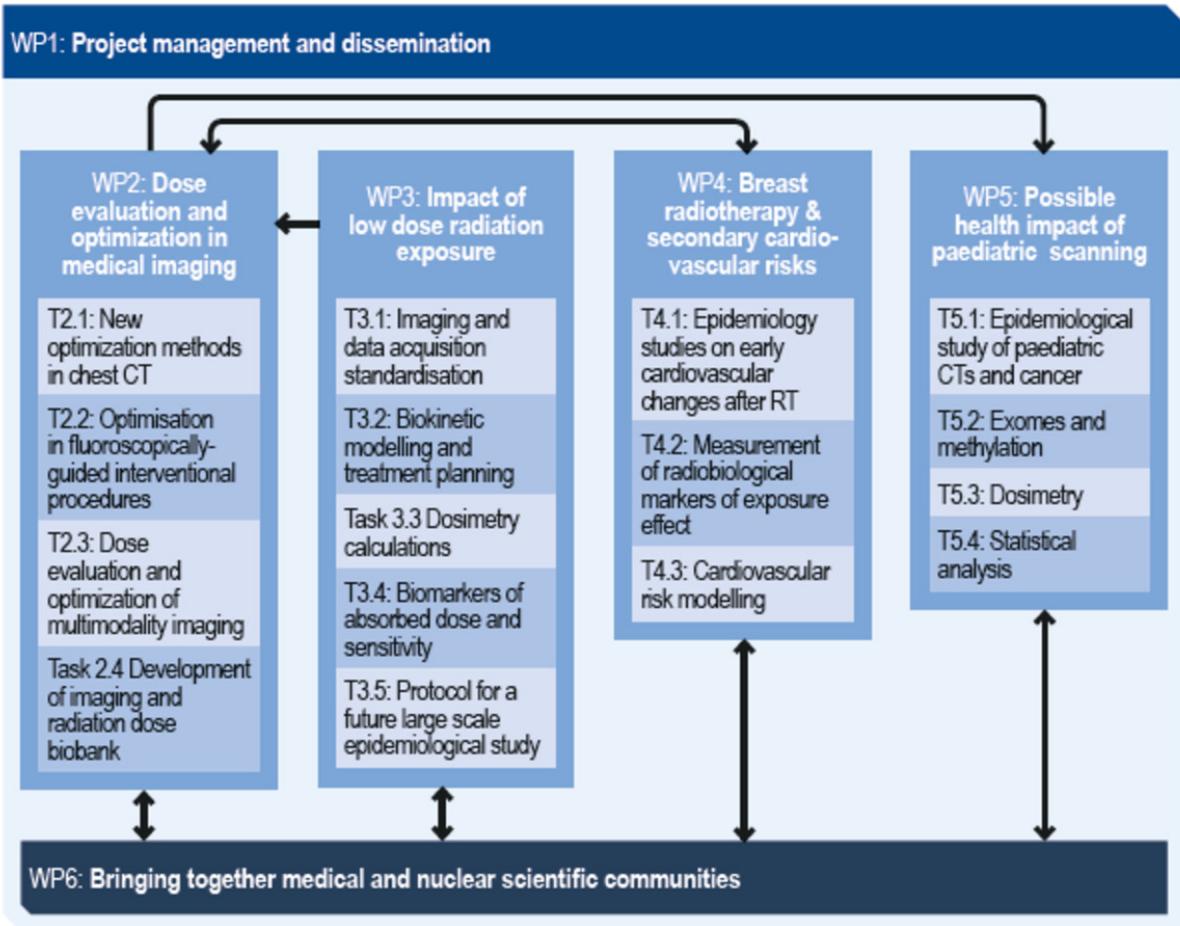


Fig. 4: MEDIRAD work plan

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Institution	Country
EIBIR Gemeinnützige GmbH zur Förderung der Erforschung der Biomedizinischen Bildgebung	AT
Studiecentrum voor Kernenergie/Centre d'étude de l'Energie Nucléaire	BE
Universiteit Gent	BE
Université de Genève	CH
Otto-Von-Guericke-Universität Magdeburg	DE
Universitätsmedizin der Johannes Gutenberg-Universität Mainz	DE
Helmholtz Zentrum München Deutsches Forschungszentrum für Gesundheit und Umwelt GmbH	DE
Universitätsklinikum Würzburg - Klinikum der Bayerischen Julius-Maximilians-Universität	DE
Philipps Universität Marburg	DE
Klinikum rechts der Isar der Technischen Universität München	DE
Fundación Privada Instituto de Salud Global Barcelona	ES
Universitat Politècnica de Catalunya	ES
Universitat Autònoma de Barcelona	ES
Institut Català d'Oncologia	ES
Université Paris Descartes	FR
Institut de Radioprotection et de Sûreté Nucléaire	FR
B-COM	FR
Institut National de la Santé et de la Recherche Médicale	FR
Institut Claudius Regaud	FR
Panepistimio Kritis	GR
University College Dublin, National University of Ireland, Dublin	IE
Università degli Studi di Roma La Sapienza	IT
Istituto Superiore di Sanità	IT
University Medical Center Groningen	NL
Vereniging voor Christelijk Hoger Onderwijs Wetenschappelijk Onderzoek en Patientenzorg	NL
Stichting het Nederlands Kanker Instituut-Antoni van Leeuwenhoek Ziekenhuis	NL
Instytut Medycyny Pracy Imienia Prof. Dra med. Jerzego Nofera w Łodzi	PL
Instituto Politécnico de Coimbra	PT
Associação para Investigação e Desenvolvimento da Faculdade de Medicina	PT
Vastra Gotalands Lans Landsting	SE
The Royal Marsden National Health Service Trust	UK

Fig. 5: MEDIRAD consortium

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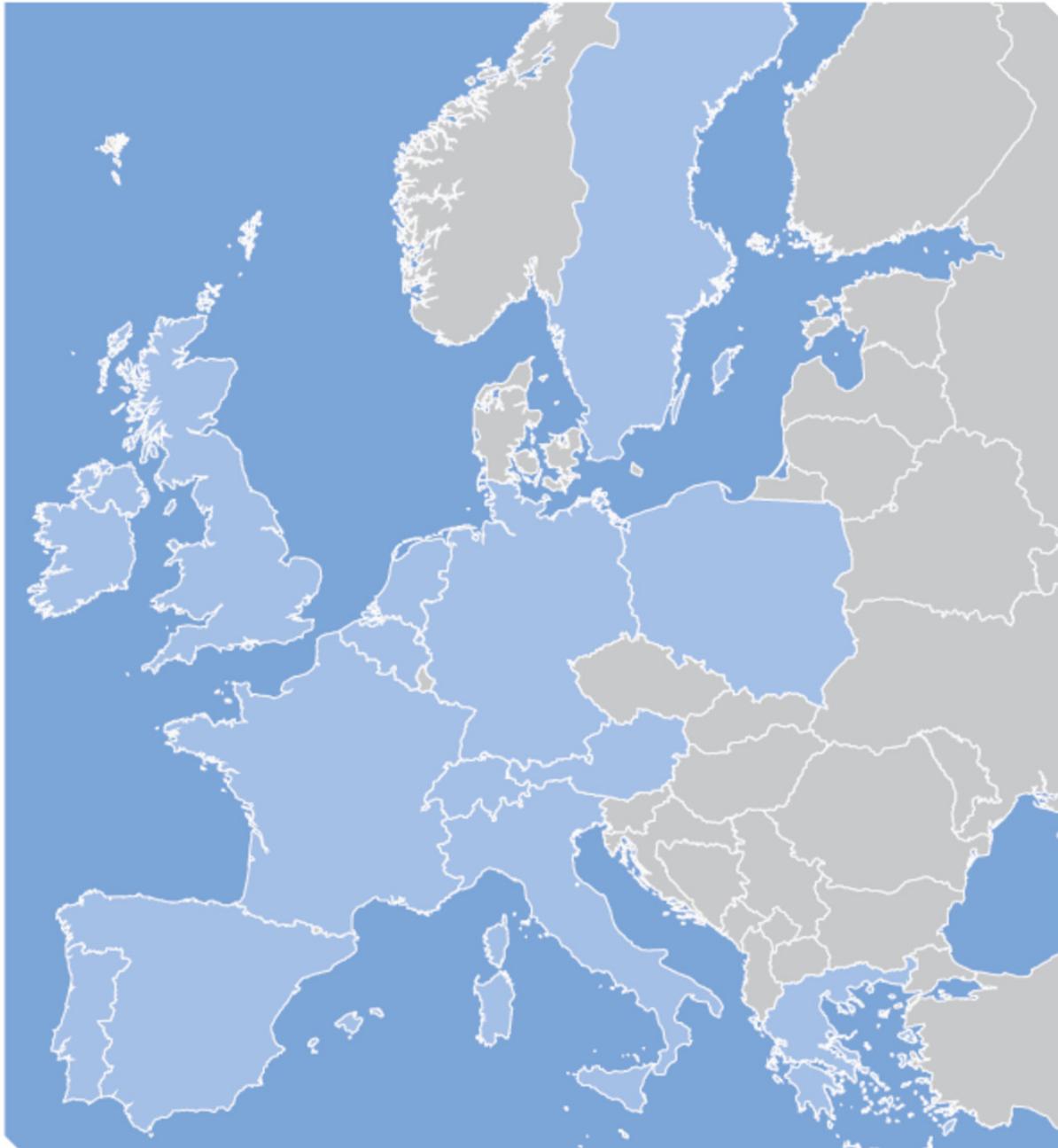


Fig. 6: MEDIRAD countries

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Conclusion and recommendations

Medical radiation is an essential tool both in diagnosis and treatment in medicine. The use of ionising radiation in medicine has been steadily increasing, and this trend is set to continue, with obvious health benefits for the population thanks to improved diagnostic and therapy technologies. However, the increasing use of new modalities both for diagnosis and treatment also raises a number of issues in radiological protection of patients and medical workers, as the population's average medical exposure levels are continually rising.

For the first time, the EURATOM call NFRP9 has offered an explicit opportunity for medical and nuclear research teams to work together on RP oriented objectives. It is expected that MEDIRAD will enhance our understanding and estimation of the health effects of low dose ionising radiation exposure from diagnostic and therapeutic imaging and from off-target effects in radiotherapy, thus reinforcing the scientific bases and clinical practice of radiation protection in the medical field.

Personal/organisational information

The project is coordinated by EIBIR: umayerhofer-sebera@eibir.org

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References

<http://www.medirad-project.eu/>

<http://www.eibir.org/>

