

BY ANNE CRIJNS

Cardiovascular effects after radiotherapy for breast cancer: the European MEDIRAD Project

Identification of imaging-derived cardiovascular effects after breast cancer radiotherapy: towards preventive strategies for radiation-induced major cardiac events

MEDIRAD

Radiation-induced major cardiac events (MCEs) are a growing problem for breast cancer patients, affecting quality of life and increasing morbidity and mortality. It is crucial to unravel the relationship between radiation dose to cardiac substructures and MCEs and their early subclinical precursor cardiovascular effects to develop preventive strategies. Today's EuroSafe Imaging session will focus on cardiovascular effects after radiotherapy for breast cancer, which are being studied as part of the European MEDIRAD Project (www.medirad-project.eu).

The MEDIRAD project, launched in June 2017, is the first EURATOM project dedicated to researching the implications of medical low dose radiation. Thirty-three partner organisations from 14 countries across Europe are participating in this ambitious four-year project, which was awarded €10 million under the EURATOM research and training programme of Horizon 2020. Prof. Elisabeth Cardis (ISGlobal, Spain) is the scientific coordinator of MEDIRAD and Prof. Guy Frija (UPDescartes, France) is responsible for the clinical management. The European Institute for Biomedical Imaging Research (EIBIR, Austria) is in charge of overall project management, as well as communication and dissemination activities.

The consortium brings together a wide range of expertise, including research groups that focus on radiology, nuclear medicine, radiotherapy, dosimetry, epidemiology, biology, bioinformatics, modelling, radiation protection, and public health.

MEDIRAD has three major operational objectives:

- 1) improving organ dose estimation and registration;
- 2) evaluating and understanding the mechanisms of the effects of medical radiation exposure, focusing on two outcomes of public health relevance (cardiovascular effects after radiotherapy for

breast cancer and cancer risk following CT scanning of children and adolescents); and,

3) developing science-based recommendations for the effective protection of patients, workers, and the general public.

Development of prediction models of early and late cardiovascular effects after radiotherapy for breast cancer take centre stage in this session about the MEDIRAD project. These prediction models will be used to describe the relationships between dose to cardiac substructures and cardiovascular effects and to select patients already treated with radiotherapy who have a high risk of future treatment-related MCEs for secondary preventive strategies. How these models can be used to optimise radiation dose distributions as a primary preventive strategy shall be explained in this session.

In addition, the large retrospective multicentre study on radiation related BReast cancer Acute Coronary Events (BRACE) will be presented in this session. At this moment, great efforts are being put into collecting all patient, clinical, treatment, follow up, and cardiac dose-distribution data from 7000 female breast cancer patients to develop validated prediction models for MCEs. Based on preliminary data, it will be shown that dose-volume parameters of cardiac substructures, like the left ventricle or left anterior descending coronary artery, may be more predictive of MCEs than mean dose to the heart.

In parallel with the BRACE study, the session will present the on-going unique prospective multicentre EARLY-HEART study. This aims to identify imaging-derived early subclinical cardiovascular effects in 250 breast cancer patients after radiotherapy. Echocardiography, cardiac MRI and CT are performed before radiotherapy and 6 and 24 months after radiotherapy. Currently, imaging data are being collected at the 6-month follow-up.

The session will conclude with an in-depth presentation of new cardiac MRI and CT techniques for identifying early signs of radiotherapy-related cardiovascular effects.

It is envisioned that, with the BRACE and EARLY-HEART studies,

it will be possible to identify breast cancer patients at high risk of developing cardiovascular effects after radiotherapy. In the future, this information will help in the development of individualised strategies of primary and secondary preventive measures.

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Dr. Anne Crijns is a radiation-oncologist with a specialty in the areas of breast cancer and haematologic cancer at the Department of Radiation-Oncology of the University Medical Centre Groningen (UMCG), the Netherlands. She combines her clinical work with research on radiation-induced cardiac toxicity in breast cancer patients. She is project coordinator of the European multicentre MEDIRAD-BRACE and MEDIRAD-EARLY HEART studies at the UMCG.

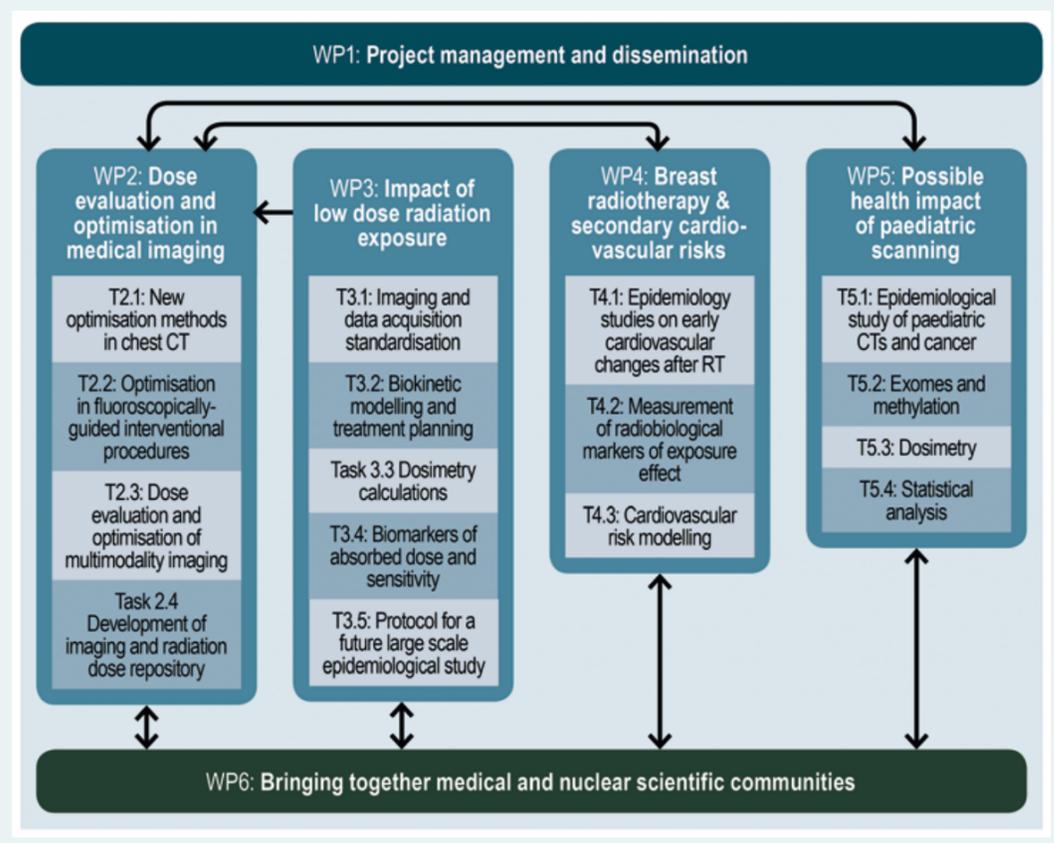
EuroSafe Imaging Session

Wednesday, February 27, 08:30–10:00, Room N

EU 1 Cardiovascular effects after radiotherapy for breast cancer: the European MEDIRAD Project

- » Chairpersons' introduction
A. Crijns; Groningen/NL
G. Frija; Paris/FR
- » Overview of dose-effect relationships and their use in strategies for prevention of cardiovascular effects after radiotherapy for breast cancer
A. Crijns; Groningen/NL
- » Discussion
- » Optimisation of multivariable prediction models for major cardiac events after radiotherapy for breast cancer
D.S. Spoor; Groningen/NL
- » Discussion
- » The MEDIRAD Early-Heart study
S. Jacob; Fontenay aux Roses/FR
- » Discussion
- » Imaging biomarkers of cardiovascular effects of incidental cardiac radiation
E. Mousseaux; Paris/FR
- » Discussion

This session is part of the EuroSafe Imaging campaign.



MEDIRAD work plan

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