

## 2020 MELODI Statement

The purpose of the MELODI Association is to define priority scientific goals and to encourage the implementation research in the field of low dose and low dose-rate radiation health risk with the aim to improve radiological protection. The Strategic Research Agenda of MELODI identifies these priority goals and the specific resources, infrastructures and training capabilities needed to further develop low-dose risk research within a time frame of 20 years. MELODI statements such as this one generally inform on priority topics for forthcoming EU and National calls, while the next EU call is anticipated for 2021, this statement should be of use to national funding agencies

In May 2020 the CONCERT European Joint Programme came to an end and there currently is no similar programme integrating all areas of radiation protection research. Planning for the next EU research framework, Horizon Europe, is underway and this Statement strongly recommends the continuation of EU-funded radiation protection research to ensure that citizens are adequately and appropriately protected from radiation health risks. The high-level priorities of all European radiation protection research platforms have been identified within the CONCERT Joint Roadmap.

The key priority for radiation protection research is to improve health risk estimates for low dose and dose-rate exposures encountered in occupational, medical and public/emergency situations. The approaches will need to be multidisciplinary and innovative. The integration of expertise outside the conventional fields of radiation research will widen the possibilities to integrate modern technologies in health research in the assessment of health risk relevant to radiation protection.

Several Horizon 2020 projects are underway, these are focused on particular topics. The MEDIRAD project has a specific focus on cardiovascular effects and diseases from radiotherapy in breast cancer patients and cancer following CT-scan among children, which constitute very specific exposure situations in specific populations. The HARMONIC project focuses on paediatric patients, undergoing interventional cardiology or proton therapy, focusing on short to medium term non-cancer outcomes (endocrine dysfunctions, cardiovascular toxicities and neurovascular damages). The RADONORM project, starting in September 2020, will consider risks associated with radon and other sources of NORM exposure, risk arising from combined exposures and elements of radon dosimetry. The SINFONIA project will also get underway in 2020 and considers cancer risks associated with medical exposures, including those at low doses.

Priorities for 2020 – 2025 period:

The overall priority is as given in the Joint Platforms Roadmap (available to download at [https://www.concert-h2020.eu/Document.ashx?dt=web&file=/Lists/Deliverables/Attachments/206/D3.7\\_Second%20joint%20roadmap\\_draft\\_reviewed%20052020\\_approved03062020.pdf&guid=01b5ac77-b2ec-4cda-9c98-917dba396f0f](https://www.concert-h2020.eu/Document.ashx?dt=web&file=/Lists/Deliverables/Attachments/206/D3.7_Second%20joint%20roadmap_draft_reviewed%20052020_approved03062020.pdf&guid=01b5ac77-b2ec-4cda-9c98-917dba396f0f)), Challenge A, *Understanding and quantifying the health effects of radiation exposure*. The following points provide more specific priorities within this overarching aim:

- To evaluate the risks of, and dose-response relationships for, non-cancer diseases at low and intermediate dose levels (100 - 500 mGy and below): in particular cardiovascular, cognitive, neurological and immunological effects.
- To define the processes contributing to cancer development in relevant target stem/progenitor cell populations after low dose/low dose-rate exposures; including for example the role of epigenetics, metabolic status, ageing, and immuno-senescence amongst others, in single and multiple stressor exposure situations.

- To identify, develop, validate and implement the use of biomarkers of exposure, and for early and late effects for cancer or/and non-cancer diseases and individual susceptibility. The relationship between these radiation biomarkers and those emerging biomarkers of healthy/unhealthy ageing needs to be considered and explored
- To understand the health effects of inhomogeneous dose distributions, radiation quality and internal emitters in particular addressing the difference between risks from acute and chronic exposures through the integration of experimental and epidemiological data applying biologically-based risk models. Also to improve the understanding of the effects of intra-organ dose distribution through observations in patients exposed to inhomogeneous fields and experiments with organotypic tissue models.
- To continue to refine risk estimates for cancers after low dose and low dose-rate exposures in occupational, medical and other cohorts. Such quantitative risk estimations are required to inform judgements on risks from acute, chronic and inhomogeneous exposures, and will provide important input to the development of quantitative mechanistic risk models and adverse outcome pathways (AOPs), see below
- To identify, explore and define AOPs for radiation-induced health effects, and determine if those operating at low doses and dose-rates are the same as those operating at higher levels of exposure, and when the triggering of an AOP is sufficient to disrupt normal homeostasis and lead to pathologies.

The current and previous MELODI statements can be found on the MELODI website. They generally provide information about short-term research priorities for specific calls. The definition of research priorities for the medium and long-term is described the CONCERT Joint roadmap.

MELODI encourages, where appropriate, (1) the use of archived biological materials from prior EU funded research, (2) the integration of experienced laboratory networks (such as e.g. RENEb), (3) the consolidation and use of important epidemiological studies (both radiological and non-radiological) where feasible, (4) the integration of expertise from outside the conventional fields of radiation research; (5) the use of shared infrastructures and (6) continued availability of targeted education and training opportunities to share and spread technical skills.