EMPIR Call 2019 – Networks

Selected Network Topic number: **SNT-w05**
Version: 1.0

Title: Support for a European Metrology Network on the medical use of ionising radiation

Abstract

Treatment and diagnosis of cancer based on surgery, chemotherapy and/or immunotherapy is not yet sufficiently advanced to replace the use of ionising radiation. Therefore, the safe exposure of patients to ionising radiation is vital for radiation therapy. The medical use of ionising radiation is consistently evolving in order to enhance treatment efficacy. This evolution can be done in a number of ways, such as by improving patient imaging, by optimising radiation dose delivery and by improving understanding of radiobiological effects which are also a concern for the radiation protection of medical staff. However, all these developments need a collaborative approach with accurate and reliable metrology, from a variety of disciplines, to underpin them. Therefore, a European Metrology Network is needed to establish such an infrastructure for stakeholders involved in the medical use of ionising radiation.

Keywords

Radiation therapy, ionising radiation, radiation protection, dosimetry, radionuclide, European Metrology Network

Background

Radiation therapy has rapidly evolved in the last few years, with the aim of improving patient treatment and diagnosis. Such advances include Magnetic Resonance Linear Accelerators (MRI-LINAC), dedicated hadron facilities, novel radiopharmaceuticals and diagnostic procedures using very short radiation pulses. These advances in turn have required new International Atomic Energy Agency (IAEA) protocols and new metrology techniques. However, this evolution is set to continue and therefore the updating and renewing process must follow it as rapidly as possible.

Radiobiology represents the future of radiotherapy, but in order to understand the mechanisms behind radiation effects, to lower iatrogenic effects and to improve treatment efficacy, it is essential to be have accurate radiobiology data. Therefore, a closer link and dialogue with stakeholders and academic institutions carrying out such studies needs to be established with the metrology community. Further to this, there are currently large discrepancies between European countries in terms of access to high investment, radiotherapy facilities and state of the art decay data libraries. This is due to the complexity and cost of operating such irradiation facilities, meaning that only the most developed countries are currently able to operate them. Therefore, a network is needed to promote and support countries in sharing their measurement infrastructure and decay data.

Currently there is no single European-wide coordination for the medical use of ionising radiation. The IAEA and a limited number of companies offer postal quality control services in radiotherapy and the IAEA promotes on site quality audits. However, techniques frequently differ and the comparison of performance, especially in terms of accuracy, is difficult. Existing coordination for the medical use of ionising radiation is also very compartmentalised, for example metrology is well represented in standardisation bodies such as ISO and IEC but not in other expert groups like the European Radiation Dosimetry Group (EURADOS) which predominantly brings together experts without dedicated irradiation resources.

How and where NMIs should focus limited resources to obtain maximum impact for society urgently requires a strategic plan and significant coordination both at European and global levels. No single NMI has the expertise or resource to tackle all or even a significant fraction of the most critical priorities without collaboration. Without coordination, there is a strong likelihood of unnecessary duplication, with NMIs (nationally and/or regionally) potentially independently choosing to focus efforts on the same challenge with consequential neglect of others. EURAMET is considering establishing a European Metrology Network to

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coordinate the European NMI response, to establish close links to the stakeholder community, to develop and implement a strategic agenda and establish a knowledge, technology transfer and promotion plan, to ensure an effective response is put in place. This SNT is intended to elaborate how a network could support EURAMET and to support that network in its initial tasks.

Objectives

Proposers should address the objectives stated below, which are mainly based on the PNT submissions. Proposers may identify amendments to the objectives or choose to address a subset of them in order to maximise the overall impact, or address budgetary or scientific / technical / legal / regulatory / market constraints, but the reasons for this should be clearly stated in the protocol.

The JNP shall focus on developing a long term ongoing dialogue between the metrology community and relevant stakeholders. This dialogue should support the take-up of research outputs from the metrology community and the collection of needs from stakeholders to inform future research.

The specific objectives are:

1. To establish regular, constructive dialogue and liaison (e.g. workshops) between the project and stakeholders in order to identify the priority areas for the medical use of ionising radiation. Stakeholders should include (i) manufacturers of medical equipment, (ii) academic experts, (iii) standards development organisations, (iv) national and international bodies, e.g. radiation oncology, medical physics, pre-clinical research, and (iv) medical staff.
2. Using the feedback from key stakeholders in Objective 1, to develop a Strategic Research Agenda and roadmaps for the medical use of ionising radiation. This should take into account the evolution of techniques, applicable regulation (e.g. Medical Device Regulation (EU) 2017/745) and existing networks (e.g. MELODI, EURAMED).
3. Using the feedback from stakeholders in Objective 1, to define how current European metrological services meet regulatory and stakeholder needs. This should include existing quality assurance mechanisms and networks e.g. European Network of biological and physical-retrospective dosimetry (RENEB) and EURADOS and the development of a web-based platform for stakeholder information. The platform should be developed in a manner that allows it to be maintained by a future EMN.
4. Using the feedback from stakeholders in Objective 1, to set up and promote a knowledge-sharing programme for stakeholders, in order to support the dissemination and uptake of results and the safe use of ionising radiation. This should include a range of regularly hosted activities, such as the exchange of researchers between organisations, metrology workshops, stakeholder events and training courses.
5. To develop a plan for a joint and sustainable European metrology research infrastructure for the medical use of ionising radiation via a European Metrology Network. The plan should be completed within 12 months of the start of the project and address how to (i) develop coordination and smart specialisation of capabilities (ii), align with existing networks, other EMNs and TC-IR, (iii) promote the development of emerging member states, and (iv) to possibly extend the collaboration to third countries.

The proposed activities shall be justified by clear reference to the measurement needs within strategic documents published by the relevant stakeholders. Proposers should establish the current state of the coordination in this area, and explain how their proposed project goes beyond this.

The proposed activities should not include those essential for the establishment and operation of the EMN. EMNs will be established and operated by the EURAMET members using their own national resources regardless of whether specific EMPIR proposals are funded. EMPIR funding is for specific tasks aimed at ensuring a proposed EMN will progress quickly towards its establishment and implementation and contribution to the objectives of the programme.

EURAMET expects the average EU Contribution for the selected JNPs in this TP to be 0.4 M€, and has defined an upper limit of 0.5 M€ for this project.

Potential Impact

Proposals must demonstrate adequate and appropriate participation/links to the “end user” community, describing how the project partners and collaborators will engage with relevant communities during the project

to facilitate knowledge transfer and accelerate the sustainability of the organisation. Evidence of support from the “end user” community (e.g. letters of support) is also encouraged.

You should detail how your JNP results are going to:

- Address the SNT objectives and deliver solutions to the documented needs,
- Provide a lasting improvement to coordination in the European metrological community and communication with their stakeholders beyond the lifetime of the project,

You should detail other impacts of your proposed JNP.

You should also detail how your approach to realising the objectives will further the aim of EMPIR to develop a coherent approach at the European level in the field of metrology and include the best available contributions from across the metrology community. Specifically, the opportunities for:

- improvement of the efficiency of use of available resources to better meet metrological needs and to assure the traceability of national standards
- the metrology capacity of EURAMET Member States whose metrology programmes are at an early stage of development to be increased

Time-scale

The project should be of up to 4 years duration.