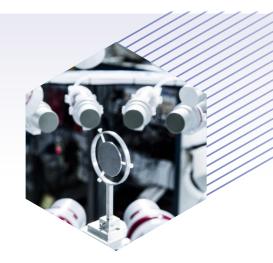


EU CONTRIBUTIONS TO NON-POWER APPLICATIONS OF NUCLEAR SCIENCE



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Nuclear and radiological science, technology and applications are used in a wide variety of areas, that go beyond the traditional energy uses, such as **medicine**, **food and agriculture**, **environment**, **industry**, **materials**, **space and cultural heritage**.

The European Union, through the European Commission's (EC) science and knowledge service Joint Research Centre (JRC), **supports the development**, **safety and sustainability of nuclear science applications (NSA)**, which have an important impact on our societies' development and well-being.

The JRC works in close cooperation with EU Member States (MS) and disposes of excellent nuclear infrastructures. The efficient use of these facilities combined with the expertise of the core research staff in the JRC enables the array of activities in the different fields of NSA.



PIONEERING MEDICAL ADVANCES THROUGH NUCLEAR SCIENCE

The JRC has a long-standing programme of research in the health applications of nuclear science, including the **development and knowledge transfer of targeted immunotherapy with alpha radiation (TAT).** JRC direct support actions on medical applications of nuclear science include:

- Treatment of advanced prostate cancer: The radiopharmaceutical Actinium-225-PSMA617 was first characterized at the JRC in Karlsruhe, followed by clinical testing in collaboration with hospitals in Germany and South Africa.
- **Guidelines and best practices:** For safe implementation of radionuclide therapy in clinical settings.
- Knowledge sharing: Knowledge dissemination, provision of training and capacity building in MS and worldwide.
- Standardisation efforts: For radionuclide calibrators in hospitals.
- **Open Access:** To the unique JRC nuclear facilities and laboratories, enabling state-of-the-art experimental research, collaboration and capacity building with a European dimension.



JOINING FORCES WITH THE INTERNATIONAL ATOMIC ENERGY AGENCY

A practical arrangement on nuclear science applications has been signed in 2017 **between the JRC and the International Atomic Energy Agency (IAEA)** to complement each institution's work and avoid duplication of efforts in the following fields: **food, agriculture, ocean science, water management, earth observation, health, environmental monitoring and emergency preparedness.** It involves education & training courses, standardization, reference materials, proficiency tests, inter-laboratory comparison exercises and validation of analytical methods.

Close to 40 joint actions were identified at the last review, including:

- Medical applications: Preparation and Clinical Utilization of Radiolabelled Therapeutic Peptides.
- Radioactivity measurements: EC has contributed to characterizing reference materials of the IAEA.
- Nuclear data: JRC and IAEA Nuclear Data Section cooperate in provision of essential data for the IAEA Member States.
- **Food & agriculture:** Achievements in food authenticity, food fraud and nuclear emergency affecting food and agriculture.



ENSURING A SUSTAINABLE SUPPLY OF MEDICAL RADIOISOTOPES

The need for sustainability of production of the medical radioisotopes poses challenges in the medium to long term, to **ensure a reliable and robust supply from raw material to end-user ready product.** The EC supports this mission through multiple efforts:

- Investigation of alternative methods of production of medical radionuclides.
- **Support to market studies & experiments on novel productions:** Ongoing projects supporting market studies on medical radionuclides and experimental investigations on novel productions paths for established (Tc99m) and emerging radionuclides (Ac-225).
- **EU initiatives on the security of supply:** Contribution to the Strategic Agenda of Medical Ionising Radiation Applications (SAMIRA), and the European Observatory on the Supply of Medical Radioisotopes.
- Surveys on the challenges to the EU supply of medical radioisotopes: Sustainable Medical Radionuclides: SMER reports.



SUPPORTING INNOVATION ON SAFETY & RADIATION PROTECTION

The EC has launched **two calls for projects** relevant to nuclear science applications, and is working on a research roadmap for medical applications of ionising radiation technologies. The two open calls will foster:

- Radiation protection and detection of ionising radiation.
- Safe use and reliable supply of therapeutic radionuclides.



CONTRIBUTING TO BEATING CANCER IN EUROPE

- SAMIRA & EU Beating Cancer Plan: The EC carries out the implementation of the Action Plan for the Strategic Agenda for Medical Ionising Radiation Applications (SAMIRA) that will support the EU Beating Cancer Plan with nuclear contributions.
- EC Knowledge Centre on Cancer: Launched in June 2021, the Centre will foster one EC coordinated approach to tackling cancer and includes the most important stakeholders, societies, and advocacy groups in Europe. It will support the Europe's Beating Cancer Plan, and the Mission on Cancer.



ADVANCING OTHER NON-POWER APPLICATIONS

- **Measurement of radionuclides:** Implementing measurements of radionuclides in the low-level underground laboratory HADES.
- **Cultural heritage:** Developing nuclear techniques for authentication and preservation.
- **Climate change:** Understanding climate change and its impact through tracer studies.
- Food: Developing studies on food authenticity and food fraud detection.
- Space exploration: Partnership with the European Space Agency on Am-221 batteries.

