

Overview

The roadmap of the Radiological Sciences and Radiopharmaceuticals activities can be summarized in the key-phrase: “*from bench to bed-side*”

□ **Major Objectives / Activities**

- [Radiopharmacy](#): Development of novel radiopharmaceuticals for medical imaging and radiotherapy.
- [Radiobiology, Biodosimetry and Radioprotection](#): (1) Absorbed dose and risk estimation following exposure to ionizing radiation (2) Evaluation of individual or induced radiosensitivity.
- [Radioecology / Environmental Radioactivity](#): Assessment of environmental radioactivity and radiological impact on ecosystems.
- [Radioactive waste management](#): Study of integrated solutions in radioactive waste management for countries with small amounts of radioactive waste.

□ [Resources - critical mass assembly](#)

Participating Laboratories / Groups

- [Radioisotopes - Radiopharmaceuticals Laboratory](#) / Radiopharmaceutical Chemistry, Molecular Radiopharmacy, Radiochemistry, Radiopharmacology and Radiobiology Groups
- [Health Physics, Radiobiology & Cytogenetics Laboratory](#) / Health Physics, Radiobiology, Cytogenetics and Radiopharmacology - Radiobiology Groups
- [Radioactive Materials Management Laboratory](#) (RMML)
- [Environmental Radioactivity Laboratory](#) / Radioecology and Radiation Protection of Man and the Environment Groups.

Major accomplishments in this thematic area can be found in the [latest Scientific Report of INRASTES](#).

□ Radiopharmacy

- Peptide-based radiopharmaceuticals: Radiolabeled somatostatin, bombesin, neurotensin, gastrin and other peptide-based analogs have been and will continue to be developed and screened as candidates for receptor-targeted diagnostic tumor imaging using SPECT and PET, as well as for peptide receptor targeted therapy (PRTT).
 - Selected analogs are undergoing Phase I clinical trials in European clinical centers (Austria, UK, Germany, Italy and The Netherlands).
 - Neuroprotective peptides (humanin, colivelin), alpha-thymosins (inflammation imaging) and anti-microbial peptides (infection imaging) labeled with Tc-99m via different chelating systems.
 - Bioinorganic compounds: New mixed ligand chelating systems for technetium, rhenium and other metals in different oxidation states.
 - Radiolabeled small bioactive molecules: Pharmacophore- (quinazolines for EGFR imaging, cationic compounds for targeting of energized mitochondria, quinolones for discrimination of infection from aseptic inflammation) coupled (radio)metal chelates, mainly 99mTc-based.
 - Antibodies: Monoclonal Antibodies labeled with gamma-, beta- and positron-emitting radioisotopes (Technetium-99m, Rhenium-186/188, Lutetium-177, Samarium-153, Arsenic-74, Niobium-90) for targeted imaging and therapy of cancer.
 - Nanoparticles: Multimodal (SPECT/PET/Optical) mannosylated dextrans for sentinel lymph node detection; Gd-based nanoparticle structures (iron-oxide/gold) labeled with Gallium-68, as dual-modality imaging agents.

[Back to Radiological Sciences and Radiopharmaceuticals main page.](#)

▣ **Radiobiology, Biodosimetry and Radioprotection**

- Development and validation of biomarkers using high throughput methodologies for assessing absorbed doses and health risk in case of radiation exposure emergencies, radiological accidents or terrorists acts.
- Development of a cytokinesis–block micronucleus (CBMN) assay for measuring DNA damage, cytostasis and cytotoxicity induced by cytotoxic agents (ionizing radiation, drugs). Evaluation of induced radiosensitivity by various drugs.
- Mechanistic insights on the aetiology of low-and high-LET radiation-induced chromosomal aberrations and risk for carcinogenesis using conventional and interphase cytogenetics.
- Induction and repair kinetics of radiation-induced chromatid breaks during G2/M transition as a biological basis for predicting enhanced radiosensitivity and susceptibility to carcinogenesis at individual level.

[Back to Radiological Sciences and Radiopharmaceuticals main page.](#)

▣ **Radioecology / Environmental Radioactivity**

- Development of a user-friendly, ready-to-use by stakeholders, commercial organism-kit for environmental quality assessment purposes.
- Providing an innovative tool for the remote control of the radioactive releases in the marine environment from local and / or regional / global radiological events.
- To advance the ERICA Tool by introducing further biological parameters for more accurate estimations of dose to non-human organisms.
- Size distribution of air-borne radionuclides / aerosol technology

[Link to research group](#)

[Back to Radiological Sciences and Radiopharmaceuticals main page.](#)

□ **Radioactive waste management**

- Contribute essentially towards the formulation of the national strategy for integrated solutions regarding radioactive waste management.
- Establish the national laboratory for conditioning and long-term storage of radioactive waste until removal for disposal at the respective national disposal facilities.
- Develop further activities and infrastructure concerning the radiological characterization and decommissioning of relevant facilities / devices.

[Back to Radiological Sciences and Radiopharmaceuticals main page.](#)

▣ **Resources - critical mass assembly**

- Experience and infrastructure (in terms of expert staff and advanced facilities) developed over the last decade(s) as a result of European and National projects.
- Currently running projects on receptor - targeted radiopharmaceuticals (EMC_BioSynthema Collaboration Agreement) and newly (within 2013) approved for funding projects (TranScan, ARISTEIA II) on translational research, therapeutic radioligands in oncology.
- Intense service provision to public and private entities in the fields of Radiopharmaceuticals QC and radioisotope/radiopharmaceutical distribution throughout Greece.
- Provision of services related to Radiation Protection of man and environment to a variety of authorities and stakeholders (issuing of certificates).
- Support by GAEC and the government to equip and sustain a National Point for radioactive waste management.

[Back to Radiological Sciences and Radiopharmaceuticals main page.](#)