

RADIOLOGICAL PROTECTION AND SAFETY

Mission and Objectives | Achievements

Mission and Objectives

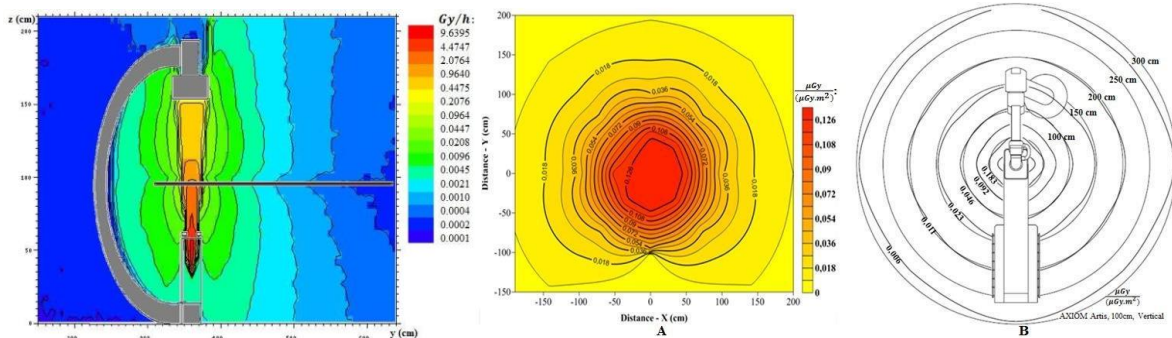
- Deployment of unique scientific and technical expertise, skills and competence in radiological protection in Portugal.
- Keeping abreast of the state-of-art in scientific and technical topics and in international regulations and safety standards in modern radiological protection and radiation safety.
- Fulfilment of the Portuguese State duties and obligations in radiological protection and radiation safety.
- Provision of scientific and technical advice and support to the Portuguese Government, to the competent authorities and to other entities and stakeholders in the execution of policies in radiological protection and in areas involving applications of ionizing radiations and radioisotopes.
- To play a leading role in Portugal, through research, services, education and training activities, in the promotion of radiation and nuclear safety culture amongst the staff in radiological installations and in the implementation of radiological protection and safety procedures compliant with the international safety standards and regulations.

Main Achievements

R&D activities

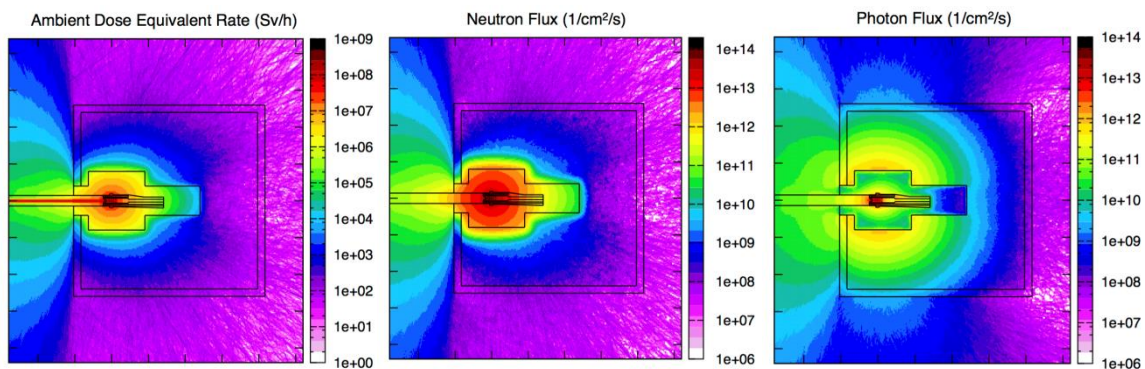
Research activities in radiological protection, dosimetry, radiobiology, metrology, environmental radioactivity and radioactive waste management were undertaken in the framework of:

- The participation in several R&D projects funded by EU FP7 programmes and by FCT in collaboration with Portuguese academia, research centres and hospitals.



Radiation protection and dosimetry of the medical applications of ionizing radiation. Computed (left and centre) versus measured (right) dose rate distribution inside an angiography room in a Portuguese hospital. Exposure of the medical staff to ionizing radiation in the interventional procedures performed in these types of rooms is nowadays a major cause of concern.

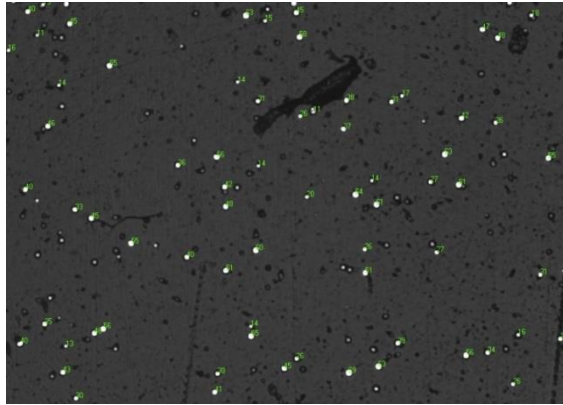
- The cooperation with CERN, EURADOS (European Radiation Dosimetry Group) and EURAMET (European Association of National Metrology Institutes) in the fields of radiological protection and safety, dosimetry and metrology of ionizing radiation.
- The membership of European Union Technology Platforms such as MELODI (Multidisciplinary European Low Dose Initiative) and IGD-TP (Implementing Geological Disposal Technology Platform).



Cooperation with CERN in radiological protection and safety studies, dosimetry and shielding assessment of nuclear technology facilities, using Monte Carlo simulations.

High added value Services, Quality Management System and accreditation of techniques

- The assessment of the safe use of ionizing radiation in 7 medical (radiotherapy and nuclear medicine) and industrial facilities.
- Radiological safety assessment, implementation of safety culture and training in facilities and activities with LINACs cargo-scanners of three harbours in Cape-Verde.
- The individual monitoring of the exposure of workers to ionizing radiation (approximately 3800 workers from 700 facilities were monitored on a monthly or quarterly basis).
- The assessment of indoor radon concentrations (about 490 measurements of radon concentration were performed during the year).



Microscopic image of alpha particles tracks from radon in a LR115 solid state nuclear track detector.
Each dot corresponds to the interaction of an alpha particle with the film.

- Analyses of the radioactivity contents of environmental (waters, foodstuffs, building materials, soils, aerosols, etc.) and biological samples. Several hundreds of samples were measured throughout the year using techniques such as gamma and alpha spectrometry, liquid scintillation and proportional counters.



UPSR Infrastructures: Cobalt-60 irradiator (left) and HPGe detectors for gamma spectrometry (right).

- The collection, segregation and interim disposal of radioactive waste from the medical, industrial and research uses of ionizing radiation (154 interventions were performed during the year).
- The licensing of radioactive sealed sources (545 licenses were issued).
- The calibration and metrological verification of radiation monitors and detectors (approximately 125 monitors and detectors were calibrated).
- Detection of radioactive materials in scrap metal at smelting factories (23 events were reported).
- Radiological protection and safety verifications (6 verifications and monitoring actions were undertaken concerning radiological protection and safety of medical and industrial facilities).
- The environmental radiological monitoring during the visit of 3 nuclear propulsion vessels at Portinho da Costa harbour in the estuary of Rio Tejo.



Radiological monitoring during the visit of nuclear propulsion vessels (left) and radiation surveys of facilities (right).

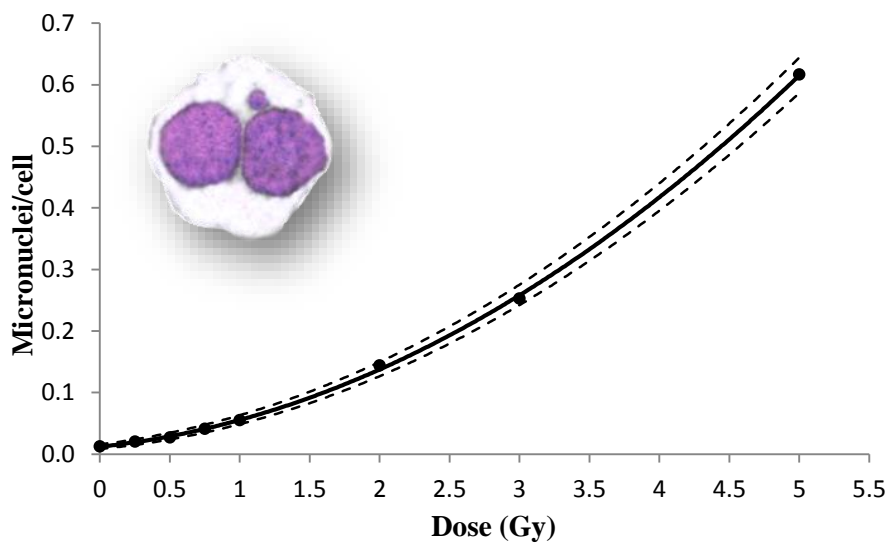
- The implementation and consolidation of the Quality Management System of the UPSR was pursued, aiming at receiving the accreditation from the IPAC (Portuguese Institute for Accreditation) for ten radioanalytical, dosimetric and metrology techniques.

Fulfilment of legal obligations

- Perform under Article 35 of the EURATOM Treaty, the environmental radiological monitoring of the Portuguese territory. Sampling of aerosols, rainwater, surface water, sediments, fish, drinking water, mixed diet, complete meals, milk and soils were performed during the year. The results are published yearly and made available to the European Commission.
- Maintaining the national standards for ionizing radiation at the Laboratory of Metrology of Ionizing Radiation.
- Statistical survey of the most frequently performed medical examinations in radiodiagnostic and nuclear medicine in Portugal (continuation of the DoseDataMed 2 project).
- Maintain and update databases on the exposure of workers to ionizing radiation and the corresponding doses received, on radon concentration and on environmental radioactivity measurements.

Preparedness of response to radiological and nuclear accidents/emergencies

- The scientific and technical expertise, competences and skills in the existing biodosimetry and radiobiology techniques were further consolidated and new techniques were implemented, in the framework of the UPSR participation in European networks and projects, aiming at increasing the preparedness of response to radiological and nuclear emergencies.
- The operation of the Whole Body Counter, unique equipment in Portugal, to assess the internal contamination of individuals due to the incorporation of radionuclides, was pursued.



Dose response curve for Portuguese population using the micronucleus assay. Results are from 16 donors and a total of 128000 binucleated cells were scored.

Organization of Conferences and Workshops, education and training activities

The undertaken activities included, *inter alia*:

- The organization of the Conference “Protecção Radiológica na Saúde 2013 (PRS2013)” promoted by IST and DGS (General Directorate for Health), which gathered medical doctors, medical physicists, radiation technologists, representatives from research organizations, academia, international organizations and foreign institutions, competent and regulatory authorities, medical equipment manufacturers and companies. PRS2013 addressed a wide spectrum of state-of-the-art and leading edge scientific and technical topics in modern radiological protection of the patient and staff in the medical applications of ionizing radiation.
- The organization of three Workshops and Training Courses in the framework of international research projects addressing scientific and legal metrology issues and radiological and nuclear emergencies.
- The organization of training courses for staff in the industrial sector and companies.
- The supervision of 7 PhD and several Master’s thesis students.
- Lecturing of radiological protection related disciplines in Portuguese Universities and Higher Education establishments.