



# Factsheet for Decision Makers

## Radiation Protection of Patients

# RADIATION PROTECTION IN NUCLEAR MEDICINE

## Why is it important?

Nuclear medicine is the use of radioactive sources in liquid form in medical diagnosis, therapy, and biomedical research. Hybrid imaging systems integrating nuclear medicine imaging and computed tomography (CT) into PET/CT and SPECT/CT provide important functional and anatomical information. While the development of modern technology can make new applications safer, their inappropriate use can lead to unnecessary or unintended radiation exposures of patients and staff.

Nuclear medicine involves handling radioactive materials and therefore contamination of staff and the working environment may occur, resulting in external and internal exposure.

More than 33 million diagnostic nuclear medicine procedures are performed annually worldwide.

## What do I need to know?

Justification and optimization are the two cornerstones of radiation protection of patients. Dose limits do not apply in medical exposures as they may limit the benefits to the patient. Dose limits apply to occupational and public exposure only.

The process of justification allows determining whether the exposure will take place or not. Once justified, the procedure should be optimized and performed such that the exposure of the patient is managed in order to achieve the medical objective.

In therapeutic nuclear medicine, the exposure of normal tissue should be kept as low as reasonably achievable while consistent with delivering the required dose to the target for therapy.



**IAEA Safety Standards**  
for protecting people and the environment

**Radiation Protection and  
Safety of Radiation Sources:  
International Basic  
Safety Standards**

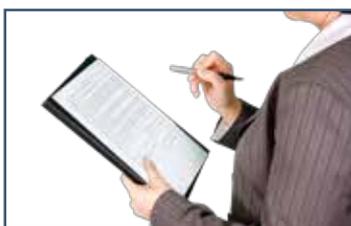
Jointly sponsored by  
EC, FAO, IAEA, ILO, OECD/NEA, PAHO, UNEP, WHO

**General Safety Requirements Part 3**  
No. GSR Part 3

The International Basic Safety Standards (BSS) are the international benchmark for radiation safety. The BSS are used in many countries as the basis for national legislation to protect workers, patients, the public and the environment from the risks of ionizing radiation.

The BSS are based on the most recent scientific evidence on the effects of ionizing radiation and take into account practices and experiences from around the world in the use of ionizing radiation and nuclear techniques. Eight international organizations sponsor the BSS.

### What actions are required?



The government is responsible for establishing and implementing a legal and regulatory framework for radiation protection in medicine.

The regulatory body is responsible for establishing requirements and guidelines, authorization and inspection, and for enforcing legislative and regulatory provisions.

The hospital management has a prime responsibility for safety and for establishing and implementing a radiation safety programme.

Medical staff is responsible for the overall protection, both for patients and for themselves, in the delivery of medical exposures.

### Pay particular attention in nuclear medicine to:

- Justification of the use of a given radiological procedure for an individual:
  - ▶ The appropriateness of the request;
  - ▶ The urgency of the procedure;
  - ▶ The characteristics of the exposure and of the individual patient;
  - ▶ The relevant information from any previous procedures;
  - ▶ The relevant referral guidelines.
- Optimization of protection and safety should include:
  - ▶ The minimum necessary exposure to the patient is necessary to achieve the objective;
  - ▶ Acceptable image quality;
  - ▶ Typical doses to patients for common procedures;
  - ▶ Diagnostic reference levels;
  - ▶ A comprehensive programme of quality assurance;
  - ▶ Protection of patients who are pregnant or breast-feeding, as well as children.
- Occupational radiation protection in nuclear medicine should include:
  - ▶ Appropriate design of facilities and nuclear medicine equipment;
  - ▶ Use of personal protective devices and protective tools, as appropriate;
  - ▶ Appropriate individual monitoring;
  - ▶ Local rules and procedures for safe handling of radiopharmaceuticals;
  - ▶ Education and training.



### Resources

Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, No. GSR Part 3

[http://www-pub.iaea.org/MTCD/publications/PDF/Pub1578\\_web-57265295.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/Pub1578_web-57265295.pdf)

Radiation Protection of Patients (RPoP) website

<https://rpop.iaea.org/RPoP/RPoP/Content/index.htm>