

Radiation Safety Information- LIFESPAN

RHODE ISLAND HOSPITAL, THE MIRIAM HOSPITAL

Medical Physics

Contents

- General Radiation Safety Principles
 - Regulations for Radiation Protection
 - Safety Issues
 - Radiation Precautions for Specific Areas
 - Radiation Oncology - Brachytherapy
 - X-ray
 - Fluoroscopy
 - Nuclear Medicine
 - Research with Radioactive Materials
 - Report Problems
 - Radiation Safety Intranet Site
-

General Radiation Safety Principles

Good radiation safety practice involves keeping radiation doses As Low As Reasonably Achievable (ALARA). The four main principles of radiation protection are:

- **Time** - minimize the amount of time spent in the exposure area;
- **Distance** - the further you are from a source of radiation, the lower your exposure; and
- **Shielding** - any material between you and the source will reduce radiation exposure. For the X-rays and gamma rays you are likely to encounter, lead is the most commonly used shield material. Low density materials like wood or drywall are not as effective for shielding.
- **Contamination Control** - Use secondary containment and absorbent pads to prevent the spread of contamination. Use personal protective equipment (e.g., gloves, lab coat, booties, etc.) to keep contamination off your person.

Radiation badges (body dosimeters and/or extremity dosimeters) are used to measure the dose an individual receives while working with ionizing radiation. You are required to wear a dosimeter if you are likely to receive, in 1 year from sources external to the body, a dose in excess of 500 mrem or 10% of any other applicable limit. Badges are not usually required for those who occasionally enter a diagnostic X-ray or therapy room. However, if you are frequently in an area where ionizing radiation is used, contact Radiation Safety to determine whether you need a badge. There is a \$10 charge for late/lost dosimeters.

Regulations for Protection of Personnel from Radiation Exposure

The Rhode Island Department of Health (DOH) Radiation Control Agency (RCA) issues the regulations governing ionizing radiation. Copies of these regulations are available for review in Radiation Safety, (Main Room 317 phone: 444-5961).

A "Notice to Employees" is posted in each department and provides additional information. These forms describe your rights and responsibilities as a Lifespan employee.

You also have access Rhode Island Hospital licenses and registrations, license conditions, amendments, or documents incorporated into a license by reference, and operating procedures applicable to licensed or registered activities; any notice of violation involving radiological working conditions, proposed civil penalty, or order issued, and any response

from Rhode Island Hospital. Contact Radiation Safety for more information.

Only an Authorized User is permitted to direct the use of radioactive material (RAM). Authorized User status is obtained through application to and approval by the Radiation Safety Committee. Individuals who would like to become Authorized Users (Principal Investigators) or change current authorizations (e.g., change a protocol, relocate, etc.) must apply to the Committee c/o Radiation Safety.

Safety Issues Associated with Exposure to Radiation

The occupational radiation exposure limits are:

Whole body:	5,000 mrem/yr
Eyes:	15,000 mrem/yr
Skin:	50,000 mrem/yr
Extremities:	50,000 mrem/yr

A rem is a unit of ionizing radiation dose. To put this in perspective, we each receive about 300 mrem/year from natural radiation sources (e.g., earth, cosmic rays, our bodies, and radon).

Radiation risk estimates were developed by several national and international scientific organizations over many years. Based on risk estimates and recommendations from these organizations, regulatory agencies have established occupational dose limits. The 5,000 mrem annual occupational dose limit, together with keeping occupational dose ALARA, provides a minimal level of risk for effects such as cancer. The limits for individual organs are below the dose levels at which acute organ effects (e.g., cataracts and skin reddening) are observed. Dose limits of 500 mrem for the total gestation period are applied to the embryo/fetus of a declared pregnant worker (a woman who has declared her pregnancy in writing). At doses below these limits, effects, including small head size and mental retardation, are expected to be negligible, and total lifetime risk of leukemia and other cancers is minimal.

More detailed information about biological effects and risks from occupational radiation exposure is available in NRC Regulatory Guide 8.29 "Instruction Concerning Risk From Occupational Radiation Exposure." Copies are available from Radiation Safety, 444-5961

Radiation Precautions for Specific Areas:

Radiation Oncology - Brachytherapy

Radiation Oncology performs intracavity and interstitial radioactive implant therapies for patients afflicted with tumors, cancers, and other conditions. The implants may be temporary or permanent in nature. This practice is collectively referred to as *brachytherapy*.

The use of radioactive material necessitates precautions for those interacting with such patients. The primary concerns are limiting exposure to caregivers and preventing the loss or uncontrolled release of the radioactive material.

Brachytherapy patient rooms are identified by the "CAUTION - RADIOACTIVE MATERIALS" sign (*see below*) posted on the door or by a cautionary notice placed in the patient's chart.



If you see this sign on the door to a patient's room:

- Obtain clearance from the charge nurse before entering the room. The charge nurse will review with you details that may be particular to this patient. Additional information is posted in the patient's chart.
- Refer to the sign on the patient's door for any time restrictions. Plan what you need to accomplish so as not to exceed these limits.
- Minimize your time in the room without compromising medical care.
- If bedside shielding is provided, remain behind it whenever possible.
- Do not order any invasive testing without first consulting Radiation Oncology and Radiation Safety.
- Surgical dressings should be changed only as directed by the physician in charge.
- If the implants become loose or fall out, do not try to replace them or pick them up with your fingers. Call the physician in Radiation Oncology. Emergency numbers will be posted in the patient's chart.
- Do not remove any trash or linens from the patient's room.
- In the event of a medical emergency or patient death, contact Radiation Oncology and Radiation Safety immediately.

Pregnant women and minors (under 18 years old) are not allowed in radiation therapy rooms.

X-ray

X-ray procedures performed at RIH/TMH include radiographic X-ray, fluoroscopy, mammography, dental X-ray, bone densitometry, CT, and therapy with accelerators. Radiation scattered from the patient is the main source of personnel exposure. When the beam is on, X-ray rooms are restricted to those who are authorized and trained.

Note: X-ray equipment only produces radiation when energized, otherwise there is no radiation hazard.

Only DOH **licensed** operators and practitioners are permitted to practice radiation imaging and treatment. **Untrained** employees are not permitted to operate x-ray equipment.

Only individuals (including Staff) identified and posted as approved "Operators" are authorized to energize or use x-ray equipment. Approval is site/room/equipment specific. Contact your supervisor or department administrator for additional information.

Various signs (*below*), such as

“CAUTION – X-ray Authorized Personnel Only” signs, “CAUTION - RADIATION AREA” signs, or “CAUTION – HIGH RADIATION AREA” signs indicate the presence of X-ray producing machines.



Before entering a labeled x-ray room or a room in which x-ray equipment is being used:

- If the door is closed, knock before entering.
- Keep out of the room while the patient is being exposed.

- If staying out of the room is not possible without compromising patient care, you should:
 - keep all parts of your body out of the primary beam, **and**
 - wear a lead apron, **or**
 - stand behind a lead barrier

Fluoroscopy

Prior to performing or participating in a fluoroscopic procedure, all personnel who operate fluoro units and all non-operators who are likely to receive >100 mrem in a year from participating in fluoro procedures are required to receive at least two hours of radiation protection training specific to fluoroscopy. This is in addition to training required by other Rhode Island Department of Health rules. Training includes bookwork, review of the Safe Operating Procedures for your area(s), and a knowledge test.

If you perform or participate in fluoroscopic procedures, contact your department administrator or Radiation Safety for instructions.

Nuclear Medicine Procedures

Nuclear Medicine patients receiving diagnostic tests generally pose minimal external radiation exposure hazard, although their body fluids can be a source of radioactive contamination. Radioactive materials used for Nuclear Medicine procedures have a very short residence time in the patient's body. All patients who have been administered radioactive material in Nuclear Medicine will have the following stamp in their chart:

NOTICE: The patient had a Nuclear Medicine procedure:
 Procedure: _____ Radionuclide: _____
 mCi: _____ administered at ____:____ on ____/____/____
 If the patient is to have invasive procedure within ____ hours
 post dose administration, please call Radiation Safety at:
 444-5961 for any necessary precaution.

If you are going to perform an invasive procedure (including blood draws) on the patient within the indicated time, use normal body substance precautions. Call Radiation Safety if you have any questions.

Nuclear Medicine also administers therapeutic doses of iodine-131 (¹³¹I) to patients who have various types of thyroid disorders. External exposure rates around these patients can be significant. In addition, saliva, perspiration, urine, feces, and other materials and tissue from these patients will be radioactive. Patients who are likely to expose others to more than 500 mrem after administration of ¹³¹I are hospitalized. These patients' rooms are posted with a "CAUTION - RADIOACTIVE MATERIALS" sign. Body fluid specimens should be drawn from these patients *before* the radioactive material is given. After administration, additional specimens should only be drawn in case of a medical emergency.

Before entering and while in a ¹³¹I therapy patient's room:

- Check in with the nursing station.
- Read the safety information about the patient in the patient's chart and at the door to the patient's room.
- Wear a lab coat and put on the shoe covers and gloves available on a cart at the door.
- If direct contact with patient body fluids is anticipated, wear disposable gowns or hospital gowns (available on the floor) and leave them in the patient's room.
- Any instruments (including stethoscopes) that come in contact with the patient may be contaminated. Leave them in the room.
- Before entering, complete the room entry log: Name, Hospital ID, date, time in, time out, etc.
- If an electronic radiation dosimeter has been assigned to the case, wear it whenever you are in the room. Log the start and end readings.

- Before leaving, remove the shoe covers and gloves and place them in the “Radioactive” labeled trashcan near the door.
- Do not remove anything from the patient's room until Radiation Safety has surveyed it for radioactive contamination.
- Stay behind the bedside lead shield as much as possible.
- Perform any unshielded tasks as quickly as possible without compromising medical care.
- In the event of a medical emergency or patient death, contact Nuclear Medicine and Radiation Safety immediately.

Pregnant women and minors (under 18 years old) are not allowed in radiation therapy rooms.

I-131 Therapy Treatment Floor:
8A

Research Areas with Radioactive Materials

Biomedical research is often performed with unsealed radioactive materials. External radiation exposures are generally low and contamination is the most likely hazard. Research laboratories are marked with "CAUTION - RADIOACTIVE MATERIALS" signs (*see page 2*). Specific work areas are additionally labeled with "CAUTION - RADIOACTIVE MATERIALS" tape to warn personnel where contamination may be found.

When in a radioactive materials laboratory:

- Eating and drinking are prohibited.
- Personal Protective Equipment (gloves, lab coats) must be worn if you could touch any contaminated areas or equipment.
- Do not pick up or remove anything labeled "Radioactive," including waste bags.

If you have any questions, please contact Radiation Safety at 444-5961.

Report Problems

Contact Radiation Safety (444-5961) to report any emergency situations or unsafe work conditions, or for additional radiation safety information.

Radiation Safety Contact Information:
 Phone: (401) 444-5961
 RSO Pager: 350 2745
 Technologist Pager: 350 5405
 Technician Pager: 350 3733

Radiation Safety Intranet Site

Access the Lifespan Intranet at intra.lifespan.org

From there, click on “Medical Physics” to access radiation safety information, forms, and links to related sites.