Occupations and Workplaces

Medical Radiation Technologist

On this page

What is a medical radiation technologist?

Medical radiation technologists (MRTs) are healthcare professionals who use various forms of radiation and medical imaging technologies to assist in diagnosing and treating disease and injury. MRTs work in hospitals, clinics, and other healthcare settings as essential members of a healthcare team, collaborating with radiologists, oncologists, and other medical specialists. MRTs deliver high-quality diagnostic imaging and therapeutic services to patients. They are responsible for preparing patients for their exams, operating equipment, and maintaining patient safety by following radiation protection protocols to minimize radiation exposure to themselves, patients, and others.

Medical radiation technologists (MRTs) work in four specialized areas of practice:

1. radiological technology,
2. nuclear medicine,
3. radiation therapy, and
4. magnetic resonance imaging.

What does a radiologic technologist do?

A radiologic technologist, also known as a radiographer, is a healthcare professional who uses medical imaging technology, such as X-rays, to create images of the human body for diagnosis and treatment.

A radiologic technologist will:

- Perform X-rays and other diagnostic imaging examinations on patients to help healthcare specialists diagnose and treat diseases and injuries
- Specialize in operating X-rays, computerized tomography (CT) scanners, radiographic and fluoroscopic equipment, and mammography units to produce radiographs or anatomic images of the human body for the diagnosis of disease. May also include interventional radiology, using fluoroscopy for procedures such as biopsies or for treating conditions of the blood vessels throughout the body
- Provide appropriate patient care during radiographic examinations and apply radiation protection measures
- Explain procedures, and position the patient and equipment
- Record and process patient data
- Perform verification and quality control checks on radiographic and film processing equipment

What does a nuclear medicine technologist do?

Nuclear medicine looks at how organs and cells function within the body. While most other diagnostic imaging tests, such as an MRI or X-ray, reveal the anatomy, nuclear medicine shows both anatomy and function.

A nuclear medicine technologist will:

- Provide physicians with diagnostic images that help pinpoint the nature of a disease, its effects on the body, and possible treatment options
- Perform single-photon emission computed tomography (SPECT) scan, bone scan, or positron emission tomography (PET) scan, and operate radiation detection equipment, such as gamma cameras, scanners, scintillation counters, densitometers and ionization chambers to acquire data for use by nuclear medicine physicians in the diagnosis of disease.
- Prepare radiopharmaceuticals, such as radionuclides, and give them to patients
- Perform diagnostic procedures using radioactive materials on biological specimens, such as blood and urine

- Provide appropriate care for patients during examinations and apply radiation protection measures
- Record and process the results of procedures, and check equipment to make sure it operates properly
- Act as the primary point of contact for patients and their families, provide information and support throughout the whole exam procedure, and ensure patient safety and comfort

What does a radiation therapist do?

A radiation therapist plays a crucial role in cancer treatment. Radiation therapy uses high-energy radiation to kill cancer cells and shrink tumours or growths over time. It is also used in palliative care to reduce pain and other symptoms.

A radiation therapist will:

- Work as part of the oncology team that treats patients with cancer, and work closely with the radiation oncologist and other healthcare professionals to plan and deliver targeted doses of radiation to patients
- Operate equipment, such as linear accelerators, X-ray machines, cobalt-60 and other radiation therapy equipment, to deliver concentrated radiation therapy to the region of a patient's tumour, as prescribed by a radiation oncologist. Alternative treatments may sometimes involve preparing sealed radioactive materials such as cobalt, radium, cesium and isotopes to treat cancerous tumours
- Check and calibrate radiation therapy equipment to make sure it operates properly
- Act as the patient's main point of contact, and work with them and their families to support their well-being throughout the treatment process. Help to educate patients on what to expect during treatment, possible side effects, dietary restrictions and answer any questions they may have
- Keep detailed records of treatment

What does a magnetic resonance imaging (MRI) technologist do?

An MRI machine uses the hydrogen atoms in a patient's body and exposes them to a strong magnetic field and radiofrequency pulse (not X-rays). When the pulse is turned off, the atoms emit energy signals that are measured by a computer. The computer processes these signals to create detailed images of human anatomy.

An MRI is better at capturing small features when images of finer detail are needed. Sometimes patients will be given a contrast agent (gadolinium) to better see a part of the anatomy during an MRI exam, allowing a radiologist to interpret and be certain of a diagnosis.

An MRI technologist will:

- Operate a magnetic resonance imaging (MRI) scanner to produce anatomic images of the human body for diagnosis of disease or injury by a radiologist.
- Administer and follow the necessary safety precautions for entry to the magnet room to protect themselves, the patient, and other members of the healthcare team
- Provide appropriate care and monitoring of the patient during the examination
- Safety screen all patients for contraindications present that could harm them or that would exclude the patient from having the examination
- Precisely position the patient and equipment based on the structures that the physician needs to see and ensure safety and comfort.
- Act as the primary contact for questions and answers about MRI.
- Record and process patient data
- Perform verification and quality control checks on magnet equipment

What are the health and safety issues for medical radiation technologists?

Biological Hazards

Medical radiation technologists (MRTs) face a variety of biological hazards in their daily work, primarily due to close and frequent contact with patients. These hazards are consistent across subcategories of MRTs, but vary in intensity and exposure routes depending on the specific tasks involved. For example, nuclear medicine technologists frequently handle radioactive blood and urine samples, increasing their risk of exposure to both infectious agents and radiopharmaceuticals. Similarly, radiation therapists and radiologic technologists can be exposed to infectious patients and bodily fluids during procedures, patient positioning, and equipment handling.

A multi-tiered infection control approach is essential. Administrative controls include routine precautions, hand hygiene protocols, environmental cleaning, and comprehensive sharps safety programs. In nuclear medicine, technologists may handle infectious material and radioactive samples, where infection control practices must integrate radiation safety protocols, including proper disposal of radioactive waste and the use of specialized personal protective equipment (PPE).

Across all MRT roles, the proper use of personal protective equipment (PPE) is vital. Gloves, gowns, face shields, and masks (including N95 respirators when appropriate) must be readily available and properly used during any activity that risks exposure to bodily fluids or infectious droplets. Finally, training and education programs are essential to ensure that all staff remain vigilant and up to date on infection control techniques, spill management procedures, and post-exposure protocols.

Chemical Hazards

Healthcare settings, such as those involving advanced diagnostic and therapeutic modalities, like medical imaging and radiation oncology, can require the use of a diverse range of chemicals. MRTs work in clinical environments where good hygiene practices are essential. Personnel routinely use specialized cleaning and disinfecting agents to sterilize imaging equipment, patient contact surfaces, and workspaces. MRTs must also work with reagents for preparing radiopharmaceuticals, as well as other solvents used for equipment maintenance. Exposure to these substances can present occupational health risks, causing dermal irritation, chemical burns, respiratory symptoms, and other chronic effects depending on the chemicals used, their properties, the exposure duration, and the route of exposure.

Ergonomic Hazards

Musculoskeletal disorders (MSDs) pose a risk for healthcare professionals, particularly those involved in patient handling and operating medical equipment. These injuries often result from repetitive tasks, awkward postures, lifting and transferring patients, and prolonged standing. Common areas affected include the back, neck, shoulders, and wrists. The nature of the work performed by medical radiation technologists can require frequent patient transfers and manipulating heavy imaging and treatment equipment, which heightens the risk of developing musculoskeletal disorders (MSDs).

To mitigate the risk of MSDs, the following control measures should be considered:

- Proper body mechanics, emphasizing correct lifting and transfer techniques such as keeping loads close to the body and bending at the knees.
- Utilizing ergonomic equipment, including mechanical lifts, transfer boards, and adjustable-height tables, to reduce the need for manual lifting and awkward movements.
- Workstation design should prioritize ergonomic principles to promote neutral postures and minimize strain.
- Education and training programs on proper body mechanics and ergonomic principles are fundamental to fostering a safer work environment.

Physical Hazards

Noise

MRI machines can produce high levels of acoustic noise during scans that may exceed occupational noise exposure limits. To protect against hearing damage, it is essential to conduct noise assessments and follow established hearing protection protocols to protect workers and patients.

Radiation Emitting Devices

Medical radiation technologists work with radiation-emitting equipment. Although radiation doses from a single procedure are generally low, the cumulative effect over many years can increase the risk of long-term health issues to workers. To protect themselves, MRTs follow strict safety protocols that minimize time near radiation sources, maximize distance, and use appropriate shielding. Additionally, special attention is given to pregnant MRTs, whose fetuses are more sensitive to radiation. Upon declaration of pregnancy, workplaces must ensure that fetal exposure remains below the established threshold to prevent potential developmental harm. Workers can request protective reassignment to protect themselves and their fetus.

Health Canada has produced a number of Safety Codes for X-ray equipment. Safety Code 35 covers the *Safety Procedures for the Installation, Use and Control of X-ray Equipment in Large Medical Radiological Facilities* (2024)

Radiopharmaceuticals

Nuclear medicine technologists (NMTs) are a specialized subgroup of MRTs who face additional risks because they work directly with unsealed radioactive materials called radiopharmaceuticals. These substances emit radiation and are administered to patients for diagnosis or treatment. NMTs are exposed to radiation hazards during the preparation, dispensing, administration, and disposal of these materials, as well as during imaging procedures. Due to the potential for both external exposure and internal contamination through inhalation or skin contact, NMTs must rigorously apply safety measures and use personal protective equipment to minimize their radiation exposure.

Psychological Hazards

MRTs can be exposed to psychological and emotional hazards due to:

- The demanding nature of their work environment
- Caring for patients with serious illnesses
- The pressure of maintaining patient safety and the responsibility of administering radioactive doses accurately
- Long hours, shift work, and night shifts add further strain and disrupt the circadian rhythm
- The need to keep pace with and adapt to changes in the medical technology they use, and the need for ongoing training required to stay current

- Technical problems with medical equipment and how work is organized can impact staff and contribute to emotional strain

To address these psychological and emotional risks, several strategies are recommended.

- Fostering a supportive workplace culture where technologists feel supported
- Offering stress management programs and mental health support services, such as counselling and resilience training, is helpful in promoting emotional well-being
- Optimizing work schedules to allow sufficient rest between shifts and minimizing night work can help maintain circadian health
- Ensuring sufficient personnel to manage the workload and reduce stress
- Implementing organizational-level interventions, such as investing in user-friendly systems, or redesigning workflows
- Taking organizational action to resolve the source of underlying problems

Violence and Harassment Hazards

Healthcare professionals are at risk of physical violence, verbal abuse, and personal and sexual harassment from both the public and co-workers. Factors that should be considered include:

- Being a younger worker or a worker new to the profession with limited experience
- Working night shifts
- Working with intoxicated patients or patients experiencing mental health conditions

To reduce the risks associated with workplace violence and harassment:

- Establish violence and harassment policies and procedures for staff in accordance with legislative requirements.
- Ensure policies and procedures address how the employer will address and protect workers from the public and patients who engage in violence or harassment
- Train employees
- Enhance physical security (e.g., provision of security services at main entrances, surveillance systems, restricted public access for staff only)
- Improve patient and staff management (e.g., scheduling and communication).
- Conduct routine staff surveys and increase policy awareness

Safety Hazards

Magnetic Resonance Imaging (MRI) technologists also face unique occupational hazards related to the strong magnetic fields generated by MRI machines. MRIs use powerful magnets and radiofrequency waves to produce images of the body. Metal objects with ferromagnetic properties are a serious projectile hazard in MRI environments because they are strongly attracted to the scanner's powerful magnetic field and present the greatest danger to patients and staff. Objects like oxygen cylinders, wheelchairs, and stretchers can be pulled rapidly toward the MRI machine, risking serious injury or death to those in its path.

Preventing incidents in MRI environments requires strict adherence to established safety measures, staff training, patient and staff screening, and controlled access to the MRI environment through designated MRI safety zones. Safety zones increase in restrictions and magnetic risk from Zone 1 (open to the public) to Zone 4 (the MRI scanner room with the strongest magnetic field and the highest risk of projectile incidents).

What are some good general safe work practices?

Ensure that you are trained and informed about how to avoid the various health and safety hazards of your job. Read about:

- Health and wellness
- Chemical hazards and WHMIS
- Blood-borne diseases such as AIDS, or hepatitis
- The importance of hand washing
- Needlestick injuries
- Proper selection, use, maintenance and storage of personal protective equipment
- Safe lifting techniques
- Preventing slips, trips and falls
- Shift work
- Fatigue
- Fire safety
- Working alone or working alone with patients
- Working safely with compressed gases
- Hazard identification and risk assessments

Always:

- Follow company safety rules

- Know how to report a hazard
- Follow good housekeeping procedures

Fact sheet first published: 2026-06-16 Fact sheet last revised: 2026-06-16

Disclaimer