MEDICAL IMAGING: THE INSIDE STORY

A guide for patients from your medical imaging team

imagingteam.ca

What is medical imaging?

Medical imaging, sometimes referred to as diagnostic imaging, captures detailed pictures of the inside of the human body. It can also show how individual body systems, organs or disease processes are functioning. Medical imaging procedures are often referred to as tests or scans.

What kinds of imaging are there?

- Ultrasound
- Radiological technology
  - X-rays
  - Computed tomography (CT)
  - Mammography
  - Bone mineral densitometry
- Molecular imaging
- Nuclear medicine
- Positron emission tomography (PET)
- Magnetic resonance (MRI)
- Interventional radiology

Why are medical imaging tests needed?

Medical imaging provides critical information that doctors and other healthcare professionals need to diagnose, treat and monitor injuries and disease.

Doctors and other referring healthcare professionals use guidelines and resources that assist them to select the right procedure for your particular condition.

Who performs imaging tests? Who analyzes them?

A group of healthcare professionals, known as the medical imaging team, works together to ensure that the appropriate medical imaging tests are performed safely and comfortably—and interpreted correctly.

The medical imaging team can include:

- **Physicians**—radiologists, interventional radiologists, nuclear medicine physicians and, occasionally, other specialists

  Radiologists specialize in interpreting the results of medical imaging exams. Family physicians and other specialists turn to radiologists for consultation on the safest and most effective exams, what the results mean for the patient and the treatment options. They have the knowledge and experience to help you and your doctor make informed decisions about your health care.

Interventional radiology is a specialty of radiology that provides minimally invasive, targeted treatments performed using imaging for guidance. Interventional radiologists use their expertise in reading x-rays, ultrasound, MRI and other diagnostic imaging, to guide tiny instruments, such as catheters, through blood vessels or through the skin to treat diseases without surgery.

Nuclear medicine is an independent specialty separate from radiology. Nuclear medicine specialists are trained to use medical isotopes for the diagnosis and treatment of various disorders, both benign and malignant, in children and adults. They are also trained in the assessment and management of abnormal bone density such as osteoporosis.

- **Medical physicists**

  With specialized training in the medical applications of physics, medical physicists serve as advisors to hospital administrators regarding technical aspects of diagnostic imaging and treatment equipment, and then perform acceptance testing and quality control on the equipment. Medical physicists have expertise in radiation safety and play an important role in ensuring optimal image quality and radiation safety for patients and healthcare workers, developing radiation shielding designs and providing staff education.

- **Sonographers**

  Diagnostic medical sonographers perform diagnostic imaging examinations, using high frequency sound waves (ultrasound), rather than ionizing radiation, to produce the dynamic visual images of organs, tissues and blood flow inside the body used by interpreting physicians to diagnose and treat disease and to guide interventional and treatment procedures.

- **Technologists**

  Medical radiation technologists (MRTs) perform diagnostic imaging examinations and administer radiation therapy treatments. If you have ever had an x-ray, CT scan, MRI, Bone Mineral Densitometry (BMD), nuclear medicine procedure or radiation therapy, you have been in contact with an MRT. Technologists also assist with interventional radiology procedures.

After the images have been taken by the technologist or the sonographer, they are interpreted by a physician. The results are processed and sent to your family doctor or referring healthcare provider. Your doctor or referring healthcare provider is responsible for communicating the results to you.

How do they know which medical imaging procedure to use?

The right medical imaging procedure is one that will show the referring healthcare provider the information they need to diagnose, treat, or monitor injuries or diseases. The medical imaging team's goal is to ensure you get the right procedure, at the right time and for the right reason to suit your healthcare needs. Organizations such as the Canadian Association of Radiologists (CAR) publish formal guidelines for the selection of the procedure. The official term for this is "appropriate medical imaging".

What is the patient's role in medical imaging?

Patients can and should play a key role in managing their health care. When a physician or other referring healthcare provider suggests a procedure, you or your family caregivers have the right to discuss the procedure, why it is being recommended and the risks involved. This allows you to make an informed decision.

What risks are associated with medical imaging procedures?

There are risks associated with all medical procedures. Generally, the risks of individual medical imaging procedures are minimal and the benefits will most likely outweigh any potential risk.

To make an informed decision, you (or your caregivers) have a right to:

- Ask any questions you may have regarding your medical imaging procedure
- Ask about the risks/benefits of the proposed medical imaging procedure
- Review concerns about tests that expose you to radiation
- Know if there are alternatives to the test being considered

Does all medical imaging use radiation?

All medical imaging procedures use some form of radiant energy to take images.

However, not all radiation is the same:

Non-ionizing radiation

These forms of energy do not cause damage to the cells of the human body. Medical imaging procedures that use these forms of energy include magnetic resonance imaging and ultrasound.

Ionizing radiation

These are forms of energy that can cause damage to the cells of human tissue. Medical imaging tests that use these forms of energy include all radiological technology, nuclear medicine, positron emission tomography (PET) and interventional radiology procedures.

Members of the imaging team use the ALARA (As Low As Reasonably Achievable) principle to minimize the radiation dose of each test while ensuring imaging quality.

Does ionizing radiation cause cancer?

As a general rule, the amount of ionizing radiation from an individual x-ray or nuclear medicine procedure has minimal impact on your chances of getting cancer within your lifetime. Your risk of getting cancer from the current exam is not increased by, or related to, previous exams. If the exam is clinically appropriate, the benefits will outweigh the risks.

Is medical imaging dangerous to children?

Because of their smaller body size, children are exposed to a larger radiation dose than adults, if the same imaging conditions are used. Healthcare professionals are developing specialized medical imaging and interventional procedures for children to lower and limit doses without compromising quality. An initiative called *Image Gently* provides many helpful information resources and guidelines for parents and members of the medical imaging team.

Is it normal to be anxious about an imaging procedure?

It's completely normal to have concerns about any medical procedure. People who suffer from claustrophobia might find medical imaging procedures such as MRI difficult. Rather than letting concerns lead to a "no show" for the procedure, you should express any worries you have to your referring doctor or healthcare provider, who may be able to prescribe a sedative or may choose an alternative medical imaging procedure.

If you are unable to make your scheduled medical imaging appointment, call the imaging facility to cancel the appointment as soon as possible. Many medical imaging departments have waitlists. Every missed appointment is a cost to our healthcare system, and a lost opportunity for someone else to access the procedure.

Is there more information about medical imaging?

Visit the patient resource centre at **imagingteam.ca** for:

- Explanations of medical imaging exams and procedures
- More information about radiation safety risks and protection
- Guidelines for referring physicians and other healthcare professionals
- Descriptions of the roles and qualifications of the medical imaging team members

CSDMS SCEM
Canadian Society of Diagnostic Medical Sonographers
Société canadienne des échographistes médicaux

CANM
ACMN

Canadian Association of Radiologists
L'Association canadienne des radiologistes

Canadian Association of Medical Radiation Technologists
Association canadienne des technologues en radiation médicale
YEARS | ANS 1942-2012

COMP OCPM

CIRA
Canadian Interventional Radiology Association
Association canadienne de radiologie d'intervention