

How do x-rays compare with natural radiation?

Radiation doses from x-rays or scans are generally low in comparison to natural exposure over a lifetime. For instance, a simple chest x-ray is the equivalent of less than four days' natural radiation.

It is also equivalent to the increased radiation you get from less than three hours' flight in an aircraft.

CHILDREN AND PREGNANCY

X-rays in pregnancy

If you are pregnant or it is possible that you may be pregnant, you need to tell your doctor and medical imaging staff before you have an x-ray. This is because an unborn baby is more sensitive to radiation than an adult.

You should discuss with your doctor or the medical imaging doctor whether the examination can be postponed or whether an ultrasound or MRI can be used instead.

What if it is necessary?

In the small number of cases where there is clear benefit to the mother and baby from information which can only be obtained from an x-ray, medical imaging staff will take great care to keep the dose to the baby as low as possible.

What about children?

Children also are more sensitive to radiation than adults. Every proposal for diagnostic examination of a child is carefully assessed to determine the need. When the examination is needed medical imaging staff take great care to keep the radiation dose as low as possible. The individual dose depends on the age, gender, size and shape of the child and the equipment used.

POINTS TO REMEMBER

- There is a slight risk associated with x-rays and other tests such as CT scans and PET scans, so you should ask your doctor whether you really need it.
- If it is necessary, the risk to your health from not having the test is likely to be very much greater than the slight risk from having it.
- Medical imaging staff are trained to keep radiation doses as low as possible and to use alternatives such as ultrasound or MRI where they will work.
- The risks are higher for children and unborn babies, so extra care is taken with young or pregnant patients.
- You should inform your doctor if you have recently had any other x-ray examinations, particularly CT scans.
- If you have a chronic condition and/or you've had lots of scans in the past, it would be a good idea to keep a record and inform your doctor each time he or she suggests an imaging test.
- You need to inform medical imaging staff if you are pregnant or if there is a possibility that you may be pregnant.

This information is of general nature only and is not intended as a substitute for medical advice. If you have any questions or concerns, please ask your doctor or medical imaging staff.

Useful websites for further information

Major reference: Quality Use of Diagnostic Imaging, Royal Australian and New Zealand College of Radiologists: **www.insideradiology.com.au**

The Alliance for Radiation Safety in Pediatric Imaging: **www.imagegently.org**

The Australian Radiation Protection and Nuclear Safety Agency: **www.arpansa.gov.au**

Medical Imaging and You

Advances in medical technology have given doctors access to a wider range of medical imaging tests than ever before to help them diagnose, manage and treat internal conditions.

This brochure provides a basic understanding of radiation, its use in medical imaging, the risks and benefits, and the safety factors built into imaging procedures.



A Picture of Medical Imaging

Medical Imaging is a highly technical and complex area of medicine practised in a radiology or nuclear medicine department. Tests include simple X-rays, ultrasound, CT (computed tomography) scans, MRI (magnetic resonance imaging), mammography, fluoroscopy, PET (positron emission technology) and bone scans, as well as minor procedures. Some of these tests use radiation to help identify what's going on inside the body.

What is Radiation?

Radiation is radiant energy. Light is a type of radiation and so is heat.

What are X-rays?

X-rays are forms of radiation that can penetrate the body, enabling the medical imaging staff to obtain internal pictures to help identify what's wrong. Imaging tests can use simple x-rays or more complex techniques.

What are CT scans?

CT scans use an x-ray beam that revolves around a patient to produce a cross-sectional image or slice. Modern scanners allow multiple slices in a single rotation, enabling 3-D images for precise diagnosis and treatment.

What is Mammography?

Mammography uses x-rays to examine the breasts. Screening mammograms can reduce the death rate from breast cancer by detecting it early, with an increased likelihood of successful treatment.

What is Fluoroscopy?

Fluoroscopy shows a continuous x-ray image on a monitor, much like an x-ray movie. It is used to diagnose or treat patients by displaying the movement of a body part or of an instrument or dye (contrast agent) through the body.

What about Nuclear Medicine?

Nuclear medicine includes PET scans and bone scans. It uses small amounts of radioactive material that is injected, swallowed or inhaled and emits gamma rays (similar to x-rays) to build a picture of what's happening inside the body.

What about Bone Density?

This test is sometimes called DEXA (Dual-Energy X-ray Absorptiometry) or BMD (Bone Mineral Density) and it uses very low doses of x-rays to measure the density of bones.

What's Different about Ultrasound and MRI?

These tests do not need radiation to obtain internal pictures of the body. Ultrasound uses sound waves and MRI uses magnetic fields. However, both of these technologies have limitations, so other imaging methods may be required.

BENEFITS AND RISKS

There is a small potential risk attached to medical imaging tests, far outweighed by the benefits of accurately identifying, locating and treating what's wrong.

How safe are x-rays?

The doses of radiation provided in diagnostic tests are generally very small and rarely produce harmful effects such as skin burns. There is a slight increase in the lifetime risk of cancer with prolonged or multiple examinations.

How much radiation do people get?

Each dose depends on the type of examination, the equipment being used and the patient's age, gender, body size and anatomy. Highly trained staff make every effort to keep the dose as low as possible for effective results.



Balancing the risk

The small potential risk needs to be balanced against the real and immediate benefits of the procedure.

Benefits of imaging tests

Diagnostic tests such as x-rays, CT scans and PET scans can include detection of serious and potentially fatal diseases like cancer at an early stage when they can't otherwise be picked up, and when they can still be cured or controlled. These tests can also rule out serious illness, providing reassurance and peace of mind to the patient.

Radiation from the environment

We are exposed to radiation from natural sources all the time. It comes from cosmic rays from the solar system, as well as from radioactive elements in the ground. The level of natural radiation increases with altitude, so there's more in the mountains or on an aircraft flight than at sea level.