



1. What is Radiation?

Radiation is a general term that refers to energy that can travel through the environment. X-rays (medical radiation) are a type of radiation that can go through the human body. This allows it to be used for medical purposes. Other radiation we come across in our daily lives are visible light, ultraviolet light, microwaves, radio waves and background radiation. This background radiation comes from the sun, soils, buildings, food, water, the air we breathe and even our own bodies. Natural or "background" radiation surrounds us every day.

2. What is Medical Radiation?

Radiation has two very different uses in medicine.

- I. Radiation Therapy - high levels of radiation are used to kill cancer cells for example breast or prostate cancer.
- II. Medical Imaging – involves lower levels of radiation.

Medical Imaging procedures provide valuable information about your health and play an important role in making a diagnosis.

3. What are the types of Medical Imaging Procedures?

- X-ray

X-rays are the most common medical imaging procedure. They are used to look at, for example broken bones, the chest or teeth. These procedures use very low amounts of radiation.

- CT (Computed Tomography)

CT is a complex procedure that uses radiation to look inside your body. CT scans use higher levels of radiation than X-rays.

- Fluoroscopy and Angiography

This is a series of x-rays to view inside your body in "real time". The amount of radiation in these procedures is often like CT.

- MRI

MRI does *not* use medical radiation. MRI is often preferred for children and pregnant women (13-40 weeks only). MRI is not suitable for all situations.

- Ultrasound

Ultrasound does *not* use medical radiation. Ultrasound is often preferred for children and pregnant women. Ultrasound is not suitable for all situations.

- Nuclear Medicine

Nuclear medicine uses a radioactive material (injected, swallowed or inhaled) for the procedures. The amount of radioactive material in your body falls quickly over a few days. The total amount of radiation is similar to fluoroscopy or CT procedures.

4 How does Queensland Health reduce the amount of radiation?

Queensland Health reduces the amount of radiation to patients by using advanced and well serviced equipment.

Medical Imaging staff are registered and licensed. They have been trained to use the lowest amount of radiation on the smallest possible area of your body. This obtains the best possible information to assist with your diagnosis.

5. What are the risks of Medical Radiation?

Amounts of radiation used for medical imaging procedures are low.

Procedures which use more radiation are more often than not involved in diagnosing more serious diseases. In recommending a medical imaging procedure the doctor believes the benefits to you from having this procedure exceeds the risk involved.

The risks of medical radiation are:

- An increased lifetime cancer risk due to medical radiation
- Skin burns or damage from complex angiographic procedures can occur, but are *very* rare.

If you have more than one medical imaging procedure the radiation risks of each procedure are added together.

If you have had a medical imaging procedure and later discover you were pregnant, the risks to the unborn child are very low, but you *must* discuss your situation with your doctor.

6. Medical Radiation risks in perspective.

Almost everything we do in our daily lives has some level of risk. We tend to regard activities as being "safe" when the risk of something bad happening is very low. The lower the level of risk, the "safer" the activity becomes. For example most people would regard a normal activity like driving a car as safe even if there is some risk of a serious accident.

The following table puts radiation from medical imaging procedures into perspective.

In the table medical radiation is compared with background radiation and the radiation received from flying in a plane. These radiation types affect our bodies in a similar way to medical radiation.

The table also shows the small increased cancer risk from having a medical radiation procedure. In Australia there is a risk that about 3 in 10 people will die of cancer, even if they have never had medical radiation.



Radiation in Perspective			
Medical Imaging Procedure	Time of background radiation that equals the amount of radiation from the procedure	Flying time that results in an amount of radiation that equals the amount of radiation from the procedure	Increased risk of dying from cancer from the radiation from the procedure
Chest X-ray	3 days	7 hours	1 in 1.3 million
Abdomen X-ray	3 months	230 hours	1 in 36,000
Mammo-gram	2 months	130 hours	1 in 63,000
CT Head	10 months	670 hours	1 in 13,000
CT Chest	3.3 years	2,700 hours	1 in 3,100
Bone Scan	1.7 years	1,300 hours	1 in 6,300
Barium Enema	3 years	2,300 hours	1 in 3,600
Complex angiography: Pelvic Vein Embolisation	25 years	20,000 hours	1 in 420

7. Radiation and Pregnancy

An unborn child is more sensitive to medical radiation. However birth abnormality and cancer risk from medical radiation is very low.

It is very important to tell medical imaging staff if you are or if you think you may be pregnant.

Non-urgent medical imaging procedures should be delayed until after giving birth. However there may be good reasons to use medical radiation to enable the best care for the mother, which in turn benefits the unborn child. If the procedure is required, the risk to the mother from not having the procedure can be greater than the risk of the possible harm to the unborn child. Medical imaging staff take special care to protect the unborn child. For example during chest x-rays or x-rays for broken bones, a lead gown that covers the woman's abdomen may be used to minimise the medical radiation.

8. Radiation and Children

Children are also more sensitive to medical radiation because their bodies are growing and making new cells. This provides a greater chance for the radiation to affect cell growth. Children also have a longer time for any radiation damage, if present, to have an effect on their health.

Medical radiation is only used on children when there is no better option to help in the diagnosis.

The increased lifetime cancer risk in children from medical radiation is very low. The benefit of the procedure should exceed the risk. Medical Imaging staff will make every effort to keep the amount of radiation as low as possible.

Important points to remember

- Medical imaging staff make every effort to keep medical radiation as low as possible for every procedure.
- Cancer risks from medical radiation are very small compared to the risk of cancer from other causes.
- Tell your doctor if you have had any recent medical imaging procedures. This may avoid procedures being repeated.
- The long term risks of medical radiation are lower for the older person and higher for the child/young person or unborn child. Extra care is taken with young or pregnant patients.
- If the medical imaging procedure is necessary then the risk to your health from not having the procedure may be greater than that from the radiation. If you are worried about the possible risks from the procedure you should discuss the matter with your doctor.

Extra written information is available and may include:

Inside Radiology Article: Radiation Risk of Medical Imaging for Adults and Children

<http://www.insideradiology.com.au/pages/view.php?id=57>

A consumer brochure: X-Rays How safe are they?

http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1194947388410

Website: Health Protection Agency.UK.

<http://www.hpa.org.uk/Topics/Radiation/>

Notes to talk to my doctor / health

practitioner about:

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