

Radiology and Radiation

Background

- There are numerous types of radiation, including visible light, gamma rays, microwaves, radio waves, and x-ray.
- X-rays can be transmitted through the body, and create an image of the body
- These images are interpreted by a radiologist, who is medically trained specialist, and the results made available to your referring doctor to assist in your medical management
- Radiology tests using radiation include x-ray and CT
- Ultrasound and MRI do not use radiation

Naturally occurring background radiation

- Many people are unaware that radiation is all around us – in the air, plants, soil etc. This is referred to as a background radiation.
- The effective dose in terms of overall risk due to radiation exposure is measured in the unit of a Sievert (Sv).
- The average background radiation in Australia measures 2 mSv per year. Worldwide, this figure varies substantially, measuring up to 20 mSv, with the average measuring 2.4 mSv.
- The effective dose of medical imaging techniques varies, and is dependent on numerous factors – patient size, patient weight, imaging technique requested, patient protection (shielding), quality of equipment etc.
- The general population lifetime risk of developing cancer is 1 in 3. The risk of developing cancer due to radiation exposure from an ionising radiology technique is extremely small.
- The table attached indicates the average effective dose from common medical procedures compared with background radiation.

Are X-rays and CT Safe?

- X-rays are safe in small doses
- The doses used in x-ray and CT are small
- Large x-ray doses have been proven to cause cancer
- To minimize this risk, Berera Radiology has invested in state of the art X-Ray and CT equipment. In fact, the CT Flash is the only dual source and dual energy CT in Tasmania, and offers the lowest radiation dose throughout the state
- Great care is also taken to use techniques that minimize the radiation dose to produce diagnostic quality images
- Your referring doctor and on-site radiologist will ensure that the diagnostic benefits of a x-ray or CT outweighs any potential risk

Children and Pregnant Women

- If you may be, or are aware that you are pregnant, please advise referring doctor and staff at the time of booking.
- Extra care is taken to ensure that any request for a x-ray or CT outweighs the potential risks.
- Occasionally, imaging techniques (x-ray and CT) can be substituted if the clinical question can be answered instead with a non-ionising technique (ultrasound or MRI)
- Appropriate shielding will also be employed to reduce exposure.

Non-medical Radiation – Typical Effective Dose

Source	Dose mSv/year
Natural radiation (ground and airborne)	1.2
Cosmic radiation at sea level	0.3
Radiation from inside the human body	0.4
Computer and/or TV use	0.01
Natural background radiation in Australia	2

Medical Radiation – Typical Effective Dose

Imaging	Dose mSv/year
Chest x-ray (2 views)	0.2
Lumbar spine x-ray	0.5-1.5
Hand x-ray	<0.1
CT Brain	2 (1)*
CT Chest	7 (2)*
CT Abdomen and Pelvis	10 (3)*
CT Coronary Angiogram (CTCA)	10-20 (1)*

* Values in brackets refer to radiation dose achieved on dual source and dual energy CT machines – the most advanced CT technology, and Berera Radiology has the only one of these CT machines throughout Tasmania

Levels of Risk for Common Imaging Techniques

Examination	Equivalent Period of Background Radiation	Lifetime Additional Risk of Cancer Per Examination
		Negligible Risk
Chest X-Ray Hand and feet X-Ray Arms and legs X-Ray	A few days	Less than 1 in 1,000,000
		Minimal Risk
Neck X-Ray	A few weeks	1 in 1,000,000 to 1 in 100,000
		Very Low Risk
Abdomen X-Ray Brain CT	A few months to a year	1 in 100,000 to 1 in 10,000
		Low Risk
Chest CT Abdomen CT Lumbar Spine CT	A few years	1 in 10,000 to 1 in 1,000