



What alternatives are there to Medical Radiation?

MRI and ultrasound do not use x-rays and are used whenever appropriate. Sometimes, MRI and ultrasound cannot be used – for example, patients with pacemakers cannot have MRI. Ultrasound cannot penetrate bone or air in the lungs or bowel and cannot be used to image such structures but is used extensively in children and in pregnant women to visualise other organs.

Are X-rays safe in Pregnancy?

Although the common examinations listed above are safe for the developing foetus, whenever possible ultrasound or MR are used in pregnant women instead of x-rays. When no other alternatives are available, an examination using x-rays can safely be performed. Dose reduction techniques are employed whenever possible, eg lead drapes cover the foetus to reduce the radiation it receives. Sometimes a woman does not know she is pregnant at the time of an x-ray and finds out she was pregnant only afterwards. In such cases, one can be reassured that no harm to the foetus is likely as “no single diagnostic procedure results in a radiation dose that threatens the well being of the developing embryo and foetus” (American College of Radiology).

Your Appointment

Date

Time

Special Instructions

Central

The Avenue Radiology and MRI 9916 1200
 Bridge Road Imaging 9242 4888

Northern

Brunswick Diagnostic Imaging 9383 6266
 Epping Diagnostic Imaging 9408 2222
 Glenroy Diagnostic Imaging 9300 1000
 Healthcare Imaging Bundoora 8467 0800
 Northern Hospital Radiology 8405 9600

Eastern

Blackburn South Radiology 9878 6255
 Glen Waverley Medical Imaging 9802 2055
 Healthcare Imaging Knox 9210 7100
 Healthcare Imaging Ringwood 8804 4030
 Healthcare Imaging Kew 9817 1331

South Eastern

South Eastern Radiology 9562 3433

Regional

Colac Radiology 5232 5162
 Wimmera Radiology 5381 9236
 Warrnambool Radiology 5563 1504

For further information please go to our website:
www.healthcareimaging.com.au

CT Scans, X-rays & Radiation Safety



a guide for patients



Healthcare Imaging Services

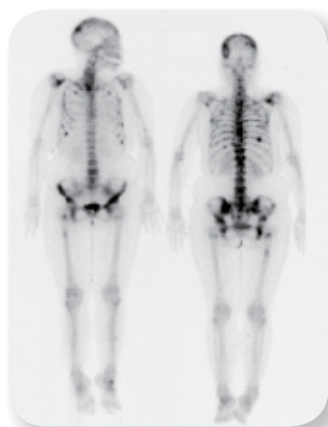
What are X-rays?

X-rays are a type of radiation. Other types of radiation include visible light, gamma rays, microwaves and radio waves. X-rays have been used in medicine for over 100 years. X-rays can penetrate the body and can create a picture of the internal body organs. These pictures are read by a radiologist, who is a medical specialist and provide your doctor with valuable information needed for decisions regarding medical management. Radiological tests using x-rays include CT scans, bone density examination (DEXA) and mammography. Nuclear medicine scans use radioisotopes, which emit gamma rays. Ultrasound and MRI do not use x-rays or gamma rays.

Where does Radiation come from?

We are all exposed to radiation, not just when having medical x-ray examinations. Radiation comes from naturally occurring radioactivity in the air, soil and rocks, from TV and computer screens, from domestic smoke alarms and from inside our bodies due to ingested radioactivity. In addition, we receive cosmic radiation from outer space and from nuclear fallout in the atmosphere. Airplane flights exposes us to more cosmic radiation than on the ground. The non-medical sources of radiation make up "Background Radiation" to which everyone is exposed. It varies from place to place, being low in Australia but high in parts of India and United states. Radiation to which the body is exposed is measured in milliSieverts (mSv).

Are X-rays safe?



Like oxygen, water, salt and vitamins, x-rays are safe in small doses but can be harmful in very large doses. Very large doses of x-rays can cause cancer. The doses used in diagnostic radiology are extremely small. The risk to the individual from medical radiation is very small; so small in fact that it is virtually impossible to measure. Such risk is vastly

outweighed by the benefits arising from the examination, if performed for the right reasons. In addition, great care is taken to use the lowest possible radiation dose needed to produce the images. Some radiology practices (including Epworth Richmond) use Bismuth shields to protect vulnerable superficial organs during some CT scans. It should also be remembered that radiation is used in extremely large doses to cure cancer in both adults and children. Some experts in radiobiology believe that small amounts of radiation are, in fact, beneficial to health.

CT Scans and Radiation

From time to time concern is raised in the media about the dangers of radiation, most recently from CT scans. CT scans are extremely useful and their use has grown around the world for that reason, whilst the use of plain x-rays, barium meals and barium enemas has declined. CT scans are now the main source of medical radiation. Despite the regularly raised concerns and the quoted estimates of "cancers caused", medical radiation, whether from CT scans, x-rays or other sources, remains safe provided it is performed properly and for proper reasons. The good news is that new CT scanners released in about 2009 emit much less radiation than previous models.

Non-medical Radiation – Typical Effective

	Doses mSv / year
Natural radiation (terrestrial and airborne)	1.2
Cosmic radiation at sea level	0.3
Nuclear fallout from atmospheric tests in the 50's and 60's	0.02
Radiation from inside the human body	0.4
7 hour Airplane travel	0.05
Cosmic radiation exposure of domestic airplane pilot	2
Computer / TV use	0.01
Natural Background Radiation in Australia	2

Medical Radiation – Typical Effective Doses

	Dose in mSv
Chest x-ray (2 views)	0.16
Lumbar spine x-ray	0.5–1.5
Hand x-ray	<0.1
Dental x-ray	<0.1
Mammogram (4 views)	0.6
CT Head	2 (1)*
CT Chest	7 (2)*
CT Abdomen and pelvis	10 (3)*
CT coronary angiogram	20 (1)*
Conventional coronary angiogram	10
Nuclear medicine bone scan	5
Nuclear medicine heart scan (MIBI)	8
Nuclear medicine lung scan	1.6
Whole body PET scan (FDG)	3

* The latest CT scanners produce much lower radiation doses (quoted in brackets).

From the above, one can see that the radiation dose involved in many medical diagnostic examinations is of the same order of magnitude as the annual background radiation dose, or lower.

Appropriate use of Medical Radiation

X-rays should only be used when medically indicated and when no other alternative exists. The responsibility for ensuring that x-rays are used appropriately is shared jointly by the referring doctor, the radiologist and the radiographer (technician performing the x-ray examination). State and Federal authorities regulate the safe use of radiation. ARPANSA (Australian Radiation Protection and Nuclear Safety Agency) is a Federal Government agency responsible for protecting the health and safety of people and the environment from the harmful effects of radiation. The ICRP (International Commission on Radiological Protection) sets limits on safe radiation exposures of the public and health professionals.