

FACTSHEET

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Radiation and its uses in hospitals for diagnostic testing

The word “X-ray” or “scan” will often be used by the doctor while talking about a test or treatment for your child.

Many types of diagnostic testing involve the use of radiation in some way.

How is radiation classified?

Radiation exists in the world in several forms. Radiation can be good for us and our bodies. Some can cause harm and some just exist without doing harm or good. In hospitals we use all of these.

There are many classes of radiation. There is low energy radiation – this comes in the shape of radio waves, microwaves and infra-red. These are used in every day things like a heater in winter, your kitchen microwave oven or how you can feel the warmth in the sunshine.

Medium energy radiation is seen by us as light. The different levels that exist in white light can be seen as the colours in a rainbow after the rain.

High energy forms of radiation, which can be harmful to our bodies, include UV or ultraviolet light, which can burn our skin.

Other types of high energy radiation are X-rays and gamma rays, which are used in hospitals for doctors to be able to diagnose illnesses. They are also used in the treatment of some conditions.

There are other forms of radiation used in hospitals which do not do any harm. These include Ultrasound and infra red (or heat) – these are non-ionising radiations.

Background or everyday radiation exposure

Every day of our lives we are all exposed to radiation. This comes from the sun (cosmic), the soil (terrestrial) and our bodies. The tissues that make up our bodies emit energy as heat. This is a non-harmful form of radiation and that is true for every person on Earth.

The cosmic and terrestrial radiation exposures can vary depending on what you do throughout life and where you live, so our bodies were designed to deal with small amounts of radiation as part of our lives.

Medical uses of radiation

Tests used in hospitals or clinics that use ionising radiations in the form of **X-ray** include:

- Radiographs – commonly known as x-rays.
- CT scans – used to be called CAT scans.

Another type of radiation is known as **Gamma rays**. These are used for:

- Bone Scans use a Gamma camera.

Non-ionising radiations include:

- MRI scans
- Ultrasound scans

X-RAYS and Gamma rays

These 2 forms of radiation are purely energy being sent from a source. The frequency is high enough for the energy to pass right through the body.

X-RAYS in tests

An “x-ray” is the common term used for a picture using x-rays of what is hard and soft in your child’s body.

X-rays are produced in the machine that you see when you go into the room. They do not exist at any time that the machine is switched off. The strength of the x-ray, or its penetrating power, is adjusted by the radiographer who is seeing you. This is decided by your child’s body size.

The x-rays are aimed at the part of the body the doctor is looking at, and the plate that is behind or below the bed your child is lying on is where the x-rays are caught and turned into a picture. On their way through the body they are stopped by hard things, like bones and go straight through soft things like skin and muscle.

CT scanners (used to be called CAT scanners) use the same type of x-ray radiation. The x-rays travel in a circle around your body and the x-rays are caught and turned into a picture. CT stands for Computed Tomography, which means the doctor can reconstruct your child’s images into a 3D computerised set of pictures. CAT scan includes the word axial, which means a slice through the body. Think of it as if the body is a loaf of bread.

The time that your child is exposed to the x-rays is very short and once the machine shuts off, there is no radiation left in the room or in your child. The relative amount of exposure compared to natural background levels is high but your doctor has considered this and decided there is more benefit from doing this scan than there is harm.

Gamma rays in tests

Gamma rays have a similar frequency to x-rays but are not produced by a machine. They are the resulting energy produced during the radioactive decay process of a “radioisotope”.

For a bone scan procedure, a radioactive liquid is injected into your child’s blood and it then spreads around the body. Some areas of the body may attract more of this liquid than others. This is what the Doctor is looking for on the results.

The camera that your child lies underneath during this test just counts the number of gamma rays coming out of your child’s body. The camera does not make the x-rays like the other machines.

For a short while after a bone scan, your child will be carrying radiation around in his or her body. The amount of time that your child will send out radiation will depend on the radioisotope used. Your technologist will tell you

how long you need to take care. Generally it is only a number of hours.

Tests using no harmful radiation

MRI Scan

This scan uses a machine that looks like a big, long doughnut. When your child lies inside the doughnut, your child is surrounded by a big magnet and sensors that can pick up how much of the magnetism comes through the body onto the picture. The magnet continually switches on and off resulting in the noise you hear while having an MRI. It is this turning on and off that produces the pictures the doctor will see. They are quite similar to the CT pictures.

Some tests your doctor orders are better seen with MRI while others are better seen on CT. Soft tissue structures for example are better seen on MRI while harder structures like bone can be better visualized on CT.

Ultrasound

These tests use high frequency sound waves to look inside your child’s body. The pictures can be seen on a TV screen next to the bed and this set of pictures is what the doctor will look at. A bit like a set of pictures taken from a video.

Infra-red (or Heat)

If your child is admitted to a ward they may be given a warm blanket to help keep warm and cosy. This has been heated up in a warming cupboard by using infra-red radiation.

Remember:

- Medical radiation exposures count for a very tiny amount of our total lifetime dose – around 8%.
- Radiation can benefit us and our bodies if it is used wisely.
- The doctor has decided that your child will benefit from the scan or X-ray they have given a referral for.
- We are constantly exposed to radiation in our daily lives and radiation is not something to be scared of.
- PLEASE ask the doctor for information on the test he or she is referring your child for.
- PLEASE ask questions of the person doing the test as they will be able to answer any other questions you may have.