

Resource

Imaging in RA

There are a number of different imaging techniques that are used in the diagnosis and monitoring of rheumatoid arthritis, including X-ray, ultrasound and MRI.

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X-ray

Conventional x-rays are cheap and readily available but only show joint damage to bone (erosions) or cartilage (joint space narrowing) at a relatively late stage in the disease. Conventional x-rays are better at showing changes to the bones themselves than to the surrounding soft tissue.?

X-rays are made up of a type of radiation known as ionising radiation, which in large doses can be very dangerous to the human body. It is natural that many patients in need of x-rays are therefore concerned about its relative safety, and want to know how much radiation they are likely to be exposed to with this technique. However, the levels of radiation in an x-ray are not greatly different from the natural exposure to radiation that we experience in everyday life.

To put this into context, brazil nuts contain minute traces of radium (a radioactive substance), and it is estimated that a typical chest x-ray, commonly used in RA patients to check the lungs before commencing treatments such as methotrexate, would expose the patient to the same level of radiation as if they ate 2x 135g bags of brazil nuts.

Ultrasound

The past decade has seen a dramatic increase in the use of ultrasound as a clinical tool by rheumatologists. Ultrasound is a painless and harmless test, using sound waves that are emitted and then collected by a probe after reflecting off the body's internal tissues, providing a detailed image of the structures beneath the skin. Bone appears bright white and fluid black on the monitor. Most people will be familiar with the use of ultrasound to look at an unborn baby in the womb. Recent advances in probe technology have enabled the use of ultrasound to examine the joints and surrounding soft tissues. Ultrasound is relatively inexpensive and safe, avoiding the exposure to radiation that is necessary for conventional x-rays and CT scans.

Traditionally, rheumatologists have referred patients to radiologists for all ultrasound examinations, but recent developments have enabled them to conduct some scans themselves. The advent of portable ultrasound machines means that scans can be carried out at the bedside or in the outpatient clinic without the need for a second appointment in the x-ray department. This speeds up

the process of investigation and allows the rheumatologist to plan treatment without delay.?

Rheumatologists can use ultrasound to guide them in carrying out difficult joint injections. They also use it to detect subtle inflammation around tendons and small knuckle joints. This is important because clinical examination may not always identify inflammation, particularly in early arthritis.?

MRI

Magnetic resonance imaging (MRI) works by using radio signals and engaging, powerful magnets, which have an effect on the protons in the body. It provides the most detailed images and is considered the 'gold standard' by which all other imaging techniques are judged. It is particularly useful for studying changes in bone and cartilage. MRI produces static images of great detail but is not suited to the examination of moving joints. Due to the powerful magnets used in this scan, you will need to remove any metal objects from your body. For the same reason, MRI scanning will not be possible for certain patients such as those with pacemakers, metal joint replacements or other metal surgical implants.

Unlike x-rays, MRI scans do not expose the body to x-ray radiation and are not deemed to be harmful to the body. However, they involve lying still in a small chamber, and as a result, many patients find this makes them feel quite claustrophobic. It can also be quite noisy. If you know that you suffer from claustrophobia (fear of small, confined spaces), you should inform your GP or consultant well in advance, as they may suggest arranging for you to take a mild sedative to help you to relax during the scan.

You are usually able to take your medication and eat and drink as normal on the day of the MRI scan.

CT scans

CT scans are computerised axial tomography scans. Claustrophobia is less of an issue with CT scans than with MRI, as, rather than being fully enclosed, you lie on a bed that moves back and forth through a ring-shaped machine. The machine uses an x-ray scanner to get images, but these images are clearer than those produced by a standard x-ray machine, as multiple beams are used, whereas standard x-ray uses a single beam.

Before having the scan, you may be asked to take what is known as a 'contrast medium', which is a liquid that contains a dye and can improve the imaging results.

A CT scan can take up to 30 minutes, and although radiation is used, as with x-ray, the levels of radiation are considered safe. You will need to remove your clothing and will be given a gown to wear during the scan. You will also need to remove all metal items, such as jewellery, from your body, as these can interfere with the scan.

PET scans

Positron emission tomography or PET scans are increasingly used to help make the diagnosis of large vessel vasculitis, a rheumatological condition, where inflammation affects arteries. The scan works by detecting a radioactive tracer which is injected into your arm before the scan. The most commonly used tracer is called FDG, which is like the naturally occurring sugar, glucose. The level of

radioactivity involved in the scan is about the same as the natural radiation you get from the sun, over 3 years. The radioactive tracer passes out of the body within a few hours.

The injection is given about an hour before the scan. During that time, you must stay quiet and still, so the tracer goes to the right parts of the body. The actual scan lasts for about 30 mins, and you have to lie on a flatbed that moves into the centre of a cylindrical scanner.

DEXA or DXA scan

A DEXA (or DXA) scan is used to measure bone density and specifically to monitor for a condition called osteoporosis, which weakens the bones, making people more prone to fractures. It is more common in people with RA than in the general population, especially for those who have been treated for long periods with steroids. More information on osteoporosis and DEXA/DXA scans can be found in [our article on Osteoporosis](#).

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