MRI scan

Introduction

Health checks: later years

Once you reach the age of 65, your regular health checks will include some new ones

Magnetic resonance imaging (MRI) is a type of scan that uses strong magnetic fields and radio waves to produce detailed images of the inside of the body.

An MRI scanner is a large tube that contains powerful magnets. You lie inside the tube during the scan.

An MRI scan can be used to examine almost any part of the body, including the:

brain and spinal cord

bones and joints

breasts

heart and blood vessels

internal organs, such as the liver, womb or prostate gland

The results of an MRI scan can be used to help diagnose conditions, plan treatments and assess how effective previous treatment has been.

Read more about how MRI scans work.

What happens during an MRI scan?

During an MRI scan, you lie on a flat bed which is moved into the scanner. Depending on the part of your body being scanned, you will be moved into the scanner either head first or feet first.

The MRI scanner is operated by someone who is trained in carrying out X-rays and similar procedures, called a radiographer. They control the scanner using a computer, which is in a different room from the scanner to keep it away from the magnetic field generated by the scanner.

You will be able to talk to the radiographer through an intercom and they will be able to see you on a television monitor throughout the scan.

At certain times during the scan, the scanner will make loud tapping noises. This is the electric current in the scanner coils being turned on and off. You will be given earplugs or headphones to wear.

It is very important that you keep as still as possible during your MRI scan. The scan will last between 15 and 90 minutes, depending on the size of the area being scanned and how many images are taken.

Read more about how an MRI scan is performed.

Safety

An MRI scan is a painless and safe procedure. You may find it uncomfortable if you have claustrophobia (fear of enclosed spaces), but with support from the radiographer, most people find this manageable. Sometimes going into the scanner feet first may be easier, although this is not always possible.

MRI scans do not involve exposing the body to X-ray radiation. This means people who may be particularly vulnerable to the effects of radiation, such as pregnant women and babies, can use them if necessary.

However, not everyone can have an MRI scan. For example, they are not always possible for people who have certain types of implants fitted, such as a pacemaker (a battery operated device that helps control an irregular heartbeat).

Extensive research has been carried out into whether the magnetic fields and radio waves used during MRI scans could pose a risk to the human body. No evidence to suggest that there is a risk has been found, which means that MRI is one of the safest medical procedures currently available.

Read more about who can and can't have an MRI scan.

How an MRI scan works

During a magnetic resonance imaging (MRI) scan, you lie in a strong magnetic field and radio-frequency waves are directed at your body. This produces detailed images of the inside of your body.

Most of the human body is made up of water molecules, which consist of hydrogen and oxygen atoms. At the centre of each hydrogen atom there is an even smaller particle called a proton. Protons are like tiny magnets and are very sensitive to magnetic fields.

When you lie under the powerful scanner magnets, the protons in your body line up in the same direction, in the same way that a magnet can pull the needle of a compass.

Short bursts of radio waves are then sent to certain areas of the body, knocking the protons out of alignment. When the radio waves are turned off, the protons realign and in doing so send out radio signals, which are picked up by receivers.

These signals provide information about the exact location of the protons in the body. They also help to distinguish between the various types of tissue in the body, because the protons in different types of tissue realign at different speeds and produce distinct signals.

In the same way that millions of pixels on a computer screen can create complex pictures, the signals from the millions of protons in the body are combined to create a detailed image of the inside of the body.

How an MRI scan is performed

A magnetic resonance imaging (MRI) scan is a painless procedure that lasts between 15 and 90 minutes, depending on the size of the area being scanned and the number of images being taken.

Before the scan

On the day of your MRI scan, you should be able to eat and drink and take any medication as usual, unless advised otherwise.

In some cases you may be asked not to eat or drink anything for up to four hours before the scan and sometimes you may be asked to drink a fairly large amount of water beforehand. This will depend on the area being scanned.

When you arrive at the hospital, you will usually be asked to fill out a questionnaire about your health and medical history. This will help the medical staff performing the scan be as sure as possible that you can have the scan safely. Read more about who can and can't have an MRI scan

Once you have completed the questionnaire, you will then usually be asked to give your signed consent for the scan to go ahead.

As the MRI scanner produces strong magnetic fields, it's important to remove any metal objects from your body, including:

watches

jewellery, such as earrings and necklaces

piercings, such as ear, nipple and nose rings

dentures (false teeth)

hearing aids

wigs (some wigs contain traces of metal)

Any valuables can usually be stored in a secure locker.

Depending on which part of your body is being scanned, you may need to wear a hospital gown during the procedure. If you do not need to wear a gown, you should wear clothes without metal zips, fasteners, buttons, underwire (bras), belts or buckles.

Some MRI scans involve having an injection of contrast dye. This makes certain tissues and blood vessels show up more clearly and in greater detail.

It's possible for contrast dye to cause tissue and organ damage in people with severe kidney disease. Therefore, if you have a history of kidney disease you may be given a blood test to determine how well your kidneys are functioning and whether it is safe to proceed with the scan.

An MRI scan is a painless procedure, so anaesthesia (painkilling medication) is not usually required. If you are claustrophobic, you can ask for a mild sedative to help you relax. If you would like a sedative, you should ask your DOCTOR or consultant well in advance of having the scan.

If you decide to have a sedative during the scan, you will need to arrange for a friend or family member to drive you home afterwards because you will be unable to drive for 24 hours (see below).

General anaesthetic (medication that makes you unconscious) is often used when young children and babies have an MRI scan. This is because it is very important to stay still during the scan, which young children and babies are often unable to do when they are awake.

During the scan

An MRI scanner is a short cylinder that is open at both ends. You will lie on a motorised bed that is moved inside the scanner. You will enter the scanner either head first or feet first, depending on the part of your body being scanned.

In some cases, a frame may be placed over the body part being scanned, such as the head or chest. This frame contains receivers that pick up the signals sent out by your body during the scan and it can help to create a better quality image.

A computer is used to operate the MRI scanner, which is located in a different room to keep it away from the magnetic field generated by the scanner.

The radiographer operates the computer, so they will also be in a separate room to you. However, you will be able to talk to them, usually through an intercom, and they will be able to see you at all times on a television monitor.

While you are having your scan, a friend or family member may be allowed to stay in the room with you. Children can usually have a parent with them. Anyone who stays with you will be asked whether they have a pacemaker or any other metal objects in their body. They will also have to follow the same guidelines regarding clothing and removing metallic objects.

To avoid the images being blurred, it is very important that you keep the part of your body being scanned still throughout the whole of the scan until the radiographer tells you to relax.

A single scan may take from a few seconds to three or four minutes. You may be asked to hold your breath during short scans. Depending on the size of the area being scanned and how many images are taken, the whole procedure will take between 15 and 90 minutes.

At certain times during the procedure, the MRI scanner will make loud tapping noises. This is the electric current in the scanner coils being turned on and off. You will be given earplugs or headphones to wear.

You are usually able to listen to music through headphones during the scan if you want to, and in some cases you can bring your own CD of music you would like to listen to.

You'll be moved out of the scanner when your scan is over.

After the scan

An MRI scan is usually carried out as an outpatient procedure. This means that you will not need to stay in hospital overnight. After the scan, you can resume normal activities immediately.

However, if you have had a sedative, a friend or relative will need to take you home and stay with you for the first 24 hours. It's not safe to drive, operate heavy machinery or drink alcohol for 24 hours after having a sedative.

Your MRI scan will need to be studied by a radiologist (a doctor trained in interpreting scans and X-rays) and possibly discussed with other specialists. It is therefore unlikely that you will know the results of your scan immediately.

The radiologist will send a report to the doctor who arranged the scan, who will discuss the results with you. Unless they are needed urgently, it usually takes a week or two for the results of an MRI scan to come through.

Who can have an MRI scan

Magnetic resonance imaging (MRI) is very safe and most people can have the procedure, including pregnant women and babies.

However, there are some instances where an MRI scan may not be recommended because the strong magnets used during the scan can affect any metal implants or fragments in your body.

Before having an MRI scan, you should tell medical staff if you think you have any metal in your body, such as:

a pacemaker - an electrical device used to control an irregular heartbeat

an implantable cardioverter-defibrillator (ICD) - a similar device to a pacemaker that uses electrical shocks to regulate heartbeats

a nerve stimulator - an electrical implant used to treat long-term nerve pain

a cochlea implant - a device similar to a hearing aid but surgically implanted inside the ear

a drug pump implant - used to treat long-term pain by delivering painkilling medication directly to an area of the body such as the lower back

brain aneurysm clips - small metal clips used to seal blood vessels in the brain that would otherwise be at risk of rupturing (bursting)

metallic fragments in or near your eyes or blood vessels (common in people who do welding or metalwork for a living)

prosthetic (artificial) metal heart valves

penile implants - used to treat erectile dysfunction (impotence)

eye implants - such as small metal clips used to hold the retina in place

an intrauterine device (IUD) - a contraceptive device made of plastic and copper that fits inside the womb

artificial joints, such as those used for a hip replacement or knee replacement

dental fillings and bridges

tubal ligation clips - used in female sterilisation (an operation that permanently prevents a woman from being able to get pregnant)

surgical clips or staples - used to close wounds after an operation

Having something metallic in your body does not necessarily mean you cannot have an MRI scan, but it is important for medical staff carrying out the scan to be aware of it so they can decide on a case-by-case basis if there are any risks or if further measures need to be taken to ensure the scan is as safe as possible.

For example, you may be able to have an MRI with a pacemaker or defibrillator if a cardiologist (heart specialist) or another trained healthcare professional is able to make the device MRI-safe. They will also need to carefully monitor your heart rhythm during the procedure.

If you're unsure whether or not you have metal fragments in your body, you will need an X-ray to confirm whether this is the case.

Tattoos

Some tattoo ink contains traces of metal, but most tattoos are safe in an MRI scanner. Tell the radiographer immediately if you feel any discomfort or heat in your tattoo during the scan.

Pregnancy

There is no evidence to suggest MRI scans pose a risk during pregnancy. However, as a precaution, MRI scans are not usually recommended during pregnancy, particularly in the first three months.