Community Diagnostic Imaging

A collaborative guide between Manchester University Foundation Trust and Europia

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Table of Contents

What is diagnostic imaging?

Diagnostic tasting is any type of medical test carried out to diagnose a condition, disease, or illness in people presenting with symptoms to help determine the presence of disease or injury.

Why is diagnostic testing necessary?
Diagnostic testing can reveal symptoms and indicators for a specific illness, disease or condition that will be used as a guide for examining and evaluating a patient's condition.
Three main factors make diagnostic testing essential to improving health worldwide.

We have compiled a list of some of the most common diagnostic imaging tests, providing some insight into what the tests are, what they are used for and what to expect if your GP has referred you to one.

Some of the most common imaging tests are:

- Magnetic Resonance Imaging (MRI)
- X-rays and other types of medical radiation
- Ultrasound
- CT scan
- DEXA

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What is diagnostic imaging?

Identification

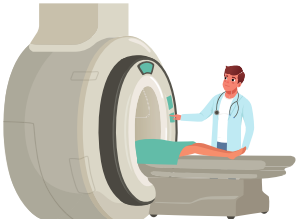
Upon evaluating a patient, including a physical exam and review of symptoms, a clinician will order imaging tests to confirm a suspected condition or to exclude conditions. This will allow for the early identification of the cause of the patient's ailments and thus can allow for a correct treatment plan to be started as soon as possible. Early detection increases the chances of faster and easier recovery.

Monitoring

Diagnostic imaging can be used during medical treatment following a diagnosis to determine the efficacy of the current intervention and allow for further examination.

Prognosis

Clinicians can also use diagnostic imaging when reviewing and evaluating the progression of the disease to determine if there has been an improvement, allowing them to predict the outcome of the disease.



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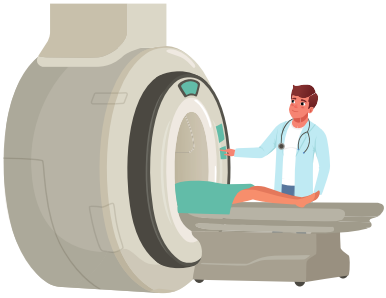
What is an MRI scan?

Magnetic Resonance Imaging (MRI) is a painless medical scan of your body, which uses a large magnetic field and radio waves to produce a picture of your body.

An MRI scanner is a large tube that contains powerful magnets. You lie inside the tube during the scan. A piece of equipment called a 'coil' is placed next to your body to receive the small signals given out by your body to make the images doctors can use to treat you.

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

- brain and spinal cord
- bones and joints
- heart and blood vessels
- internal organs



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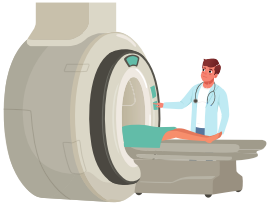
How to prepare for an MRI scan?

Before your appointment

- you will be sent a safety questionnaire to complete. If you have any metal implants or devices or are pregnant, contact the hospital before your appointment.
- Family members or friends will not be allowed to accompany you into the scan room If you require an interpreter, arrange that with the hospital before your appointment.

On the day of your MRI scan

- You should be able to eat, drink and take any medication as usual unless you're advised otherwise.
- You will be asked to complete a medical history questionnaire, review the safety questionnaire with the medical staff on site, and sign a consent form.
- If you prefer, you can bring your own pyjamas or loose-fitting non-metallic clothing. (such as a T-shirt and jogging bottoms/ shorts).
- As the MRI scanner produces strong magnetic fields, removing any metal objects from your body is important such as jewellery, watches, underwire bras and anything that might have traces of mental within.



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What happens during an MRI?

The MRI scan is a painless procedure that lasts 15 to 90 minutes, depending on the size of the area being scanned and the number of images being taken.

During the scan, you will have to lie flat within the scanner. This is a 1.5-metre tunnel, which is open at both ends. If you have claustrophobia, you may require a light sedative, which you can obtain from your GP and bring for the scan.

To avoid blurred images, keeping your whole body still throughout the scan is very important until the radiographer tells you to relax. A single scan may take a few seconds to 3-4 minutes. You may be asked to hold your breath during short scans.

The scan is very noisy, and you will be given some headphones or earplugs to wear.
Occasionally you may be given an injection during the scan of special MRI dye into a vein in your arm, but that would be explained to you prior to your appointment.

The radiographer will monitor you during your scan and you will be able to talk to them through an intercom if you need assistance or feel unwell.

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Are there any risks?

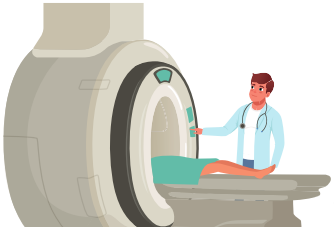
MRI is considered to be safe. It does not use X-rays and is not associated with any increased risk of cancer, making it a relatively safe medical procedure.

You cannot feel the magnetic fields or radio waves from the MRI scan so the scan itself is painless. However, it is important to get you into the correct position. Holding this position/lying on a table may, for some people, feel uncomfortable, especially if you have claustrophobia, but most people are able to manage it with support from the radiographer.

In such cases, it is important to share your concerns with your clinician, who might be able to suggest possible adjustments to make the procedure easier.

Most modern MRI scanners have a wider tunnel, which can help reduce claustrophobia. Going into the scanner feet first may be easier, although this isn't always possible.

For more information, visit: https://bit.ly/MRIscanNHS or https://bit.ly/45cEnRW



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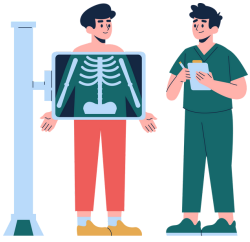
What are X-rays & other types of medical radiation

X-ray is a type of medical procedure that uses a radiation beam that passes through the body. Radiation is energy that can't be seen by the naked eye, and a person cannot feel it.

It is used to diagnose or treat patients by recording images of the inside of your body.
Each request for an X-ray or scan is assessed by an expert who ensures it is the most appropriate test for you. Your X-ray or scan will be done with the smallest amount of radiation that is necessary to produce the correct images.

X-rays are most commonly used to examine bones and joints for injuries, but your doctor may recommend getting an x-ray to help diagnose and monitor many different health conditions, including problems with your lungs, bowel, or heart.



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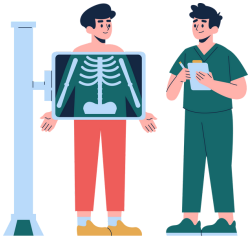
How to prepare for an X-ray?

General X-rays do not require special preparation before the appointment, you don't have to limit food and drink consumption or stop the medication unless the X-ray uses a contrast agent.

For any X-rays that may need special preparation beforehand or will usually take longer, your appointment letter should clearly outline anything you need to do to prepare.

It is recommended to wear loose and comfortable clothes as you might be asked to get changed before the examination into a gown or lie down and switch positions during the examination. Avoid wearing any jewellery, belts, bras or other clothes containing metal, as you may need to remove them prior to the examination.



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What happens during an X-ray?

During an X-ray, you will usually be asked to lie on a table or stand against a flat surface so that the part of your body being examined can be positioned in the right place.

You will need to stay still so the images are not blurry.

The X-ray machine, which looks like a tube containing a large light bulb, will be carefully aimed at the part of the body being examined by the radiographer. They will operate the machine from behind a screen or in the next room.

The X-ray will last for a fraction of a second. You won't feel anything while it's carried out.

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Are there any risks?

There is a minimal risk of developing cancer from X-ray exposure, so medical radiation is only used when it is necessary.

You might be concerned about being exposed to radiation during an X-ray. However, the part of your body being examined will only be exposed to a low level of radiation for a fraction of a second. Sometimes the radiation causes changes to the cells in our body. In almost all cases, these changes are repaired naturally by the body.

If you have any concerns about the risks associated with X-rays, speak to your doctor or radiographer beforehand and inform them if you have had a recent x-ray or think you maybe or are currently pregnant, as there may be an alternative you can explore.

For more information, visit:
https://www.nhs.uk/conditions/x-ray/

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What is an Ultrasound?

An Ultrasound scan, sometimes called a Sonogram, uses sound waves to take pictures of your body.

The soundwaves are of a much higher frequency than normal, so you cannot hear them.
A type of gel is used to help conduct the sound inside the body, and when they bounce off different parts of the body, they create "echoes" picked up by the probe and turned into a moving image. This image is displayed on a monitor while the scan is carried out.

Non-pregnancy-related scans - Your doctor has requested that you have an Ultrasound scan so that they can get detailed pictures of the size, shape and function of the area to look for any abnormality.

Pregnancy-related scans - Your doctor or midwife has requested that you have an Ultrasound scan to determine that your pregnancy is progressing normally and that your baby is growing and developing at the normal rate. The scan is also to check for any potential problems with the baby.

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How to prepare for an ultrasound?

You should plan to be in the department for up to 2 hours.

- You might be advised to drink water and not go to the toilet until after the scan – this may be needed before a scan of your unborn baby or your pelvic area.

- You might be asked to avoid eating or drinking for several hours before the scan – this may be needed before a scan of your digestive system, including the liver and gallbladder.

- Depending on the area of your body being examined, the hospital may ask you to remove some clothing and wear a hospital gown. Your appointment letter will give you more details.

- As hospitals employ both male and female sonographers, if you feel more comfortable with a certain gender of your examiner, make sure to request that with the hospital before your appointment.

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What happens during an ultrasound?

Most Ultrasound scans last between 15 and 45 minutes.

They usually occur in a hospital radiology department or local community locations such as GP practices and are performed by a doctor, or sonographer.

You will need to lie on the bed with the lights turned down low so that the doctor or sonographer can see the screen easily. They will put some ultrasound gel on your skin over the area being scanned and move a probe over the area.

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Are there any risks?

You would not be able to feel the Ultrasound scan's sound waves, so the procedure is painless.

However, it is important to get into the correct position. Holding this position/lying on a table may make some uncomfortable, but for most patients, this is not the case.

The radiologist or sonographer may also need to apply some pressure with the probe, which may cause some discomfort. If it becomes painful you will need to let your sonographer know.

There are no known risks from the sound waves used in an ultrasound scan. Unlike some other examinations, such as X-rays, ultrasound scans don't involve radiation exposure and are considered a relatively safe medical procedure.

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What is a CT scan?

A CT scan is a computerised tomography (CT) scan that uses X-rays and a computer to create detailed images of the inside of the body.

Why do I need a CT scan?

There are a number of different reasons for your doctor to order a CT scan:

- To diagnose conditions such as damage to internal organs, blood flow problems, stroke or cancer
- Guide further tests or treatments – determining the location, size and shape of a tumour before having radiotherapy
- Monitor conditions – including checking the size of tumours during and after cancer treatment

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How to prepare for a CT scan?

You will receive an appointment letter outlining anything you need to do to prepare for the scan, such as eating and drinking anything for several hours before your appointment to help make sure clear images are taken.

Make sure to contact the hospital before your appointment if you have any allergies or kidney problem, if you're taking medication for diabetes, or if you are pregnant, as special arrangements may need to be made.

It's a good idea to wear loose, comfortable clothes and avoid wearing jewellery and clothes containing metal (such as zips), as these will need to be removed.

Your scan results will not usually be available immediately. A computer will need to process the information from your scan, which will then be analysed by a radiologist.
After analysing the images, the radiologist will write a report and send it to the doctor who referred you for the scan so they can discuss the results with you. This normally takes a few days or weeks.

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What happens during a CT scan?

You cannot feel the CT scans so the procedure itself is painless.

During the scan, you will usually lie on your back on a flat bed that passes into the CT scanner. While each scan is taken, you will need to lie very still and breathe normally, it may feel slightly uncomfortable. If you start feeling claustrophobic, make sure to inform the radiographer.
You may be asked to breathe in, breathe out, or hold your breath at certain points.

The radiographer will operate the scanner from the next room. While the scan is taking place, you will be able to hear and speak to them through an intercom. The scan will usually take around 10 to 20 minutes.

You should not experience any after-effects from a CT scan and can usually go home soon afterwards. But if a contrast was used, you may be advised to wait in the hospital for up to an hour to make sure you don't have a reaction to it.

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Are there any risks?

Radiation risk

The use of X-rays may mean that there is a slight increase in the chance of cancer occurring many years after your examination; e.g. 1 in 10,000 for a CT head scan, 1 in 1,000 for a CT abdomen scan. Although this examination involves the use of X-rays, your doctor will have decided that the benefit of having the scan far outweighs any risks. The dose is equal to the natural radiation we all receive from our surroundings over a period of approximately 1–5 years.
It is also worth noting that these risk levels only represent very small additions to the 1 in 3 chance we all have of getting cancer.

Contrast risk

Before having the scan, you may be given a special dye called a contrast to help improve the quality of the images. This may be swallowed in the form of a drink, passed into your bottom (enema), or injected into a blood vessel. The radiographers will complete a checklist to ensure it is safe for you to have the dye, and you will be asked to sign this form as consent, the specific side effects are documented on the checklists that you complete. The contrast is normally completely harmless and will pass out of your body in your urine but you might be asked to stay in the hospital afterwards as the dye may cause an allergic reaction in rare cases.

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Are there any risks?

Extravasation

If the contrast dye is injected into the patient's vein in your arm or hand, there is a small chance that the injection may leak out from the vein into the tissues under the skin – this is known as extravasation. If this happens, you may experience a stinging sensation where the contrast has gone into the tissue and it can be painful but otherwise harmless. This will usually wear off after about 30 minutes.

For more information, visit: https://www.nhs.uk/conditions/ct-scan/

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What is Bone Densitometry (DEXA) scan?

A bone density scan uses low dose X-rays to see how strong your bones are based on their density and identify any potential bone problems.

Doctors request DEXA scans for a variety of reasons. For example you may have recently broken a bone, you can be taking medication that can affect your bones making them weaker and increasing your future fracture risk or assess your risk of developing osteoporosis, a health condition that weakens bones and makes them more likely to break.

Why do I need a DEXA scan?

As mentioned above your doctor may order a DEXA scan to determine the health of your bones especially if you are:

- over 50 with a risk of developing osteoporosis
- under 50 with other risk factors, such as smoking or a previous broken bone

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How to prepare for a DEXA scan?

There is usually no special preparation needed for a DEXA scan as it is a relatively simple procedure. However you might be asked to complete a bone health questionnaire prior to the appointment. You will need to bring the letter to the radiographer who might need to ask a couple of follow up questions.

You may be able to remain fully clothed, however it is recommended to wear loose clothing that has no metal in them that can discord the results.
You will need to remove items with fasteners such as zips, hooks, buttons or buckles, underwire bras etc.

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What happens during a DEXA scan?

The scan will usually be carried out by a radiographer, a specialist in taking X-ray images.
The radiographer will measure your height and weight and then will ask you to lie down on the scanner bed in the correct position for your scan. A DEXA scanner is open; you will not need to go into a tunnel or have an injection.

You'll need to keep still during the scan so the images are not blurred. The scanning arm moves slowly over your body using a beam of low dose radiation to measure bone density in the part of your body being examined. This is usually the hip and lumbar spine.

The scan usually takes 10 to 20 minutes. You will be able to go home after you have had it done.

The images from the scan will be sent to a specialist after the appointment, who will be able to interpret the results and provide a diagnosis.

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Are there any risks?

X-rays are of a type of radiation known as ionising radiation, however the dose you get is very low, similar in strength to natural radiation we are exposed to in our everyday lives.

This makes the risk of this procedure very low and that the benefits of having the x-ray outweigh any risk.

If you are concerned or have any questions about the dose or radiation you can speak to your doctor prior to the appointment or with the radiographer before your procedure.

For more information, visit:
https://www.nhs.uk/conditions/dexa-scan/

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Written by Elena Chiviyska Health and Wellbeing Project Worker at Europia along with Manchester University NHS Foundation Trust. Europia is a Registered Charity No. 1161453, a community development organisation established in 2008. Our mission is to reach out, support and empower European nationals to navigate life in the UK; improve wellbeing; promote cultural diversity and enhance & inspire communities.

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