

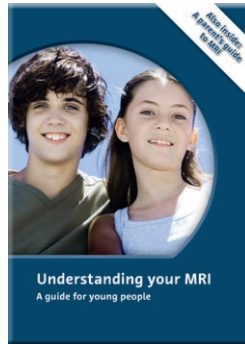
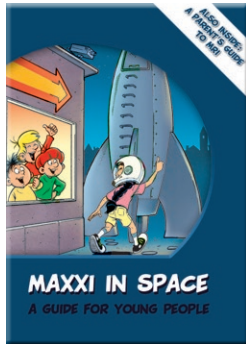
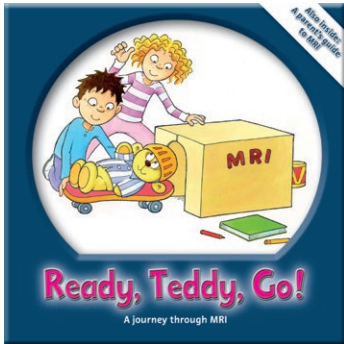


A parent's guide to MRI

Introduction to your child's MRI scan

The prospect of having an MRI scan can be daunting for children – and for parents and guardians too. Fear of the unknown can make you both feel anxious and worried. This booklet provides some background on MRI and the scan itself. It also aims to give you the information you need to help prepare and support your child.

Children of varying ages have different questions about having an MRI scan. Depending on the age of your child, there is a picture book, comic and information booklet that should help answer some of these questions.



Checklist for your child's MRI

MRI uses a magnet and radiowaves to take detailed pictures of the inside of the body. Because the magnet can be affected by metal, it is important that your child does not take any metal objects into the scanner room as these may distort the images or be damaged by the equipment.

You may be invited to stay with your child during their scan. In this case you will also have to remove anything metal from your pockets and clothes.

Here are some examples of things that shouldn't be taken into the scanner room:

- ✗ Mobile phones, coins, keys, pens, jewelry (don't forget rings, earrings and other piercings), hair clips, watch, belt, glasses and any other metal objects
- ✗ Any clothes with metal buttons or zips
- ✗ Any cards with a magnetic strip (e.g. credit cards) will be damaged so don't take these in with you



All items will be kept safe and stored in a secure locker. If you are uncertain about what can and cannot be taken into the scanner room, please ask the MRI technician.

Before the scan you should make sure that:

- ✓ You and your child have completed the safety questionnaire given to you on arrival
- ✓ You tell the MRI technician if you or your child:
 - Have any metal fragments or implants such as a pacemaker
 - Wear braces on your teeth
 - Have any tattoos
 - Are wearing any patches, for example for nicotine replacement or pain relief, as these may contain metal
 - Have hearing aids



Frequently asked questions

What is MRI?

MRI stands for *Magnetic Resonance Imaging*. It uses a magnetic field, radiowaves and a computer to produce very detailed images of the inside of the body. More information on MRI is provided in the science section of this booklet (page 10).



Courtesy of Medical Imaging Consultants

What is it used for?

MRI can produce very detailed images of almost any part of the body. It's commonly used to diagnose diseases and injuries in the brain, spine, abdomen, pelvis and joints. It can also detect blockages in blood vessels, as well as swelling or inflammation. MRI helps doctors to choose the best available therapy and see if it's working or needs to be altered.

Is it safe?

MRI is considered a very safe procedure. It has been used for many years, doesn't use X-rays or damaging radiation, and there are no known side effects.

Will it hurt?

MRI is completely painless. In fact, your child will not feel anything at all and the scanner won't touch them. The magnetic fields and radiowaves that MRI uses are the same as those that are around us the whole time.

How long will it take?

It depends on which part of the body is scanned, but normally it takes 15–60 minutes in total. Within this time, usually four or five scans are taken, each lasting around 2–8 minutes.

Can my child take a break during the scan?

There are not normally any breaks. It is best not to move and to remain still for the entire duration if possible.

MRI Fact:

"MRI shows up soft tissue such as organs, tendons and muscles with greater detail than CT."

Frequently asked questions

Will my child be sedated or anesthetized?

Typically, young children under five are sedated or given a general anesthetic; however, if your child has special needs or is unable to stay still during the scan, it may help them if they are sedated. Depending on the type of sedation used, your child may not be able to eat and drink before the scan. This will be discussed with you prior to the scan. There is more information about sedation on page 11 in this booklet.

What is a contrast agent and is it necessary to have it?

A contrast agent is a colorless liquid that is injected and makes the images appear brighter and easier for the radiologist to see. It is often used, but not in every case. If used, it will be injected into a vein in your child's arm during the scan. More information about contrast agents is provided on page 9.

Could the noise of the MRI scanner damage my or my child's ears?

The MRI scanner makes loud knocking sounds while it's scanning. This is not harmful to you or your child's ears. Both you and your child will be given earplugs to wear or headphones to listen to music.

Who will perform the scan?

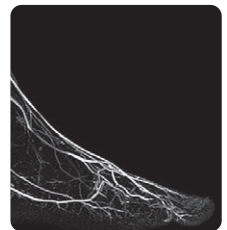
The scan will be performed by an MRI technician.

Can we go home after the scan?

You will be able to take your child home straight after the scan unless sedation or anesthetic has been used. In this case they will be monitored in a recovery area for a couple of hours until they are fully awake.

When will we get the results?

You will get the results as soon as possible but this may not be on the day of the examination as the scans need to be studied by a radiologist. A copy of the results will be sent to the doctor who requested the examination and you should make an appointment with them to get the results.



MRI scans of a hand, knee and foot

Preparing for your child's scan

There are usually no special preparations needed before an MRI scan, but here are a few things that you can do to help your child get ready for their scan.

- If possible, ensure your child wears loose comfortable clothing without metal zips or buttons. It is likely that they will be asked to change into a hospital gown or pyjamas; however, scans are occasionally carried out in their own clothes.
- Younger children can bring along a favorite soft toy and take it into the scanner with them. Please remember to check that there is no metal on it.
- Encourage your child to ask questions to help alleviate any fears they may have. If you can, try to find out as much as possible about MRI so you can answer these questions. If you can't, the MRI technician will be able to help.
- Your child can eat and drink as normal on the day of their scan, unless the doctor has told you otherwise.
- For babies it is helpful to do breastfeeding before the scan so that the baby falls asleep and is sleeping during the MRI scan.



What to expect before the scan

- An MRI scanner usually has a short tunnel that is open at both ends, although some scanners are open at the side. In both types, your child will lie on a bed and go in either feet first or head first, depending on which part of their body is being scanned.
- If a contrast agent is needed, a needle attached to a soft, thin plastic tube will be inserted into a vein, normally in your child's arm, before the scan is started. There is more information about contrast agents on page 9.
- A special antenna – called a coil – will be placed around the part of the body being imaged. The scanner uses this to take the images. For a head scan, your child will wear a coil that looks a bit like a large birdcage.
- Once your child is comfortable, the MRI technician will slide the bed into the scanner. The inside is well lit and a fan will blow air through it.

What to expect during the scan

The MRI technician will operate the scanner from a separate room, using a computer that must be kept away from the magnetic field created by the MRI scanner.

- While it is taking the images, the scanner makes a loud knocking sound. This is a normal part of the imaging process and won't damage your or your child's ears.
- You'll both be given earplugs, or headphones to listen to music.

It's most important for your child to keep as still as possible and try not to talk during the knocking sound. Any small movements will blur the image.

- The procedure will normally take between 15 and 60 minutes, during which time there will be four or five different scans lasting 2–8 minutes each.
- You may be able to sit with your child in the scanner room during the scan.
- The MRI technician will talk to your child via an intercom.
- If your child feels scared or uncomfortable at any time, they can press a bell button that they will hold in their hand to alert the MRI technician.
- If a contrast agent is needed, it will be injected at some point during the scan.



The role of the parent or guardian

During the scan

Your role in making the scan run smoothly is very much appreciated. The scan can take up to an hour, and this is a long time for anyone to keep still! Visualization techniques can often help children to cope – for example, imagining they are lying on a beach, or thinking of some of their favorite things to do. Counting or saying the alphabet backwards can also help.

After the scan

If your child has not been sedated, they will be allowed to go home immediately after the scan. MRI does not cause any known side effects and they won't feel any different after the scan.

If they have been sedated, they will be monitored in a recovery area for a couple of hours until they are fully awake.



- The MRI scans will need to be studied by a radiologist, so you may not get the results immediately.
- A copy of the results will be sent to the doctor who requested the scan, to discuss them with you. This will be as soon as possible.
- The radiologist will be able to advise you when to make your child's next appointment.

Some key points to remember

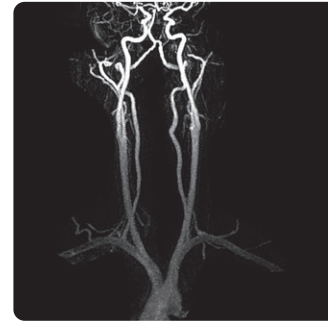
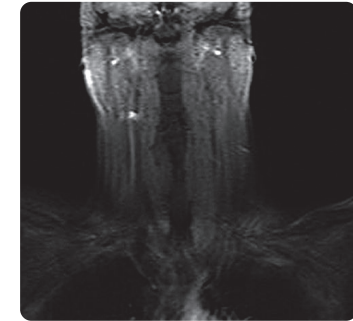
- The best way to help your child is for you to remain calm
- Talk to your child before and during the scan to reassure them
- Tell the MRI technician if there are specific ways to help calm your child
- Ask any questions you may have before or after the scan
- Follow the instructions of the MRI technician and do not interrupt the scan

Contrast agents

What is a contrast agent?

A contrast agent is a colorless liquid which is used to improve the image quality from an MRI scan. It makes parts of the image appear brighter and increases the level of detail on the scan. This helps doctors to make a faster and more reliable diagnosis.

- The images here show two MRI scans of the neck. They are from the same person and were taken shortly after each other.
- The images are taken with (right) and without (left) a contrast agent. The image taken with a



Courtesy of Lindy Wozniak

contrast agent looks brighter and shows up the blood vessels clearly.

A contrast agent is often used in MRI scans, but not in every case. If it is used for your child's scan, it just means the doctor needs to see the image more clearly and it is simply a part of the scanning process.

How will it be used?

Before the scan starts, anesthetic cream may be applied to your child's arm to numb the area. This normally takes 30–45 minutes to work, then a needle attached to a soft, thin plastic tube will be inserted into a vein in your child's arm.

- A small amount of the contrast agent will be injected during the scan, either by hand injection or a pump.
- In some cases, your child might experience a cold feeling in their arm – you can explain that this is normal and will disappear shortly.
- Your child may have fears about the injection and it may help to run through the process with them beforehand. For young children, using a teddy bear to explain what will happen can make it easier.

MRI Fact:

“MRI contrast agents have been used for more than 30 years and have proven to be very well tolerated.”

How MRI works

MRI images the hydrogen in water



- Every tissue and organ in the human body contains water (H₂O), which is made up of hydrogen and oxygen atoms.
- The MRI scanner analyzes the location of those hydrogen atoms to produce a cross-sectional image of the part of the body being scanned.

MRI uses a magnetic field and radiowaves

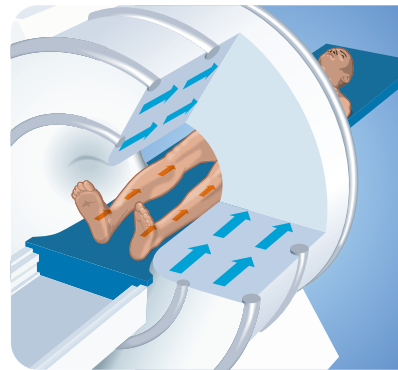
- When the patient enters the scanner, the magnet aligns the hydrogen atoms in the body so they point in the direction of the magnetic field.
- A very short pulse of radiowaves is then turned on, which makes them temporarily change orientation. After the radiowaves are switched off the hydrogen atoms realign themselves, giving off tiny radio signals that are picked up by the coil (a radio antenna).
- This is all completely painless and the patient is never aware that it is happening.

- The hydrogen atoms that are in various parts of each organ and tissue realign themselves at different rates, causing the image that the scanner produces to have light and dark contrast.

MRI makes a loud knocking sound

- Although there are no moving parts, there are magnets (called gradient coils) inside the MRI scanner that are switched on and off quickly. This causes them to vibrate, which produces the knocking sounds that you hear when it's working.
- This is perfectly normal and part of the imaging process.

Once the scan is over, a computer converts the data into the detailed image that the radiologist analyzes.



MRI Fact:

“MRI can reveal information about how the brain functions by investigating blood flow.”

Sedation

It is important that your child stays as still as possible during the MRI scan so that the pictures obtained are very clear to help in the evaluation and diagnosis. Sedation is often used for young children to make them more comfortable during the scan. Sedation will make them drowsy and they won't remember the scan afterwards. Older children who have special needs or experience severe claustrophobia may also find it easier if they are sedated.

- Sedation is normally given orally, although some children will require an injection. Your child will be carefully monitored throughout the whole procedure until they are awake. Normally they will be able to go home a couple of hours after their scan.
- Sedation can make your child sleepy for the next day or so, so you should keep an eye on them until they are back to normal.
- Sometimes a general anesthetic will be used instead of sedation. This will depend on the normal practice of the imaging unit you are visiting. In this case, your doctor will explain the procedure to you.

Depending on the type of sedation used, your child may not be able to eat and drink before the scan.

Pregnancy

Because of the unknown risks associated with scanning pregnant women, MRI scans are not advised during pregnancy unless there are special circumstances. You **MUST** tell a member of staff in the MRI unit as soon as possible if you or your child is or might be pregnant.

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