

Information and Resources

Magnetic Resonance Imaging (MRI)

Magnetic resonance imaging (MRI) is a test that uses a magnetic field and pulses of radio wave energy to make pictures of organs and structures inside the body. In many cases MRI gives different information about structures in the body than can be seen with an [X-ray](#), [ultrasound](#), or [computed tomography \(CT\) scan](#). MRI also may show problems that cannot be seen with other imaging methods.

For an MRI test, the area of the body being studied is placed inside a special machine that contains a strong magnet. Pictures from an MRI scan are digital images that can be saved and stored on a computer for more study. The images also can be reviewed remotely, such as in a clinic or an operating room. In some cases, [contrast material](#) may be used during the MRI scan to show certain structures more clearly.

See pictures of a [standard MRI machine](#)  and an [open MRI machine](#) .

Why It Is Done

Magnetic resonance imaging (MRI) is done for many reasons. It is used to find problems such as tumors, bleeding, injury, blood vessel diseases, or infection. MRI also may be done to provide more information about a problem seen on an X-ray, ultrasound scan, or CT scan. Contrast material may be used during MRI to show abnormal tissue more clearly. An MRI scan can be done for the:

Head. MRI can look at the brain for tumors, an [aneurysm](#), bleeding in the [brain](#), nerve injury, and other problems, such as damage caused by a [stroke](#). MRI can also find problems of the [eyes](#) and [optic nerves](#), and the [ears](#) and [auditory nerves](#).

Chest. MRI of the chest can look at the [heart](#), the valves, and [coronary blood vessels](#). It can show if the heart or [lungs](#) are damaged. MRI of the chest may also be used to look for [breast](#) or [lung cancer](#).

Blood vessels. Using MRI to look at blood vessels and the flow of blood through them is called [magnetic resonance angiography \(MRA\)](#). It can find problems of the [arteries](#) and veins, such as an aneurysm, a blocked blood vessel, or the torn lining of a blood vessel (dissection). Sometimes contrast material is used to see the blood vessels more clearly.

Abdomen and pelvis. MRI can find problems in the organs and structures in the belly, such as the [liver](#), [gallbladder](#), [pancreas](#), [kidneys](#), and [bladder](#). It is used to find tumors, bleeding, infection, and blockage. In women, it can look at the uterus and ovaries. In men, it looks at the [prostate](#).

Bones and joints. MRI can check for problems of the bones and joints, such as [arthritis](#), problems with the [temporomandibular joint](#), [bone marrow](#) problems, [bone tumors](#), [cartilage](#) problems, torn [ligaments](#) or [tendons](#), or infection. MRI may also be used to tell if a bone is broken when X-ray results are not clear. MRI is done more commonly than other tests to check for some bone and joint problems.

Spine. MRI can check the discs and nerves of the spine for conditions such as [spinal stenosis](#), [disc bulges](#), and [spinal tumors](#).

Date visited 5/1/13

How To Prepare

Before your MRI test, tell your doctor and the MRI technologist if you:

Are allergic to any medicines. The contrast material used for MRI does not contain iodine. If you know that you are allergic to the contrast material used for the MRI, tell your doctor before having another test.

Are or might be pregnant.

Have any metal implanted in your body. This helps your doctor know if the test is safe for you. Tell your doctor if you have:

Heart and blood vessel devices such as a coronary artery stent, a pacemaker, an ICD (implantable cardioverter-defibrillator), or a metal heart valve.

Metal pins, clips, or metal parts in your body, including artificial limbs and dental work or braces.

Any other implanted medical device, such as a medicine infusion pump or a cochlear implant.

Cosmetic metal implants, such as in your ears, or tattooed eyeliner.

Had recent surgery on a blood vessel. In some cases, you may not be able to have the MRI test.

Have an [intrauterine device \(IUD\)](#) in place. An IUD may prevent you from having the MRI test done.

Become very nervous in confined spaces. You need to lie very still inside the MRI magnet, so you may need medicine to help you relax. Or you may be able to have the test done with open MRI equipment. It is not as confining as standard MRI machines.

Have any other health conditions, such as kidney problems or [sickle cell anemia](#), that may prevent you from having an MRI using contrast material.

Wear any medicine patches. The MRI may cause a burn at the patch site.

You may need to arrange for someone to drive you home after the test, if you are given a medicine ([sedative](#)) to help you relax.

For an MRI of the abdomen or pelvis, you may be asked to not eat or drink for several hours before the test.

You may need to sign a consent form that says you understand the risks of an MRI and agree to have the test done. Talk to your doctor about any concerns you have regarding the need for the test, its risks, how it will be done, or what the results will mean. To help you understand the importance of this test, fill out the [medical test information form](#).

How It Is Done

A magnetic resonance imaging (MRI) test is usually done by an MRI technologist. The pictures are usually interpreted by a [radiologist](#). But some other types of doctors can also interpret an MRI scan.

You will need to remove all metal objects (such as hearing [aids](#), dentures, jewelry, watches, and hairpins) from your body because these objects may be attracted to the powerful magnet used for the test.

How It Is Done continued...

Date visited 5/1/13

You will need to take off all or most of your clothes, depending on which area is examined (you may be allowed to keep on your underwear if it is not in the way). You will be given a gown to use during the test. If you are allowed to keep some of your clothes on, you should empty your pockets of any coins and cards (such as credit cards or ATM cards) with scanner strips on them because the MRI magnet may erase the information on the cards.

During the test you usually lie on your back on a table that is part of the MRI scanner. Your head, chest, and arms may be held with straps to help you remain still. The table will slide into the space that contains the magnet. A device called a coil may be placed over or wrapped around the area to be scanned. A special belt strap may be used to sense your breathing or heartbeat. This triggers the machine to take the scan at the right time.

Some people feel nervous (claustrophobic) inside the MRI magnet. If this keeps you from lying still, you can be given a medicine (sedative) to help you relax. Some MRI machines (called open MRI) are now made so that the magnet does not enclose your entire body. Open MRI machines may be helpful if you are claustrophobic, but they are not available everywhere. The pictures from an open MRI may not be as good as those from a standard MRI machine. See pictures of a [standard MRI machine](#) and an [open MRI machine](#).

Inside the scanner you will hear a fan and feel air moving. You may also hear tapping or snapping noises as the MRI scans are taken. You may be given earplugs or headphones with music to reduce the noise. It is very important to hold completely still while the scan is being done. You may be asked to hold your breath for short periods of time.

During the test, you may be alone in the scanner room. But the technologist will watch you through a window. You will be able to talk with the technologist through a two-way intercom.

If contrast material is needed, the technologist will put it in an [intravenous \(IV\) line](#) in your arm. The material may be given over 1 to 2 minutes. Then more MRI scans are done.

An MRI test usually takes 30 to 60 minutes but can take as long as 2 hours.

How It Feels

You will not have pain from the magnetic field or radio waves used for the MRI test. The table you lie on may feel hard and the room may be cool. You may be tired or sore from lying in one position for a long time.

If a contrast material is used, you may feel some coolness and flushing as it is put into your IV.

In rare cases, you may feel:

- A tingling feeling in the mouth if you have metal dental fillings.

- Warmth in the area being examined. This is normal. Tell the technologist if you have [nausea](#), vomiting, [headache](#), [dizziness](#), pain, burning, or [breathing problems](#).

Risks

There are no known harmful effects from the strong magnetic field used for MRI. But the magnet is very powerful. The magnet may affect pacemakers, artificial limbs, and other medical devices that contain iron. The magnet will stop a watch that is close to the magnet. Any loose metal object has the risk of

Date visited 5/1/13

causing damage or injury if it gets pulled toward the strong magnet.

Metal parts in the eyes can damage the [retina](#). If you may have metal fragments in the eye, an X-ray of the eyes may be done before the MRI. If metal is found, the MRI will not be done.

Iron pigments in tattoos or tattooed eyeliner can cause [skin](#) or eye irritation.

An MRI can cause a burn with some [medication](#) patches. Be sure to tell your health professional if you are wearing a patch.

There is a slight risk of an [allergic reaction](#) if contrast material is used during the MRI. But most reactions are mild and can be treated using medicine. There also is a slight risk of an infection at the IV site.

Results

A [magnetic resonance imaging \(MRI\)](#) is a test that uses a magnetic field and pulses of radio wave energy to make pictures of organs and structures inside the body.

The [radiologist](#) may discuss initial results of the MRI with you right after the test. Complete results are usually ready for your doctor in 1 to 2 days.

An MRI can sometimes find a problem in a tissue or organ even when the size and shape of the tissue or organ looks normal.

Magnetic resonance imaging (MRI)

Normal:	The organs, blood vessels, bones, and joints are normal in size, shape, appearance, and location.
	No abnormal growths, such as tumors, are present.
	No bleeding, abnormal fluid, blockage in the flow of blood, or bulges in the blood vessels (aneurysms) are present.
	No signs of inflammation or infection are present.
Abnormal:	An organ is too large, too small, damaged, or absent.
	Abnormal growths (such as tumors) are present.
	Abnormal fluid from a cause such as bleeding or an infection is present. Fluid is found around the lungs or heart. Fluid is found around the liver, bowel, or other organ in the abdomen.
	A blood vessel is narrowed or blocked. An aneurysm is present.

Date visited 5/1/13

Blockage in the gallbladder [bile](#) ducts or in the tubes ([ureters](#)) that lead out of the kidneys is present.

Damage to [joints](#), [ligaments](#), or [cartilage](#) is seen. Bones are broken or show infection or disease.

Problems of the [nervous system](#) are present, such as [multiple sclerosis \(MS\)](#), [dementia](#), [Alzheimer's disease](#), or [herniated disc](#).

What Affects the Test

Reasons you may not be able to have the test or why the results may not be helpful include:

Pregnancy. An MRI test usually is not done during pregnancy. But MRI may be done to get more information about a possible problem that cannot be seen clearly with [ultrasound](#).

Medical devices that use electronics, such as a pacemaker or medicine infusion pump. The MRI magnet may cause problems with these devices, and that may keep you from having an MRI.

Medical devices that have metal in them. The metal might make some of the detailed MRI pictures blurry. This may prevent your doctor from seeing the organ that is being looked at. For example, an [intrauterine device \(IUD\)](#) with metal may prevent your doctor from seeing the uterus clearly.

Inability to remain still during the test.

Obesity. A person who is very overweight may not fit into standard MRI machines.

Many modern medical devices that do not use electronics—such as heart valves, stents, or clips—can be safely placed in most MRI machines. But some newer MRI machines have stronger magnets. The safety of MRI scans with these stronger MRI magnets in people with medical devices is not known.

What To Think About

Sometimes your MRI test results may be different from the results of CT, ultrasound, or X-ray tests, because the MRI scan shows tissue differently.

MRI is a safe test for looking at structures and organs inside the body. It costs more than other methods and may not be available in your area.

Open MRI machines are now made so that the magnet does not completely surround you. But these machines may not be available in all medical centers. Open MRI is useful for people who are claustrophobic or obese.

MRI can be used to check different parts of the body, such as the head, belly, breast, spine, shoulder, and knee. For more information, see the topics [MRI of the Head](#), [MRI of the Abdomen](#), [MRI of the Breast](#), [MRI of the Spine](#), [MRI of the Shoulder](#), and [MRI of the Knee](#).

Magnetic resonance angiogram (MRA) is a special MRI method that studies blood vessels and blood flow. For more information, see the topic [Magnetic Resonance Angiogram \(MRA\)](#).

MRI spectroscopy is a special MRI method that identifies certain medical problems by looking for specific chemicals in body tissues.

Date visited 5/1/13

Contrast material that contains gadolinium may cause a serious skin problem (called nephrogenic fibrosing dermopathy) in people with **kidney failure**. Before having an MRI scan, tell your doctor if you have serious kidney disease or if you have had a kidney transplant.

Other Works Consulted

Chernecky CC, Berger BJ (2008). Laboratory Tests and Diagnostic Procedures, 5th ed. St. Louis: Saunders.

Fischbach FT, Dunning MB III, eds. (2009). Manual of Laboratory and Diagnostic Tests, 8th ed. Philadelphia: Lippincott Williams and Wilkins.

By Healthwise Staff

Primary Medical Reviewer Kathleen Romito, MD - Family Medicine

Specialist Medical Reviewer Howard Schaff, MD - Diagnostic Radiology

Last Revised May 16, 2011

WebMD Medical Reference from Healthwise



Last Updated: May 16, 2011

This information is not intended to replace the advice of a doctor. Healthwise disclaims any liability for the decisions you make based on this information.

© 1995-2011 Healthwise, Incorporated. Healthwise, Healthwise for every health decision, and the Healthwise logo are trademarks of Healthwise, Incorporated.

My Notes:

ADVERTISEMENT

WebMD Allergy

Download the Free App

Download Now



This Week in Health



- Childhood ADHD: Understanding Symptoms
- 10 Secrets to Whiter Teeth
- Common Skin Problems
- Medications for Multiple Sclerosis