

MRI of the Chest

- ***What is MRI of the Chest?***
- ***What are some common uses of MRI of the Chest?***
- ***How should I prepare for my MRI of the Chest?***
- ***How does the MRI of the Chest procedure work?***
- ***How is the MRI of the Chest performed?***
- ***What will I experience during my MRI of the Chest procedure?***
- ***What are the benefits vs. risks of MRI of the Chest?***
- ***What are the limitations of MRI of the Chest?***

What is MRI of the Chest?

Magnetic resonance imaging (MRI) is a non-invasive way of viewing organs, soft tissues, bone and virtually all other internal body structures. MRI uses radio waves passed through a powerful magnetic field to produce clear and detailed pictures of the chest, providing information on the heart and lungs that cannot be otherwise obtained from an x-ray, ultrasound, or computed tomography (CT) scan.

What are some common uses of MRI of the Chest?

- Magnetic resonance imaging (MRI) of the chest gives very detailed pictures of the structures within the chest cavity, including the heart and lungs, from almost any angle.
- Abnormal growths, including cancer of the lungs or other tissues, may be detected and their size, extent, and degree of spread determined for staging purposes. MRI can often distinguish between tumors, other lesions, and normal tissues.
- MRI may reveal diseased heart valves at a stage when surgery may be easier and safer to perform.
- An MRI exam displays lymph nodes and blood vessels. It is a noninvasive method of showing whether blood flow is normal or reduced.

- A special form of MRI called magnetic resonance angiography (MRA) can demonstrate narrowing of the coronary arteries or an actual blockage by fatty deposits or a blood clot, which often precedes clinical heart disease. MRA may also demonstrate an abnormal ballooning out of the wall of an artery (aneurysm) or a torn inner lining of an artery (dissection).
- Disorders of the ribs and sternum may be assessed by chest MRI.
- An MRI exam can detect breast cancer at an early stage.
- MRI can provide visual guidance when doing an interventional procedure or taking a tissue sample (biopsy).
- MRI of the chest may clarify findings from a previous x-ray exam or computed tomography (CT) scan.

How should I prepare for my MRI of the Chest?

The strong magnetic field used in magnetic resonance imaging (MRI) of the chest can exert a force on metallic objects that contain iron. Examples include artificial heart valves, intrauterine devices (IUD's), vascular access ports, metal plates, pins, screws, surgical staples, prostheses and medication pumps. If you have an implanted heart pacemaker you should not have an MRI exam. In most cases, metal objects used in orthopedic surgery pose no risk. A recently placed artificial joint may, however, mean that another imaging procedure should replace MRI. If there is any question, an x-ray may be taken to detect the presence of any metal object. An x-ray is indicated if there might be shrapnel or a bullet in your body. MRI may be a problem for sheet metal workers and others who are exposed to small metal fragments. You will be asked to remove all metal objects such as jewelry, watch, eyeglasses and hairpins. You should take out any removable dental work. Pens, eyeglasses or pocketknives can become dangerous projectiles when the magnet is activated. Red dyes used in tattoos may contain iron, but this is rarely a problem.

Some MRI procedures use oral or injected contrast material to help obtain clearer images. For this reason the radiologist or technologist will ask if you have an allergy of any kind such as hay fever, hives, allergic asthma, or allergy to food or drugs. The radiologist should know if you have any serious health problems. Some conditions, such as kidney disease and sickle cell anemia, may rule out a contrast MRI study.

People who tend to be nervous when in a confined space (claustrophobic) may become very uncomfortable if examined in an enclosed MRI unit and have trouble lying still. A sedative may relieve anxiety in this circumstance. Another option is to use an open MRI unit, if available, which is less confining than a conventional unit.

Rules about eating and drinking before the exam vary at different MRI facilities. Unless told otherwise, you may follow your usual routine. Medications can be taken as usual. When you arrive at the MRI unit you may receive a lightweight hospital gown to wear, or you may be allowed to wear your own clothing if it is loose-fitting and has no metal fasteners. You should inform MRI staff if you might be pregnant.

How does the MRI of the Chest procedure work?

Magnetic resonance imaging (MRI) does not depend on radiation, as do conventional x-ray examinations and computed tomography (CT) scans. Instead, radio waves are directed at protons which are most abundant in water molecules (they are the "H" in H₂O). When a strong magnetic field is generated, the protons change their position, producing signals that are processed by a computer program to form images. MRI images show differences in water content between various tissues. The images are very sharp and detailed, and may be viewed in any plane or from any direction. MRI is especially suited to detecting disorders that increase the amount of fluid, such as tumors, infection and inflammation.

A typical chest MRI exam includes two to six imaging sequences, each of which produces sectional views, or slices, through the structures within the chest. The slices are about one-quarter-inch apart and are presented in different planes: left to right, front to back, upper to lower. In addition to these two-dimensional slices, the computer is able to produce three-dimensional images of various tissues. The images may be stored in a computer and viewed on screen, or they may be stored on photographic film or videotape. Unlike conventional x-ray exams, MRI scans can see through the bones to image the underlying soft tissues.

How is the MRI of the Chest performed?

The MRI scanner is in a special room that is shielded from outside magnetic fields. You will lie on your back on a narrow table that slides inside a tunnel-like tube. Your chest may be secured with straps to help you remain still, and bolsters may be used to maintain correct positioning. A device called a coil will be placed over your chest or wrapped around it. If contrast material is needed, the technologist will inject it, usually through an intravenous line in

your arm. Additional images are obtained after the injection. Each set of images takes two to 15 minutes to collect; the complete exam takes about an hour or sometimes longer.

What will I experience during my MRI of the Chest procedure?

Magnetic resonance imaging (MRI) of the chest is a pain-free procedure. Your chest may feel slightly warm, but this is a normal and harmless sensation. The scanner is air-conditioned, well lit, and you can talk to the technologist. Sedation is available for patients who become anxious from feeling closed in, but probably fewer than one in twenty require it. Because excessive movement can blur the images, you may be sedated to help you remain still as the images are recorded. If contrast material is injected, you may feel coolness and flushing for a minute or two.

The MRI scanner produces loud thumping and humming noises. You can request earplugs to reduce the noise. Some scanners have recorded music or a built-in television screen to help pass the time. Many MRI centers permit a relative or friend to remain near the patient during the exam, or a parent if the patient is a child. The technologist who operates the scanner will observe you from an adjacent room throughout the exam. You will be able to speak with the technologist at any time using a two-way intercom installed in the MRI unit. It is important to remain perfectly still when images are being recorded, but you may relax between imaging sequences. If you have not been sedated, no recovery period is necessary. You may resume your usual activities immediately after the exam.

What are the benefits vs. risks of MRI of the Chest?

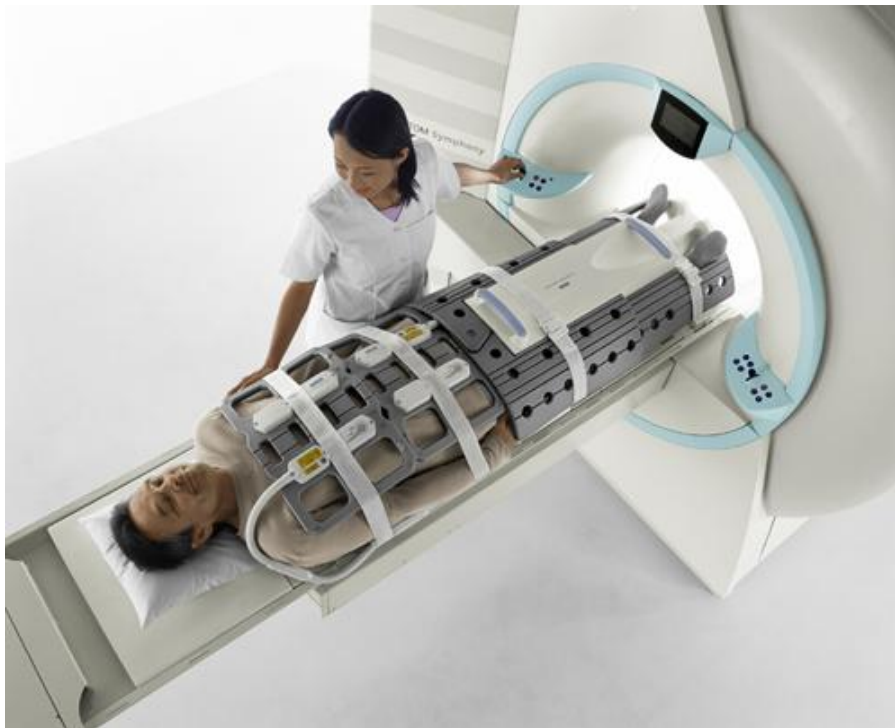
Benefits

- Magnetic resonance imaging (MRI) of the chest is more informative than other imaging procedures for differentiating soft tissues. It provides very clear and detailed views of internal organs of the chest without obstruction by bone. Tissues are imaged from multiple viewpoints.
- MRI is a totally noninvasive imaging technique that does not require exposure to radiation.
- MRI of the chest can help to diagnose abnormal growths and provides the information needed to stage them. Tumors may be distinguished from other lesions and from normal tissues.

- Blood flow may be assessed without risking the side effects of angiography.
- The contrast material used in some chest MRI exams does not contain iodine and so is very unlikely to produce an allergic reaction.

Risks

- Although there is no reason to believe that magnetic resonance imaging (MRI) harms the fetus, the effects of a strong magnetic field are not well understood. For this reason pregnant women usually are advised not to have an MRI exam.
- If sedation is used there are risks of excessive sedation. The technologist monitors the patient's vital signs to minimize this risk.
- Patients have been injured when failing to remove metal objects from their clothing or when such objects were left in the room by a previous patient.
- There is a very slight risk of an allergic reaction if contrast material is injected. Such reactions usually are mild and easily controlled by medication. There also is a very small risk of skin infection at the site of injection.



Open MRI of full body.

What are the limitations of MRI of the Chest?

Magnetic resonance imaging (MRI) of the chest is a costly procedure that takes more time than an x-ray or CT study. High-quality images are assured only if the patient is able to remain perfectly still while the images are being recorded. Patients who are anxious or confused may find it difficult to lie still. Although the strong magnetic field is not harmful in itself, medical devices that contain metal may malfunction or cause problems during an MRI exam.

Patients who are claustrophobic may have to be sedated during an MRI study, or else examined in one of the newer open MRI units. A person who is very obese may not fit into the opening of a conventional MRI machine.

MRI generally is not recommended for patients who have been acutely injured. This is because traction devices and life support equipment must be kept away from the area to be imaged. Furthermore, the results will not be immediately available as is often necessary in trauma situations.