# Musculoskeletal MRI



Magnetic resonance imaging (MRI) uses a powerful magnetic field, radio waves and a computer to produce detailed pictures of joints, soft tissues and bones. It is usually the best choice for evaluating the body for injuries, tumors, and degenerative disorders.

Tell your doctor about any of your health problems, recent surgeries or allergies and whether there's a possibility you are pregnant. The magnetic field is not harmful, but it may cause some medical devices, such as cardiac pacemakers, to malfunction. Smaller metallic items in your body, like aneurysm clips, may even move. Most orthopedic implants pose no risk, but you should always tell the technologist if you have any devices or metal in your body. Sometimes, these items can heat up in the scanner, but you can always stop the scan if you feel that happening. Guidelines about eating and drinking before your exam vary between facilities. Unless you are told otherwise, take your regular medications as usual. Leave jewelry at home and wear loose, comfortable clothing. You may be asked to wear a gown. If you have claustrophobia or anxiety, you may want to ask your doctor for a mild sedative prior to the exam.

## What is musculoskeletal MRI?

Magnetic resonance imaging (MRI) is a noninvasive test doctors use to diagnose medical conditions.

MRI uses a powerful magnetic field, radiofrequency pulses, and a computer to produce detailed pictures of internal body structures. MRI does not use radiation (x-rays).

Detailed MR images allow doctors to examine the body and detect disease.

## What are some common uses of the procedure?

MR imaging is usually the best choice for examining the:

- major joints.
- spine for back pain.
- soft tissues (muscles, tendons and ligaments) of the extremities.

MR imaging is typically performed to diagnose or evaluate:

- joint disorders such as degenerative arthritis (http://www.radiologyinfo.org) .
- tears of the menisci, ligaments and tendons (knee) or rotator cuff (shoulder) and labrum (shoulder or hip).
- fractures (in selected patients).
- spinal disk abnormalities (such as a herniated disk (http://www.radiologyinfo.org) ).
- the integrity of the spinal cord after trauma.


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- sports-related injuries and work-related disorders caused by repeated strain, vibration or forceful impact.
- infections (such as osteomyelitis (http://www.radiologyinfo.org) ).
- tumors (primary tumors and metastases (http://www.radiologyinfo.org) ) involving soft tissues around the joints and extremities (such as muscles, bones and joints).
- pain, swelling or bleeding in the tissues in and around the joints and extremities.
- congenital malformations of the extremities in children including infants.
- developmental abnormalities of the extremities in children including infants.
- congenital and idiopathic (developing during adolescence) scoliosis prior to surgery.
- tethered spinal cord (abnormal stretching of the spinal cord) in children including infants.

## Who interprets the results and how do I get them?

A radiologist, a doctor trained to supervise and interpret radiology exams, will analyze the images. The radiologist will send a signed report to your primary care or referring physician, who will share the results with you.

You may need a follow-up exam. If so, your doctor will explain why. Sometimes a follow-up exam further evaluates a potential issue with more views or a special imaging technique. It may also see if there has been any change in an issue over time. Follow-up exams are often the best way to see if treatment is working or if a problem needs attention.

## What are the benefits vs. risks?

### Benefits

- MRI is an imaging technique that does not require exposure to radiation.
- MR images of the soft-tissue structures of the body (particularly muscles, bones and joints) are often clearer and more detailed than with other imaging methods. This detail makes MRI an invaluable tool in early diagnosis and evaluation of many conditions, including tumors.
- MRI can distinguish abnormal tissues from normal tissues much more accurately than most other imaging tests (x-ray, CT, etc.).
- MRI can detect abnormalities that might be obscured by bone with other imaging methods.
- The MRI gadolinium contrast material is less likely to cause an allergic reaction than the iodine-based contrast materials used for x-rays and CT scanning.
- MR images allow the physician to see even very small tears and injuries to tendons, ligaments and muscles and some fractures that cannot be seen on x-rays (http://www.radiologyinfo.org) and CT.

### Risks

- The MRI exam poses almost no risk to the average patient when appropriate safety guidelines are followed.
- If sedation is used, there is a risk of using too much. However, your vital signs will be monitored to minimize this risk.
- The strong magnetic field is not harmful to you. However, it may cause implanted medical devices to malfunction or distort the images.
- Nephrogenic systemic fibrosis is a recognized complication related to injection of gadolinium (http://www.radiologyinfo.org) contrast. It is exceptionally rare with the use of newer gadolinium contrast agents. It usually occurs in patients with serious kidney disease. Your doctor will carefully assess your kidney function before considering a contrast injection.
- There is a very slight risk of an allergic reaction if your exam uses contrast material. Such reactions are usually mild and controlled by medication. If you have an allergic reaction, a doctor will be available for immediate assistance.
- Although there are no known health effects, evidence has shown that very small amounts of gadolinium can remain in the


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body, particularly the brain, after multiple MRI exams. This is most likely to occur in patients receiving multiple MRI exams over their lifetime for monitoring chronic or high-risk health conditions. The contrast agent is mostly eliminated from the body through the kidneys. If you are a patient in this category, consult with your doctor about the possibility of gadolinium retention, as this effect varies from patient to patient.

- If contrast material is injected into the joint, there may be related complications such as infection, bleeding or pain.
- IV contrast manufacturers indicate mothers should not breastfeed their babies for 24-48 hours after contrast material is given. However, the most recent American College of Radiology (ACR) Manual on Contrast Media reports that studies show the amount of contrast absorbed by the infant during breastfeeding is extremely low. *For further information please consult the ACR Manual on Contrast Media (https://www.acr.org/Clinical-Resources/Contrast-Manual) and its references.*

## What are the limitations of a musculoskeletal MRI?

High-quality images depend on your ability to remain perfectly still and follow breath-holding instructions while the images are being recorded. If you are anxious, confused or in severe pain, you may find it difficult to lie still during imaging.

A person who is very large may not fit into certain types of MRI machines. There are weight limits on the scanners.

Implants and other metallic objects can make it difficult to obtain clear images. Patient movement can have the same effect.

A very irregular heartbeat may affect the quality of images. This is because some techniques time the imaging based on the electrical activity of the heart.

MRI is generally not recommended for seriously injured patients. However, this decision is based on clinical judgment. This is because traction devices and life support equipment may distort the MR images. As a result, they must be kept away from the area to be imaged. Some trauma patients, however, may need MRI.

Present data show no convincing evidence that non contrast MRI harms the fetus of a pregnant woman. However, if the need for the exam is not time sensitive your doctor may delay the exam until after delivery. MRI gadolinium contrast agents are generally avoided during pregnancy except in very specific circumstances. Your doctor will discuss the benefits and risks of any MRI procedure with you. Doctors may perform MRI after the first trimester to assess the fetus for findings that are not fully evaluated by ultrasound.

An MRI exam typically costs more and may take more time than other imaging exams. Talk to your insurance provider if you have concerns about the cost of MRI.

Because of the length of time to complete an MRI, many young children (particularly infants) require sedation to hold still for the exam.

Initial assessment of bones and joints is typically performed with x-rays.

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