

# Magnetic Resonance Imaging

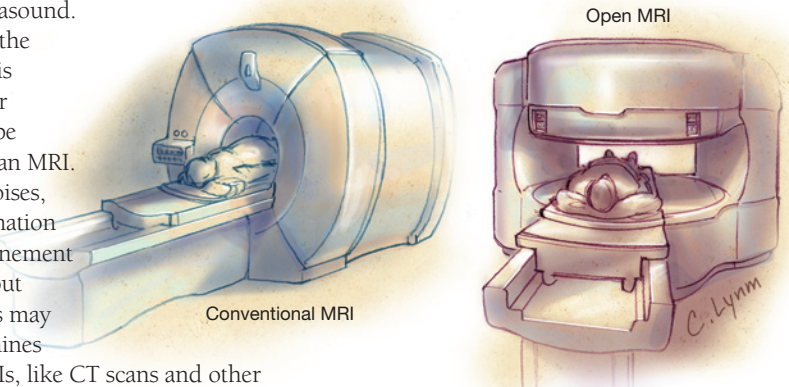
**M**agnetic resonance imaging (MRI) uses magnetic fields to provide images of body tissues, helping diagnosis of certain conditions in adults and in children. MRI can be used to look at all parts of the body, including the brain, the heart, blood vessels, the spinal cord, and the extremities. Unlike x-ray tests, computed tomography (CT scans), and angiography, MRI does not use ionizing radiation.

However, MRIs are noninvasive tests, like x-rays and ultrasound.

Having an MRI does not hurt, although it is essential for the patient to lie completely still during the examination. This may be difficult for individuals who have anxiety, pain, or **claustrophobia** (fear of enclosed spaces). Sedation may be available for those persons and for children who require an MRI.

Because the equipment used in an MRI produces loud noises, earplugs may be used if the MRI does not include examination of the head. Open MRI machines have less sense of confinement and may be preferred by persons who have concerns about being in a small enclosed space. Extremely obese persons may not fit into traditional MRI scanners, but open MRI machines can accommodate larger individuals. Performance of MRIs, like CT scans and other imaging studies, is usually supervised by a **radiologist** (a physician with specialized training in medical imaging and interpretation of those images).

The December 16, 2009, issue of *JAMA* includes an article about a study using MRI in persons with Alzheimer disease.



Conventional MRI

Open MRI

## HOW MRI WORKS

Combining **radiofrequency** (pulsing) energy and different levels of magnetic fields processed with highly sophisticated computers, MRI scans produce detailed and clear pictures of body parts. These images can be seen on a computer screen or transferred to film or to other digital media, such as a disc. All parts of the body can be imaged using MRI. Sometimes the radiologist will use intravenous (IV) contrast liquid to improve the appearance of some body tissues within an image.

## RISKS

- Because of the powerful magnets used, all metal objects must be removed before entering the MRI area. This includes removable dental appliances, hearing aids, rings and other jewelry, body piercings, and even medication patches. Credit cards, phones, personal electronic devices, and watches should not be brought into an MRI suite.
- MRI does not use ionizing radiation, so there are no risks from x-ray exposure, including cancer.
- If intravenous contrast liquid is used, there is a small risk of **anaphylaxis** (severe allergic reaction) from the liquid. The MRI personnel have protocols for treating an allergic reaction if it occurs.
- In persons who have poor kidney function, there are slight risks from intravenous contrast liquid injection. These risks should be discussed with the radiologist.
- There are usually no restrictions about activity after the MRI. However, if sedation is used for the MRI, you will be asked not to eat or drink anything for several hours before the procedure and have a responsible adult to drive you home afterward.

## REASONS NOT TO HAVE AN MRI

- Pregnancy
- Implanted defibrillators or pacemakers
- Cochlear implants (in the ear)
- Certain types of brain aneurysm clips
- Recent joint replacement

## FOR MORE INFORMATION

- American College of Radiology  
[www.acr.org](http://www.acr.org)
- Radiological Society of North America  
[www.radiologyinfo.org/en/info.cfm?pg=bodymr](http://www.radiologyinfo.org/en/info.cfm?pg=bodymr)
- International Society for Magnetic Resonance in Medicine  
[www.ismrm.org/public](http://www.ismrm.org/public)

## INFORM YOURSELF

To find this and previous JAMA Patient Pages, go to the Patient Page link on JAMA's Web site at [www.jama.com](http://www.jama.com). Many are available in English and Spanish.

Sources: National Institutes of Health; American College of Radiology; National Library of Medicine; International Society for Magnetic Resonance in Medicine; National Heart, Lung, and Blood Institute; Radiological Society of North America

Janet M. Torpy, MD, Writer

Cassio Lynn, MA, Illustrator

Richard M. Glass, MD, Editor

The JAMA Patient Page is a public service of JAMA. The information and recommendations appearing on this page are appropriate in most instances, but they are not a substitute for medical diagnosis. For specific information concerning your personal medical condition, JAMA suggests that you consult your physician. This page may be photocopied noncommercially by physicians and other health care professionals to share with patients. To purchase bulk reprints, call 312/464-0776.

