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For patients

Functional MRI (fMRI)

Functional magnetic resonance imaging (fMRI) measures the small changes in blood flow that occur with brain activity. It may be used to examine which parts of the brain are handling critical functions, evaluate the effects of stroke or other disease, or to guide brain treatment. fMRI may detect abnormalities within the brain that cannot be found with other imaging techniques.

Tell your doctor about any 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 to malfunction. Most orthopedic implants and stents pose no risk, but you should always tell the technologist if you have any devices or metal in your body. Guidelines about eating and drinking before your exam vary between facilities. Unless you are told otherwise, take your regular medications as usual and try to maintain your typical habits for drinking caffeinated beverages (especially coffee). For example, if you normally drink coffee every morning, try not to skip it on the day of your exam. If you rarely drink coffee, try to avoid it on the day of your exam. Leave jewelry at home and wear loose, comfortable clothing. You may need to change into a gown for the procedure.

What is functional MRI (fMRI)?

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.

Functional magnetic resonance imaging (fMRI) uses MR imaging to measure the tiny changes in blood flow that take place when a certain part of your brain is working.

What are some common uses of the procedure?

Doctors use fMRI to learn how a normal, diseased or injured brain is working. They may also use it to assess the potential risks of surgery or other invasive (http://www.radiologyinfo.org) brain treatments. While doctors may use fMRI to research many conditions, the FDA has only approved the use of fMRI for surgical planning.

Your doctor may order an fMRI to:

- Determine which part of the brain is handling critical functions such as thought, speech, movement and sensation, which is called brain mapping (http://www.radiologyinfo.org) . Studying which parts of the brain are involved in certain functions of our body is called functional anatomy.
- Monitor the growth and function of brain tumors (https://www.radiologyinfo.org/en/info/braintumor) .
- Guide the planning of surgery, radiation therapy (http://www.radiologyinfo.org) , or other invasive treatments for the brain,

by determining which brain functions – such as language or movement – may be affected by treatment.

Who interprets the results and how do I get them?

A radiologist, neurologist, or neuropsychologist, specifically trained in functional MRI interpretation, will analyze the images. The doctor will send a signed report to your primary care or referring physician, who will share the results with you.

What are the benefits vs. risks?

Benefits

- MRI is a noninvasive imaging technique that does not involve exposure to radiation.
- MRI can help physicians evaluate both the structure of an organ and how it is working.
- MRI can detect abnormalities that might be obscured by bone with other imaging methods.
- fMRI enables the detection of abnormalities of the brain, as well as the assessment of the normal functional anatomy of the brain, which cannot be accomplished with other imaging techniques.

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.

What are the limitations of fMRI?

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.

fMRI is especially sensitive to head motion. It is important to keep relaxed but still during the scan.

fMRI requires that you are able to perform the tasks presented to you. If the tasks are too difficult for you or if you have difficulty performing the actions, you should tell the technologist. They may give you different tasks or easier questions.

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.

Functional MRI (http://www.radiologyinfo.org) is still evolving and improving. While it appears to be as accurate in finding the location of brain activity as any other method, overall there is less experience with fMRI than with many other MRI techniques. Your physician may recommend additional tests to confirm the results of fMRI if there are critical decisions to make (such as in planning brain surgery).

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