

MR-Guided Breast Biopsy

Magnetic resonance- or MR-guided breast biopsy uses a powerful magnetic field, radio waves and a computer to help locate a breast lump or abnormality and guide a needle to remove a tissue sample for examination under a microscope. It does not use ionizing radiation and leaves little to no scarring.

Tell your doctor about any health problems, recent surgeries 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 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. Tell your doctor about any medications you're taking, including aspirin and herbal supplements, and whether you have any allergies – especially to anesthesia or contrast material. You will be advised to stop taking aspirin or blood thinner three days before your procedure. Wear loose, comfortable clothing and leave jewelry at home. You may be asked to wear a gown. If you are to be sedated, plan to have someone drive you home afterward.



What is MR-Guided Breast Biopsy?

Physical, mammography, and other exams often detect lumps or abnormalities in the breast. However, these tests cannot always tell whether a growth is benign (<http://www.radiologyinfo.org>) or cancerous.

Doctors use breast biopsy to remove a small amount of tissue from a suspicious area for lab analysis. The doctor may perform a biopsy surgically. More commonly, a radiologist will use a less invasive procedure that involves a hollow needle and image-guidance. Image-guided needle biopsy does not remove the entire lesion. Instead, it obtains a small sample of the abnormality for further analysis.

Image-guided biopsy (<http://www.radiologyinfo.org>) uses ultrasound, MRI, or mammography imaging guidance to take samples of an abnormality.

In MRI-guided breast biopsy, magnetic resonance imaging (<http://www.radiologyinfo.org>) is used to help guide the radiologist's (<http://www.radiologyinfo.org>) instruments to the site of the abnormal growth.

What are some common uses of the procedure?

An MRI-guided breast biopsy is most helpful when MR imaging shows a breast abnormality such as:

- a suspicious mass not identified by other imaging techniques
- an area of distortion
- an area of abnormal tissue change

Doctors use MRI guidance in biopsy (<http://www.radiologyinfo.org>) procedures that use:

- vacuum-assisted device (<http://www.radiologyinfo.org>) (VAD), which uses a vacuum powered instrument to collect multiple tissue samples during one needle insertion.
- wire localization (<http://www.radiologyinfo.org>) , in which a guide wire is placed into the suspicious area to help the surgeon locate the lesion for surgical biopsy (<http://www.radiologyinfo.org>) .

How should I prepare?

You will need to change into a hospital gown. This is to prevent artifacts appearing on the final images and to comply with safety regulations related to the strong magnetic field.

Guidelines about eating and drinking before an MRI vary between specific exams and facilities. Take food and medications as usual unless your doctor tells you otherwise.

Some MRI exams use an injection of contrast material. The doctor may ask if you have asthma or allergies to contrast material, drugs, food, or the environment. MRI exams commonly use a contrast material called gadolinium (<http://www.radiologyinfo.org>) . Doctors can use gadolinium in patients who are allergic to iodine contrast. A patient is much less likely to be allergic to gadolinium than to iodine contrast. However, even if the patient has a known allergy to gadolinium, it may be possible to use it after appropriate pre-medication. *For more information on allergic reactions to gadolinium contrast, please consult the ACR Manual on Contrast Media (<https://www.acr.org/Clinical-Resources/Contrast-Manual>) .*

Tell the technologist or radiologist if you have any serious health problems or recent surgeries. Some conditions, such as severe kidney disease, may mean that you cannot safely receive gadolinium. You may need a blood test to confirm your kidneys are functioning normally.

Women should always tell their doctor and technologist if they are pregnant. MRI has been used since the 1980s with no reports of any ill effects on pregnant women or their unborn babies. However, the baby will be in a strong magnetic field. Therefore, pregnant women should not have an MRI in the first trimester unless the benefit of the exam clearly outweighs any potential risks. Pregnant women should not receive gadolinium contrast unless absolutely necessary. *See the MRI Safety During Pregnancy (<https://www.radiologyinfo.org/en/info/safety-mri-pregnancy>) page for more information about pregnancy and MRI.*

Prior to a needle biopsy, tell your doctor about all the medications you take, including herbal supplements. List any allergies, especially to anesthesia (<http://www.radiologyinfo.org>) . Your doctor may advise you to stop taking aspirin, blood thinners, or certain herbal supplements three to five days before your procedure. This will help decrease your risk of bleeding.

Also, inform your doctor about recent illnesses or other medical conditions.

You may want to have someone drive you home afterward, especially if you receive sedation.

There are other important guidelines for patients to follow prior to undergoing MR imaging. For a list of these and a review of all preparations that should be made prior to MR imaging, please see MRI of the Breast (<https://www.radiologyinfo.org/en/info/breastmr>) .

What does the equipment look like?

The traditional MRI unit is a large cylinder-shaped tube surrounded by a circular magnet. You will lie on a table that slides into a tunnel towards the center of the magnet.

Some MRI units, called short-bore systems (<http://www.radiologyinfo.org>) , are designed so that the magnet does not completely surround you. Some newer MRI machines have a larger diameter bore, which can be more comfortable for larger patients or those with claustrophobia. "Open" MRI units are open on the sides. They are especially helpful for examining larger patients or those with claustrophobia. Open MRI units can provide high quality images for many types of exams. Open MRI may not be used for

certain exams. For more information, consult your radiologist.

Most MRI-guided breast biopsies are currently performed in closed MRI systems with a specially modified exam table. This moveable examination table allows your breasts to hang freely into cushioned openings, which contain wire coils that send and receive radio waves to help create the MR images.

The procedure will use one of these instruments:

- A vacuum-assisted device (VAD), a vacuum-powered instrument that uses pressure to pull tissue into the needle.
- A thin guide wire, which is used for a surgical biopsy.

This procedure may use other sterile equipment, including syringes, sponges, forceps, scalpels and a specimen cup or microscope slide.

How does the procedure work?

Unlike x-ray and computed tomography (CT) exams, MRI does not use radiation. Instead, radio waves re-align hydrogen atoms that naturally exist within the body. This does not cause any chemical changes in the tissues. As the hydrogen atoms return to their usual alignment, they emit different amounts of energy depending on the type of tissue they are in. The scanner captures this energy and creates a picture using this information.

In most MRI units, the magnetic field is produced by passing an electric current through wire coils. Other coils are inside the machine and, in some cases, are placed around the part of the body being imaged. These coils send and receive radio waves, producing signals that are detected by the machine. The electric current does not come into contact with the patient.

A computer processes the signals and creates a series of images, each of which shows a thin slice of the body. The radiologist can study these images from different angles.

MRI is often able to tell the difference between diseased tissue and normal tissue better than x-ray, CT, and ultrasound.

Using MRI guidance to calculate the position of the abnormal tissue and to verify the placement of the needle, the radiologist inserts the biopsy needle through the skin, advances it into the lesion (<http://www.radiologyinfo.org>) and removes tissue samples. If a surgical biopsy is being performed, MRI may be used to guide a wire into the mass to help the surgeon locate the area for excision (<http://www.radiologyinfo.org>) .

How is the procedure performed?

Image-guided, minimally invasive procedures such as MR-guided breast biopsies are most often performed by a specially trained breast radiologist.

Breast biopsies are usually done on an outpatient basis.

In most cases, you will lie face down on a moveable exam table. The doctor will position the affected breast into an opening in the table.

A nurse or technologist (<http://www.radiologyinfo.org>) will insert an intravenous (<http://www.radiologyinfo.org>) (IV) line into a vein in your hand or arm and the contrast material gadolinium (<http://www.radiologyinfo.org>) will be given intravenously.

Your breast will be gently compressed between two compression plates (similar to those used in a diagnostic MRI exam), one of which is marked with a grid structure. Using computer software, the radiologist measures the position of the lesion with respect to the grid and calculates the position and depth of the needle placement.

The doctor will inject a local anesthetic into the skin and more deeply into the breast to numb it.

The doctor will make a very small nick in the skin at the site where they will insert the biopsy needle.

The radiologist then inserts the needle, advances it to the location of the abnormality and MR imaging is performed to verify its position. Depending on the type of MRI unit being used, you may remain in place or be moved out of the center or bore (<http://www.radiologyinfo.org>) of the MRI scanner.

The doctor removes tissue samples using a vacuum-assisted device (<http://www.radiologyinfo.org>) (VAD). Vacuum pressure pulls tissue from the breast through the needle into the sampling chamber. Without withdrawing and reinserting the needle, it rotates positions and collects additional samples. Typically, the doctor will collect eight to 10 samples of tissue from around the lesion.

After this sampling, the doctor will remove the needle.

If a surgical biopsy (<http://www.radiologyinfo.org>) is to be performed, the doctor will insert a wire into the suspicious area as a guide for the surgeon.

The doctor may place a small marker at the biopsy site so they can locate it in the future if necessary.

Once the biopsy is complete, the doctor or nurse will apply pressure to stop any bleeding. They will cover the opening in the skin with a dressing. No sutures are needed.

The doctor may use mammography to confirm that the marker is in the proper position.

This procedure is usually completed within 45 minutes.

What will I experience during and after the procedure?

You will be awake during your biopsy and should have little discomfort. Many women report little pain and no scarring on the breast. However, certain patients, including those with dense breast tissue or abnormalities near the chest wall or behind the nipple, may be more sensitive during the procedure.

Some women find that the major discomfort of the procedure is from lying on their stomach for the length of the procedure. Strategically placed cushions can ease this discomfort. Some women may also experience neck and/or back pain as the head is turned to the side when the doctor positions the breast for biopsy.

When you receive the local anesthetic to numb the skin, you will feel a pin prick from the needle followed by a mild stinging sensation from the local anesthetic. You will likely feel some pressure when the doctor inserts the biopsy needle and during tissue sampling. This is normal.

The area will become numb within a few seconds.

You must remain very still while the doctor performs the imaging and the biopsy.

As tissue samples are taken, you may hear clicks or buzzing sounds from the sampling instrument. These are normal.

If you experience swelling and bruising following your biopsy, your doctor may tell you to take an over-the-counter pain reliever and to use a cold pack. Temporary bruising is normal.

Call your doctor if you experience excessive swelling, bleeding, drainage, redness, or heat in the breast.

If a marker is left inside the breast to mark the location of the biopsied lesion, it will cause no pain, disfigurement, or harm. Biopsy

markers are MRI compatible and will not cause metal detectors to alarm.

Avoid strenuous activity for at least 24 hours after the biopsy. Your doctor will outline more detailed post-procedure care instructions for you.

Who interprets the results and how do I get them?

A pathologist (<http://www.radiologyinfo.org>) examines the removed specimen and makes a final diagnosis. Depending on the facility, the radiologist or your referring physician (<http://www.radiologyinfo.org>) will share the results with you. The radiologist will also evaluate the results of the biopsy to make sure that the pathology and image findings explain one another. In some instances, even if cancer is not diagnosed, surgical removal of the entire biopsy site and imaging abnormality may be recommended if the pathology does not match the imaging findings.

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

- The procedure is less invasive than surgical biopsy, leaves little or no scarring, and can be performed in less than an hour.
- MRI is a noninvasive imaging technique that does not involve exposure to radiation.
- MRI-guided breast biopsy using a core needle (<http://www.radiologyinfo.org>) is considered both safe and accurate.
- The speed, accuracy and safety of MRI-guided vacuum-assisted (<http://www.radiologyinfo.org>) breast biopsy are as good as MR-guided wire localization (<http://www.radiologyinfo.org>) without the associated complications and cost of surgery.
- MRI-guided biopsy does not use ionizing radiation (<http://www.radiologyinfo.org>) .
- MRI-guided breast biopsy takes less time than surgical biopsy, causes less tissue damage, and is less costly.
- Recovery time is brief and patients can soon resume their usual activities.

Risks

- There is a risk of bleeding and forming a hematoma (<http://www.radiologyinfo.org>) , or a collection of blood at the biopsy site. The risk, however, appears to be less than one percent of patients.
- An occasional patient has significant discomfort, which can be readily controlled by non-prescription pain medication.
- Any procedure where the skin is penetrated carries a risk of infection. The chance of infection requiring antibiotic treatment appears to be less than one in 1,000.
- Depending on the type of biopsy or the design of the biopsy machine, a biopsy of tissue located deep within the breast carries a slight risk that the needle will pass through the chest wall. This could allow air around the lung and cause the lung to collapse. This is extremely rare.
- There is a small chance that this procedure will not provide the final answer to explain the imaging abnormality.
- 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 MRI-Guided Breast Biopsy?

MRI-guided tissue sampling is limited by the position of the abnormality in the breast. Breast lesions located in the extreme

posterior region of the breast or small abnormalities can be difficult or impossible to accurately target using MR.

Breast biopsy procedures will occasionally miss a lesion or underestimate the extent of disease present. If the diagnosis remains uncertain after a technically successful procedure, surgical biopsy (<http://www.radiologyinfo.org>) will usually be necessary.

The MR-guided breast biopsy method cannot be used unless the mass can be seen on an MRI exam. Calcifications within a cancerous nodule (<http://www.radiologyinfo.org>) are not seen on Breast MRI. Therefore, it may be difficult to accurately target small lesions during MR-guided breast biopsy.

The widespread use of this technique is limited by its high cost, availability, and length of the procedure. MR-guided biopsy should not be considered if the lesion can be seen on mammography (<http://www.radiologyinfo.org>) or on ultrasound (<http://www.radiologyinfo.org>), where the biopsy can be performed more easily with less patient discomfort. In those cases, stereotactic biopsy or ultrasound-guided biopsy are the more appropriate methods of tissue sampling.

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