

X-ray Guided (Stereotactic) Breast Biopsy

This procedure is reviewed by a physician with expertise in the area presented and is further reviewed by committees from the American College of Radiology (ACR) and the Radiological Society of North America (RSNA), comprising physicians with expertise in several radiologic areas.

What is X-ray Guided Breast Biopsy?

Mammography is an excellent way to detect breast abnormalities, but in many cases it is not possible to tell from the imaging studies alone whether a growth is benign or cancerous. To make this determination it is necessary to obtain a tissue sample for microscopic examination. As an alternative to open surgical biopsy, which removes a larger specimen for microscopic analysis, a hollow needle may be passed through the skin into the suspicious lesion with the help of special breast x-rays. The sample of breast tissue obtained in this way can show whether the lesion is malignant or benign and the procedure is much less invasive than the surgical approach. A special computerized mammography machine uses intersecting coordinates to pinpoint the area of tissue change. This method is called stereotactic biopsy or x-ray-guided biopsy. A pathologist examines the removed specimen and makes a final diagnosis so that treatment planning can begin.

What are some common uses of the procedure?

A stereotactic breast biopsy is most helpful when mammography shows a mass, a cluster of microcalcifications (tiny calcium deposits that are closely grouped together), or an area of abnormal tissue change but no lump can be felt on careful breast examination. There are a number of biopsy instruments and methods that are utilized with x-ray guidance. They include core biopsy, which uses a large-bore needle to remove a generous sample of breast tissue, and a vacuum-assisted needle biopsy device (VAD), which uses vacuum suction to obtain a tissue sample.

X-ray images also are used to place a guide wire into the suspicious area in order to help locate the lesion during open surgical biopsy, which is performed in an operating room.

An x-ray-guided biopsy often is done when:

- A woman has a mammogram showing a suspicious solid mass that cannot be felt on breast examination.
- A woman has a mammogram showing a suspicious cluster of small calcium deposits.
- The structure of the breast tissue is distorted.
- A new mass or area of calcium deposits is present at a previous surgery site.
- The patient or physician strongly prefers a non-surgical method of assessment.

How should I prepare for the procedure?

Even though most women who have a breast biopsy are found not to have cancer, despite an abnormality on the mammogram, you may want to have a relative or friend join you to lend support and drive you home. If you are taking aspirin or a blood thinner, your physician may want you to stop three days in advance of the biopsy.

What does the equipment look like?

Sometimes a specially designed table is used for stereotactic biopsy. In this case, the patient is lying face-down with her breast projecting through a hole in the table. The actual biopsy is done below the table after raising it to gain access to her breast. The procedure also may be done with the patient upright in a chair. An upright study may be best for those women who might have difficulty climbing onto the table or who are unable to lie prone for any reason. You must not move during the procedure.

A paddle-shaped instrument compresses the breast during biopsy. A tray is nearby containing all of the equipment necessary for the biopsy.

How does the procedure work?

In addition to the specialized equipment needed for x-ray-guided breast biopsy, specially trained technologists and physicians perform the procedure. The images are obtained not with x-ray-exposed film as in conventional mammography, but using computerized or digital imaging in place of a film cassette. This reduces x-ray exposure to the breast and also permits the images to be viewed on a computer monitor seconds after exposure—compared with the several minutes needed to develop x-ray film. The principle of stereotactic biopsy is that a lesion can be located precisely in three dimensions by calculating its apparent change in position on angled x-ray images. The first x-ray locates the abnormality in the breast, after which two stereo views are obtained, each angled 15 degrees to either side of the initial image. The physician then marks the lesion electronically on the stereo images. The computer calculates how much the lesion's position appears to have changed on each of the stereo views, and in this way is able to determine its exact site in three-dimensional space.

The biopsy instrument used in this procedure is called a vacuum-assisted device (VAD), which consists of an inner needle with a trough extending from it at one end and an overlying sheath. When the sheath is retracted, a vacuum is used to pull breast tissue into the needle trough. The outer sheath rapidly moves forward to cut the tissue and collect it in the trough.

An advantage of the VAD is that the needle is inserted only once into the breast without having to withdraw the needle after each sampling. Biopsies are obtained in an orderly manner by rotating the probe, assuring that the entire region of interest will be sampled.

How is the procedure performed?

The first step is to clean the skin and inject a local anesthetic. A small nick is made in the skin and the tip of the biopsy needle is advanced to the previously calculated site of the lesion. At this point stereo images are again obtained to confirm that the needle tip is actually within the lesion. Usually six to 12 samples are collected when the VAD is used. Then a final set of images is obtained. If they show that the lesion has been mostly or completely removed, a small clip is left at the biopsy site so that it can be easily located if the lesion proves to be cancer. Once the biopsy is complete the skin

opening is covered with a dressing; it need not be sutured. You will be told to avoid strenuous activity for 24 hours after returning home, but then usually will be able to resume normal activities.

What will I experience during the procedure?

X-ray-guided breast biopsy can take 30 to 60 minutes or more. Most women report little or no pain and no scar is left from the tiny skin incision. Many women find that the major discomfort of the procedure is from lying on their stomach for the length of the procedure. This discomfort may be reduced by strategically placed cushions.

Who interprets the results and how do I get them?

A pathologist must examine the specimens of tissue. A diagnosis requires processing numerous, high-quality slides over a period of one to five working days. When your biopsy findings are ready you may have a session with your physician to discuss the results and decide on the next step. If cancer is found you may be referred to a surgeon or tumor specialist.

What are the benefits vs. risks?

Benefits

- X-ray-guided breast biopsy is an excellent way to evaluate calcium deposits or tiny masses that are not visible on ultrasound.
- X-ray-guided core needle biopsy is a simple procedure that may be performed in an outpatient imaging center.
- Compared with open surgical biopsy, the procedure is completed more rapidly at about one-third the cost. Generally it is not painful and the results are as accurate as when a tissue sample is removed surgically. No breast defect remains and, unlike surgery, x-ray-guided core needle biopsy does not distort the breast tissue and make it difficult to read future mammograms.
- Recovery time is brief and patients can soon resume their usual activities.
- Use of the VAD may make it possible to remove the entire lesion.

Risks

- Because the VAD removes large pieces of tissue there is a risk of bleeding and forming a hematoma, a collection of blood at the biopsy site. The risk, however, appears to be less than 1 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.
- X-ray-guided breast biopsy is not infallible. The lesion may be missed altogether or the extent of disease underestimated.
- Special care is taken during x-ray examinations to ensure maximum safety for the patient. Women should always inform their doctor or x-ray technologist if there is any possibility that they are pregnant.

What are the limitations of X-ray Guided Breast Biopsy?

Lesions accompanied by diffuse calcium deposits scattered throughout the breast are difficult to target by stereotactic biopsy. Those lesions near the chest wall also are hard to evaluate by this method. If the mammogram shows only a vague change in tissue density but no definite mass or nodule, the x-ray-guided method may not be successful. Occasionally, even after a successful biopsy, the tissue diagnosis remains uncertain and a surgical biopsy will be necessary, especially when atypical or precancerous cells are found on core biopsy.

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