

Screening Mammograms: Questions and Answers

Key Points

- A *screening* mammogram is an x-ray of the breast used to detect breast changes in women who have no signs or symptoms of breast cancer (see Question 1).
- Women age 40 and older should have mammograms every 1 to 2 years (see Question 3).
- The older a woman is, the greater her chance of developing breast cancer (see Question 5).
- Women can get high-quality mammograms in breast clinics, hospital radiology departments, mobile vans, private radiology offices, and doctors' offices (see Question 12).

1. What is a *screening* mammogram?

A *screening* mammogram is an x-ray of the breast used to detect breast changes in women who have no signs or symptoms of breast cancer. It usually involves two x-rays of each breast. Mammograms make it possible to detect tumors that cannot be felt. Mammograms can also find microcalcifications (tiny deposits of calcium in the breast) that sometimes indicate the presence of breast cancer.

2. How are *screening* and *diagnostic* mammograms different?

A *diagnostic* mammogram is an x-ray of the breast that is used to check for breast cancer after a lump or other sign or symptom of breast cancer has been found. Signs of breast cancer may include pain, skin thickening, nipple discharge, or a change in breast size or shape. A *diagnostic* mammogram also may be used to evaluate changes found during a *screening* mammogram, or to view breast tissue when it is difficult to obtain a *screening* mammogram because of special circumstances, such as the presence of breast implants (see Question 13). A *diagnostic* mammogram takes longer than a *screening* mammogram because it involves more x-rays in order to obtain views of the breast from



several angles. The technician may magnify a suspicious area to produce a detailed picture that can help the doctor make an accurate diagnosis.

3. When does the National Cancer Institute (NCI) recommend that women have screening mammograms?

- Women age 40 and older should have mammograms every 1 to 2 years.
- Women who are at higher than average risk of breast cancer should talk with their health care providers about whether to have mammograms before age 40 and how often to have them.

4. What are the factors that place a woman at increased risk of breast cancer?

The risk of breast cancer increases gradually as a woman gets older. However, the risk of developing breast cancer is not the same for all women. Research has shown that the following factors *increase* a woman's chance of developing this disease:

- **Personal history of breast cancer**—Women who have had breast cancer are more likely to develop a second breast cancer.
- **Family history**—A woman's chance of developing breast cancer increases if her mother, sister, and/or daughter have a history of breast cancer (especially if they were diagnosed before age 50).
- **Certain breast changes on biopsy**—A diagnosis of atypical hyperplasia (a noncancerous condition in which cells have abnormal features and are increased in number) or lobular carcinoma *in situ* (LCIS) (abnormal cells found in the lobules of the breast) increases a woman's risk of breast cancer. Women who have had two or more breast biopsies for other benign conditions also have an increased chance of developing breast cancer. This increased risk is due to the condition that led to the biopsy, and not to the biopsy itself.
- **Genetic alterations (changes)**—Specific alterations in certain genes (BRCA1, BRCA2, and others) increase the risk of breast cancer. These alterations are rare; they are estimated to account for no more than 10 percent of all breast cancers.
- **Reproductive and menstrual history**—Women who began having periods before age 12 or went through menopause after age 55 are at an increased risk of developing breast cancer. Women who have their first child after age 30 or who never have a child are at an increased risk of developing breast cancer.
- **Long-term use of menopausal hormone therapy**—Women who use combination estrogen-progestin menopausal hormone therapy for more than 5 years have an increased chance of developing breast cancer.

- **Breast density**—Breasts appear dense on a mammogram if they contain many glands and ligaments (called dense tissue), and do not have much fatty tissue. Because breast cancers tend to develop in the dense tissue of the breast (not in the fatty tissue), those older women whose mammograms show more dense tissue are at an increased risk of breast cancer. Abnormalities in dense breasts can be more difficult to detect on a mammogram.
- **Radiation therapy (“x-ray therapy”)**—Women who had radiation therapy to the chest (including the breasts) before age 30 are at an increased risk of developing breast cancer throughout their lives. This includes women treated for Hodgkin lymphoma. Studies show that the younger a woman was when she received her treatment, the higher her risk of developing breast cancer later in life.
- **DES (diethylstilbestrol)**—The drug DES was given to some pregnant women in the United States between 1940 and 1971. (It is no longer given to pregnant women.) Women who took DES during pregnancy may have a slightly increased risk of breast cancer. The possible effects on their daughters are under study.
- **Body weight**—Studies have found that the chance of getting breast cancer after menopause is higher in women who are overweight or obese.
- **Physical activity level**—Women who are physically inactive throughout life may have an increased risk of breast cancer. Being active may help reduce risk by preventing weight gain and obesity.
- **Alcohol**—Studies suggest that the more alcohol a woman drinks, the greater her risk of breast cancer.

5. What are the chances that a woman in the United States might get breast cancer?

Age is the most important risk factor for breast cancer. The older a woman is, the greater her chance of developing breast cancer. Current rates suggest that 13.2 percent of women (or one in eight) born today will be diagnosed with breast cancer at *some time* in their lives. This statistic is based on population averages. However, the estimated chance of being diagnosed with breast cancer for specific age groups and for specific time periods may be a more informative way to consider breast cancer risk. Estimates of developing breast cancer in 10-year age intervals—as shown below—take into account that not all women live to older ages, when breast cancer risk becomes the greatest.

A woman’s chance of being diagnosed with breast cancer is:

- from ages 30 to 39. . . 0.44 percent (often expressed as “1 in 229”)
- from ages 40 to 49. . . 1.46 percent (often expressed as “1 in 68”)
- from ages 50 to 59. . . 2.73 percent (often expressed as “1 in 37”)
- from ages 60 to 69. . . 3.82 percent (often expressed as “1 in 26”)

Most breast cancers occur in women over the age of 50. The number of cases is especially high for women over age 60. Breast cancer is relatively uncommon in women under age 40. The NCI fact sheet *Probability of Breast Cancer in American Women* provides more information about lifetime risk. This fact sheet is available at <http://www.cancer.gov/cancertopics/factsheet/Detection/probability-breast-cancer> on the Internet.

6. What is the best method of detecting breast cancer as early as possible?

Getting a high-quality mammogram and having a *clinical* breast exam (an exam done by a health care provider) on a regular basis are the most effective ways to detect breast cancer early. Like any test, mammograms have both benefits and limitations. For example, some cancers cannot be detected by a mammogram but may be found by breast examination.

Checking one's own breasts for lumps or other unusual changes is called breast *self-exam* (BSE). Studies so far have not shown that BSE alone reduces the number of deaths from breast cancer. BSE should not take the place of routine clinical breast exams and mammograms.

7. What are the benefits of screening mammograms?

Several large studies conducted around the world show that breast cancer screening with mammograms reduces the number of deaths from breast cancer for women ages 40 to 69, especially those over age 50. Studies conducted to date have not shown a benefit from regular screening mammograms, or from a baseline screening mammogram (a mammogram used for comparison), in women under age 40.

8. What are some of the limitations of screening mammograms?

- **Finding cancer does not always mean saving lives**—Even though mammography can detect tumors that cannot be felt, finding a small tumor does not always mean that a woman's life will be saved. Mammography may not help a woman with a fast-growing or aggressive cancer that has already spread to other parts of her body before being detected.
- **False negatives**—False negatives occur when mammograms appear normal even though breast cancer is present. Overall, mammograms miss up to 20 percent of the breast cancers that are present at the time of screening. False negatives occur more often in younger women than in older women because the dense breasts of younger women make breast cancers more difficult to detect in mammograms. As women age, their breasts usually become more fatty (and therefore less dense), and breast cancers become easier to detect with screening mammograms.
- **False positives**—False positives occur when mammograms are read by a radiologist as abnormal, but no cancer is actually present. All abnormal mammograms should be

followed up with additional testing (a diagnostic mammogram, ultrasound, and/or biopsy) to determine if cancer is present. False positives are more common in younger women, women who have had previous breast biopsies, women with a family history of breast cancer, and women who are taking estrogen (for example, hormone replacement therapy).

9. What is the Breast Imaging Reporting and Database System (BI-RADS®)?

The American College of Radiology (ACR) has established a uniform way for radiologists to report mammogram findings. The system, called BI-RADS, includes seven standardized categories, or levels. Each BI-RADS category has a follow-up plan associated with it to help radiologists and other physicians appropriately manage a patient’s care.

Breast Imaging Reporting and Database System (BI-RADS)		
Category	Assessment	Follow-up
0	Need additional imaging evaluation	Additional imaging needed before a category can be assigned
1	Negative	Continue annual screening mammography (for women over age 40)
2	Benign (noncancerous) finding	Continue annual screening mammography (for women over age 40)
3	Probably benign	Receive a 6-month follow-up mammogram
4	Suspicious abnormality	May require biopsy
5	Highly suggestive of malignancy (cancer)	Requires biopsy
6	Known biopsy—proven malignancy (cancer)	Biopsy confirms presence of cancer before treatment begins

Further information on BI-RADS is available on the ACR Web site at <http://www.acr.org/> on the Internet or by calling the ACR at 1-800-227-5463 (1-800-ACR-LINE).

10. What happens if mammography leads to the detection of ductal carcinoma *in situ* (DCIS)?

Over the past 30 years, improvements in mammography have made it possible to detect a higher number of tissue abnormalities called DCIS. DCIS is abnormal cells that are confined to the milk ducts of the breast. The cells have not invaded the surrounding breast tissue. DCIS usually does not cause a lump, so it cannot be detected during a

clinical breast exam or BSE. However, mammography is able to detect 80 percent of DCIS cases. Some of these cases later become invasive cancers.

It is not possible to predict which cases of DCIS will progress to invasive cancer. Therefore, DCIS usually is removed surgically. Until recently, DCIS was often treated with a mastectomy, but breast-conserving therapy (breast-sparing surgery plus radiation therapy) is now standard practice for many women with DCIS. Tamoxifen may also be used. Women who have been diagnosed with DCIS should talk with their doctor to make an informed decision about treatment.

11. How much does a mammogram cost?

Screening mammograms generally cost between \$50 and \$150. Most states now have laws requiring health insurance companies to reimburse all or part of the cost of screening mammograms. Insurance companies and health care providers can supply details.

All women age 40 and older with Medicare can get a screening mammogram each year. Medicare will also pay for one baseline mammogram for a woman between the ages of 35 and 39. There is no deductible requirement for this benefit, but Medicare beneficiaries have to pay 20 percent of the Medicare-approved amount. Information about Medicare coverage is available at <http://www.medicare.gov> on the Internet, or through the Medicare Hotline at 1-800-633-4227 (1-800-MEDICARE). For the hearing impaired, the telephone number is 1-877-486-2048.

Some state and local health programs and employers provide mammograms free or at low cost. For example, the Centers for Disease Control and Prevention (CDC) coordinates the National Breast and Cervical Cancer Early Detection Program. This program provides screening services, including clinical breast exams and mammograms, to low-income women throughout the United States and in several U.S. territories. Contact information for local programs is available on the CDC's Web site at <http://apps.nccd.cdc.gov/cancercontacts/nbccedp/contacts.asp> on the Internet, or by calling the CDC at 1-800-CDC-INFO (1-800-232-4636). Information on low-cost or free mammography screening programs is also available through the NCI's Cancer Information Service (CIS) at 1-800-4-CANCER (1-800-422-6237).

12. Where can women get high-quality mammograms?

Women can get high-quality mammograms in breast clinics, hospital radiology departments, mobile vans, private radiology offices, and doctors' offices.

The Mammography Quality Standards Act (MQSA) is a Federal law designed to ensure that mammograms are safe and reliable. Through the MQSA, all mammography facilities in the United States must meet stringent quality standards, be accredited by the Food and Drug Administration (FDA), and be inspected annually. The FDA ensures that

mammography facilities across the country meet MQSA standards. These standards apply to the following people at the mammography facility:

- The technologist who takes the mammogram.
- The radiologist who interprets the mammogram.
- The medical physicist who tests the mammography equipment.

Women can ask their doctors or staff at the mammography facility about FDA certification before making an appointment. All mammography facilities are required to display their FDA certificate. Women should look for the MQSA certificate at the mammography facility and check its expiration date. MQSA regulations also require mammography facilities to give patients an easy-to-read report on the results of their mammogram.

Information about local FDA-certified mammography facilities is available through the CIS at 1-800-4-CANCER (1-800-422-6237). Also, a list of these facilities is on the FDA's Web site at <http://www.fda.gov/cdrh/mammography/certified.html> on the Internet.

13. What should women with breast implants do about screening mammograms?

Women with breast implants should continue to have mammograms. (A woman who had an implant following breast cancer surgery should ask her doctor whether a mammogram of the reconstructed breast is necessary.) It is important to inform the mammography facility about breast implants when scheduling a mammogram. The technician and radiologist must be experienced in x-raying patients with breast implants. Implants can hide some breast tissue, making it more difficult for the radiologist to detect an abnormality on the mammogram. If the technologist performing the procedure is aware a woman has breast implants, steps can be taken to make sure that as much breast tissue as possible can be seen on the mammogram.

14. What is digital mammography? How is it different from conventional (film) mammography?

Both digital and conventional mammography use x-ray radiation to produce an image of the breast; however, conventional mammography stores the image directly on film, whereas digital mammography takes an electronic image of the breast and stores it directly in a computer. This allows the recorded data to be enhanced, magnified, or manipulated for further evaluation. The difference between conventional mammography and digital mammography is like the difference between a traditional film camera and a new digital camera. Aside from the difference in how the image is recorded and stored, there is no other difference between the two.

In January 2000, the FDA approved the first digital mammography system. In September 2005, preliminary results from a large clinical trial (research study) of digital vs. film mammography were published. These findings show no difference between digital and

film mammograms in detecting breast cancer for the general population of women in the trial. However, those women with dense breasts who are pre- or perimenopausal (women who had a last menstrual period within 12 months of their mammograms) or who are younger than age 50 may benefit from having a digital rather than a film mammogram.

Digital mammography allows a radiologist to electronically adjust, store, and retrieve digital images. These features may offer the following advantages over conventional mammography:

- Long-distance consultations with other mammography specialists may be easier.
- Subtle differences between normal and abnormal tissues may be easily noted.
- The number of follow-up procedures needed may be fewer.
- Fewer repeat images may be needed, reducing exposure to radiation.

Digital mammography can be done only in facilities that are certified to practice conventional mammography and have received FDA approval to offer digital mammography. The procedure for having a mammogram with a digital system is the same as with conventional mammography.

15. What other technologies are being developed for breast cancer screening?

The NCI is supporting the development of several new technologies to detect breast tumors. This research ranges from methods being developed in research labs to those that have reached clinical trials. Efforts to improve conventional mammography include digital mammography (see Question 14), magnetic resonance imaging (MRI), and positron emission tomography (PET scanning).

In addition to imaging technologies, NCI-supported scientists are exploring methods to detect markers (genetic traits) of breast cancer in blood, urine, or nipple aspirates (fluid from the breast) that may serve as early warning signals for breast cancer. The NCI fact sheet *Improving Methods for Breast Cancer Detection and Diagnosis* provides more information about technologies that are under development for breast cancer screening and diagnosis. This fact sheet is available at <http://www.cancer.gov/cancertopics/factsheet/Detection/breast-cancer> on the Internet.

16. What studies is NCI supporting to find better ways to prevent and treat breast cancer?

NCI is supporting many studies to improve the prevention and treatment of breast cancer.

- **Basic research**—Researchers are working to identify the causes of breast cancer, including the role of changes in the BRCA1 and BRCA2 genes. They also are looking at how these genes interact with other genes and with hormonal, dietary, and environmental factors.

- **Prevention**—Researchers are looking for ways to prevent breast cancer in women who are at increased risk. For some of these women, the drugs tamoxifen and raloxifene have been shown to decrease the risk of developing breast cancer. Other medications are currently under study. Also, studies are evaluating how changes in diet, physical activity, nutrition, and environmental factors could lead to a reduced risk of developing breast cancer.
- **Early detection and diagnosis**—Several studies are seeking better ways to detect and diagnose breast cancer so women can receive treatment sooner.
- **Treatment**—Several studies are aimed at finding breast cancer treatments that are more effective and less toxic than current methods.

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Related NCI materials and Web pages:

- National Cancer Institute Fact Sheet 5.6, *Probability of Breast Cancer in American Women* (<http://www.cancer.gov/cancertopics/factsheet/Detection/probability-breast-cancer>)
- National Cancer Institute Fact Sheet 5.14, *Improving Methods for Breast Cancer Detection and Diagnosis* (<http://www.cancer.gov/cancertopics/factsheet/Detection/breast-cancer>)
- Breast Cancer Home Page (<http://www.cancer.gov/cancertopics/types/breast>)
- *What You Need To Know About™ Breast Cancer* (<http://www.cancer.gov/cancertopics/wyntk/breast>)

For more help, contact:

NCI's Cancer Information Service

Telephone (toll-free): 1-800-4-CANCER (1-800-422-6237)

TTY (toll-free): 1-800-332-8615

LiveHelp® online chat: <https://cissecure.nci.nih.gov/livehelp/welcome.asp>

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