
CANCER FACTS

National Cancer Institute • National Institutes of Health
Department of Health and Human Services

Screening Mammograms: Questions and Answers

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. With a mammogram, it is possible to detect microcalcifications (tiny deposits of calcium in the breast, which sometimes are a clue to the presence of breast cancer) or a tumor that cannot be felt.

2. What is a *diagnostic* mammogram?

A diagnostic mammogram is an x-ray of the breast that is used to diagnose unusual breast changes, such as a lump, pain, thickening, nipple discharge, or a change in breast size or shape. A diagnostic mammogram is also used to evaluate changes detected on a screening mammogram. This type of mammogram may be necessary if it is difficult to obtain a clear x-ray with a screening mammogram because of special circumstances, such as the presence of breast implants (see question 12). A diagnostic mammogram takes longer than a screening mammogram because it involves more x-rays 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 in their 40s 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**—Having 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 increase is due to the condition that led to the biopsy, and not to the biopsy itself.
- **Genetic alterations**—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**—Evidence indicates that:
 - The older a woman is when she has her first child, the greater her chance of developing breast cancer.
 - Women who started menstruating at an early age (age 11 or younger), experienced menopause late (after age 55), or never had children are also at an increased risk of developing breast cancer.
 - Women who take hormone replacement therapy for a long time also appear to 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 nearly always develop in the dense tissue of the breast (not in the fatty tissue), older women who have mostly dense tissue on a mammogram 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’s disease. Studies show that the younger a woman was when she received her treatment, the higher her risk of developing breast cancer later in life.
- **Diet and lifestyle factors**—Diet is thought to play a role in breast cancer risk, although researchers have not yet identified specific dietary factors that affect risk. Differences in diet may explain the lower risk of breast cancer among Asian women compared with American women. Studies have found that obesity and weight gain in postmenopausal women increase breast cancer risk. A number of studies suggest that moderate alcohol consumption may also increase a woman’s chance of developing 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. A woman’s chance of being diagnosed with breast cancer is:

from age 20 to age 30. . . 1 out of 2,000
 from age 30 to age 40. . . 1 out of 250
 from age 40 to age 50. . . 1 out of 67
 from age 50 to age 60. . . 1 out of 35
 from age 60 to age 70. . . 1 out of 28
 Ever 1 out of 8

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.

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

A high-quality mammogram with a *clinical* breast exam (an exam done by a health care provider) is the most effective way to detect breast cancer early. Like any test, mammograms have both benefits and limitations. For example, some cancers cannot be detected by mammogram, but may be detectable 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 numbers of deaths from breast cancer. BSE should not take the place of clinical breast exam and mammography. Mammograms can detect breast cancer that cannot be felt.

* Source: National Cancer Institute Surveillance, Epidemiology, and End Results Program, 1973–1998.

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 for regular screening mammograms, or for a baseline screening mammogram, 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 spot 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. Although all abnormal mammograms should be followed up with additional testing (a diagnostic mammogram, ultrasound, and/or biopsy), most abnormalities turn out *not* to be cancer. 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 happens if mammography leads to the detection of ductal carcinoma *in situ* (DCIS)?**

Over the past 30 years, improvements in mammography have resulted in an ability to detect a higher number of tissue abnormalities called DCIS. DCIS contains abnormal cells that are confined to the milk ducts of the breast. The cells have not invaded the surrounding breast tissue. Eighty percent of cases of DCIS are found by mammography because DCIS usually does not cause a lump that can be felt. Some of these cases later become invasive cancers.

Today, it is not possible to predict which cases of DCIS will progress to invasive cancer. Therefore, DCIS is usually removed surgically. Until recently, DCIS was often treated with mastectomy, but breast-conserving surgery is now an option for many women with DCIS. Radiation therapy, with or without tamoxifen, also may be used. Women who

have been diagnosed with DCIS should talk with their doctor to make an informed decision about treatment.

10. How much does a mammogram cost?

Screening mammograms generally cost between \$100 and \$150. Most states now have laws requiring health insurance companies to reimburse all or part of the cost of screening mammograms. Details can be provided by insurance companies and health care providers.

Medicare pays 80 percent of the cost of a screening mammogram each year for beneficiaries age 40 and older and one baseline mammogram for beneficiaries age 35 to 39. There is no deductible requirement for this benefit, but Medicare beneficiaries are responsible for a 20 percent copayment 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 deaf and hard of hearing callers, the TTY/TDD 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://www.cdc.gov/cancer/nbccedp/contacts.htm> on the Internet, or by calling the CDC at 1-888-842-6355 (select option 7). 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).

11. Where can women get high-quality mammograms?

Women can get high-quality mammograms in breast clinics, radiology departments of hospitals, 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 facilities across the country meet MQSA standards. These standards apply to the following people at the facility:

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

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. Women can ask their doctors or staff at the mammography facility about FDA certification before making an appointment. 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.

12. 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 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.

13. What is digital mammography? How is it different from conventional mammography?

Digital mammography records x-ray images in computer code instead of on x-ray film, as with conventional mammography. In January 2000, the FDA approved a digital mammography system that may offer potential advantages over the use of standard x-ray film. Research studies so far have *not* shown that digital images are more effective in finding cancer than x-ray film images. However, NCI is directing additional studies to learn whether digital mammography is as good as or better than conventional mammography.

Digital mammography may offer the following advantages over conventional mammography:

- The images can be stored and retrieved electronically, which makes long-distance consultations with other mammography specialists easier;

- Because the images can be adjusted by the radiologist, subtle differences between tissues may be noted;
- Digital mammography may reduce the number of followup procedures that are necessary; and
- The need for fewer exposures with digital mammography can reduce the already low levels of radiation.

Currently, 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.

14. **What other technologies are under development for breast cancer screening?**

The NCI is supporting the development of several new technologies to detect breast tumors. This research ranges from methods under development in research labs to those that have reached the stage of testing in humans (in studies known as clinical trials). Efforts to improve conventional mammography include digital mammography (see question 13), magnetic resonance imaging (MRI), and positron emission tomography (PET scanning).

In addition to imaging technologies, NCI-supported scientists are exploring methods to detect markers 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://cis.nci.nih.gov/fact/5_14.htm on the Internet, or can be ordered from the CIS at 1-800-4-CANCER (1-800-422-6237).

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

NCI is supporting many studies that are looking for improved prevention and treatment of breast cancer.

- **Basic research:** Many studies are taking place to identify the causes of breast cancer, including an analysis of the role that alterations in the BRCA1 and BRCA2 genes play in the development of cancer. Scientists 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 these women, a medication called tamoxifen has been shown to decrease the risk of developing breast cancer. Other medications, including a drug called raloxifene, are currently under study. Also, studies are evaluating how

modification in diet, physical activity, nutrition, and environmental factors could lead to new prevention strategies.

- **Treatment:** Several studies are aimed at finding treatments for breast cancer that are more effective and less toxic than current methods.

Women who would like more information on cancer prevention, treatment, or screening studies can call the CIS at 1-800-4-CANCER (1-800-422-6237).

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Sources of National Cancer Institute Information

Cancer Information Service

Toll-free: 1-800-4-CANCER (1-800-422-6237)

TTY (for deaf and hard of hearing callers): 1-800-332-8615

NCI Online

Internet

Use <http://cancer.gov> to reach the NCI's Web site.

LiveHelp

Cancer Information Specialists offer online assistance through the *LiveHelp* link on the NCI's Web site.

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