About Your Screening Mammogram

A few regular steps can help find breast disease early, when it is most treatable

Inside

Answers to important questions about breast screening...

Why do I need to get a mammogram?

Does mammography find cancer early?

Am I at risk for breast cancer?

What should I ask my doctor?

Breast cancer is the most frequently diagnosed non-skin cancer in women. In 2004, an estimated 215,990 new cases of invasive breast cancer and 55,700 cases of noninvasive breast cancer will be diagnosed. The most common noninvasive breast cancer is ductal carcinoma in situ, or DCIS, in which the cancer is confined to a duct within the breast.

While there is no way to prevent breast cancer, finding and treating it early can lead to a better health outcome and longer life. Many published research studies have established that mammography—a low-dose x-ray of the breast—is an important tool for early breast cancer detection. Regular mammography is especially valuable considering that up to 70% of women diagnosed with breast cancer have no known risk factors other than being female and growing older.

While it is important to be aware of the limitations of mammography screening, the test is the best tool currently available to detect breast cancer early.

Screening mammography is performed on women who are asymptomatic and exhibit no signs of disease. While far from being a perfect test, mammography can identify many cancers at their earliest stage, usually before physical symptoms develop and up to two years before the cancer is large enough to be felt. The size of a cancer and how far it has spread are key predictors of health outcome from the disease.

Studies conducted during the past 40 years have consistently shown a reduction in death rates from breast cancer as the result of routine mammography screening. According to the American Cancer Society, more than two million breast cancer survivors are living in the U.S. today.

Routine screening mammography does have limitations. About 20%

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of breast cancers cannot be found with screening mammography alone. The ability of mammography to find breast cancer may depend on the size of the tumor, the density of the breast tissue, and the skill of the technologist performing the exam and the radiologist interpreting the exam. Mammography findings can also be false-negative or false-positive, leading to additional and sometimes unnecessary diagnostic tests. Technology is improving to address these concerns, and researchers are working to make breast imaging even more accurate.

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It is important to note that breast cancer also occurs in men. An estimated 1450 cases of male breast cancer will be diagnosed in 2004. Male breast cancer is diagnosed and treated using the same methods as for women, but men do not undergo routine breast cancer screening with mammography.

Making the best better: improving mammography

Mammography is the best exam currently available to detect breast cancer at its earliest stage. But it is not 100% accurate. In fact, screening mammography detects only about 80% of all breast cancers.

Some cancers are simply not visible, and others may be obscured by dense tissue or overlooked.

Radiologists are continually working on ways to improve mammography interpretation as well as image acquisition.

Some breast imaging clinics now use a system of double reading to increase the accuracy of mammography findings. Double reading means that two radiologists review all screening mammograms. Some clinics that use this technique have reported finding an additional 4% to 15% of cancers as a result.

Improved technology is also boosting mammography performance. Computer-aided detection (CAD) acts as a second pair of eyes by analyzing patterns in the mammogram and marking areas that appear suspicious, similar to a computer spellchecker. The radiologist reviews these areas again and makes a final diagnosis. In several research studies, the use of CAD has increased breast cancer detection by 15% to 20% on average. The American Cancer Society now recognizes its benefits. CAD can be used with film or digital mammography. The use of interpretive aids, such as double reading or CAD, does not require additional compression or radiation exposure.

Digital mammography, another new technology, creates images without the use of film. Radiologists review breast images on computer workstations and use software to look closely at a particular area of interest.

Screening guidelines: Beginning at age 40

Breast cancer can develop at any age, but risk increases as a woman grows older. Most major medical associations recommend that women undergo screening mammography every year at age 40.

This recommendation is backed by the American Cancer Society, the American Medical Association, the Department of Health and Human Services, the American Medical Women's Association, and the American College of Radiology, among others.

The results of large, randomized, and controlled trials have shown a clear benefit for mammography screening in women beginning at age 40. Tumors that are too small to be detected one year may be found the next—therefore it is important to wait no more than a year between screening exams.

Y-ME National Breast Cancer Organization recommends that women between ages 40 and 49 discuss family history and other risk factors with their physician to determine if a yearly or biannual mammogram is most appropriate. Beginning at age 50, all women should have yearly mammograms.

Finding cancer early is best accomplished using a combination of routine mammography screening, yearly clinical breast exam by a medical professional, and regular breast self-exam.

Who is at risk for breast cancer?

Some women are at higher risk for breast cancer than others. The biggest risk factor for the disease is age. It is also important to remember that 70% of women who are diagnosed with breast cancer have no known risk factors other than being female and growing older.

Some risk factors that are linked to breast cancer are tied to personal and lifestyle choices such as alcohol and diet. Other potential risk factors cannot be changed. These include:

- A personal or family history of breast cancer, such as a mother, sister, grandmother, or aunt on either side of the family who has had the disease;
- A long history of menstrual periods, such as those that begin early (before age 12) or end late (after age 55);

• Obesity after menopause;

• Never bearing children, or bearing a first child after the age of 30.

The presence of one or several risk factors does not mean that a woman will develop breast cancer. Risk factors can also change over time. A change could be caused by increasing age, a new breast biopsy result, or a new diagnosis of breast cancer within a woman's family.

Genetic risk factors also play a role. Genetic risk factors are involved in an estimated 5% to 10% of all breast cancer diagnoses. In these cases, the disease is a result of inherited mutations of the BRCA1 and BRCA2 genes. When working normally, these genes help prevent cancer by making proteins that keep cells from growing abnormally. If a woman has inherited a mutated gene from a parent, she is at increased risk for breast cancer.

For women with genetic risk factors, or with a family history of breast cancer, multiple strategies exist for dealing with increased breast cancer risk. Among them are genetic counseling to determine how often to undergo screening, and participation in specialized screening programs that include regular mammograms, frequent clinical breast examinations, and additional detection and monitoring techniques such as magnetic resonance imaging (MRI). MRI may be useful in evaluating asymptomatic women who have a high-risk history, although this has not yet been scientifically proven.

In addition, published research demonstrates that the anti-estrogen drug tamoxifen, approved by the Food and Drug Administration, reduces breast cancer risk in certain high-risk women. Preliminary research also indicates that another related drug, raloxifene, may also reduce risk. Other options include prophylactic mastectomy or oophorectomy to remove breasts or ovaries. Talk with your physician about the risks, benefits, and side effects of these procedures.

63% of breast cancers are found at an early, highly treatable stage. The five-year survival rate for such cancers is 97%.

What happens during a mammography exam?

A mammogram is a low-dose x-ray of the breast using a specially designed x-ray machine. The same type of machine is used for both screening and diagnostic mammography.

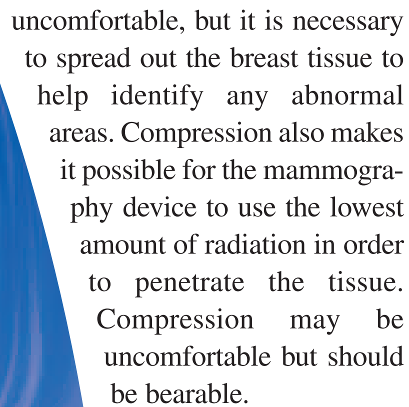
The day of the mammography exam, avoid using deodorant and lotions since these can affect the image captured on film. If previous mammograms were performed at a different clinic, be sure to bring these films with you. Patients have a right to receive their mammograms upon request, and it is best to have the original films.

The mammography experience varies, but typically, patients will be shown to a dressing room, asked to undress from the waist up, and given a hospital gown to wear. At most mammography clinics, the exam is performed with patients in the standing position.

The mammographic exam is performed by a registered radiologic technologist, who positions the breast, one at a time, between two plastic plates. These plates compress or flatten the breasts for a few seconds while the mammography device sends an x-ray beam through the breast tissue. Patients must hold their breath momentarily while the x-ray is taken, and then the breast compression is released. The entire process of compression, breath-hold, and release for each black and white image of the breast takes about the same amount of time as obtaining a dental x-ray.

These images include a top-to-bottom view and a side view of each breast. Additional views of the breast tissue may also be acquired.

Breast compression can be



uncomfortable, but it is necessary to spread out the breast tissue to help identify any abnormal areas. Compression also makes it possible for the mammography device to use the lowest amount of radiation in order to penetrate the tissue. Compression may be uncomfortable but should be bearable.

There are several ways to make the exam more comfortable. Tell the technologist if you experience any pain during the procedure. Premenopausal women should schedule their screening mammogram after their monthly menstrual period rather than just before or during it. Women who avoid eating salty or spicy foods for a few days before the exam may also experience less discomfort—such foods can cause bloating and mild breast swelling. Last, if breasts tend to be unusually sensitive, take a pain reliever before arriving for the exam.

6% of breast cancers are found at an advanced stage when they have spread to other parts of the body. The five-year survival rate for such cancers is 23%.

The entire exam should take about 20 minutes or less. When it is complete, the technologist will ask you to wait in the dressing room while the mammography images are checked to make sure no additional views are needed. The films will then be interpreted by a radiologist.

The role of technologists and radiologists

Mammography exams are performed by a trained radiologic technologist. These professionals have an important job: to make sure that the breast is positioned properly so that the best image of breast tissue is obtained.

Technologists can answer any questions about the procedure and how it will be performed. But they are not doctors and do not have the expertise to read the mammogram and provide exam results. That is the job of the radiologist.

A radiologist is a physician experienced in medical imaging exams. He or she will evaluate the breast images, sometimes while the patient waits at the facility, but more typically, later that same day.

The radiologist will dictate a report describing any abnormalities and will suggest a likely diagnosis. This report is then sent to the patient's referring physician within a few days. A woman should expect to receive a letter from the mammography facility directly informing her of the results of the test. By federal law, such results should be received within 30 days.

Mammograms should be performed at a facility displaying a Food and Drug Administration certificate of approval. This certificate ensures good quality equipment, trained and licensed radiologic technologists, and experienced, board-certified radiologists.

What do radiologists look for?

The majority of screening mammograms are normal and do not require any follow-up. The radiologist who interprets the mammogram will look for several types of changes in the breast, including areas of tissue distortion of masses, differences between the breasts, and abnormal calcium deposits.

Calcifications are tiny mineral deposits within the breast tissue that appear as small white dots on films or images.

There are two types of calcifications: microcalcifications and macrocalcifications. Macrocalcifications are typically associated with benign conditions and do not require a biopsy.

Microcalcifications are tiny (less than 1/50th of an inch) specks of calcium in the breast and may appear alone or in clusters. An area of microcalcification on a mammogram does not always mean that cancer is present. The shape and arrangement of the calcifications help the radiologist determine the next step. In some cases, the presence of microcalcifications may not indicate a biopsy. Instead, a radiologist may recommend a follow-up mammogram within three to six months. In other cases, the microcalcifications are more suspicious, and a biopsy will be ordered.

Radiologists will also look for other changes in the breast, such as a dense area, or mass, which may occur with or without calcifications. Masses can be non-malignant, such as a cyst or fibroadenoma.

Masses may also be cancer and are generally biopsied if they are not fluid-filled cysts. Some masses can be monitored with periodic mammograms, while others may require immediate or delayed biopsy. A spiculated mass—which is star-shaped as opposed to round, for example—is typically seen as suspicious and is usually followed up. Many times a biopsy will reveal that a particular mass is benign.

In some cases, the radiologist will request that a woman return for additional imaging. This does not mean that cancer is present, or likely. The radiologist may require clearer views of a particular area, or may call for a repeat study sooner than one year in order to watch a potential mass more closely.

Considerations for women with augmented breasts

Women with augmented breasts or breast implants should continue to have mammograms. The technologist and radiologist should be informed of the presence of implants before the mammography exam, as both acquiring and interpreting exams of augmented breasts may require special techniques.

Silicone implants are not transparent on x-rays and can block a clear view of the tissues behind them. This is especially true if the implant has been placed in front of, rather than behind, the chest muscles.

Experienced technologists and radiologists carefully compress the breasts to avoid rupturing the implant. This may involve sliding the implant backward against the chest wall, and pulling the breast tissue over and in front to ensure that the x-ray device takes the best picture of the breast instead of the implant. Interpreting the mammogram also can be difficult, especially if scar tissue has formed around the implant or silicone has leaked into nearby breast tissues.

MRI is another tool that is increasingly being used to evaluate women with breast implants. Please discuss this option with your physician if this applies to you. However, it is not being used routinely as a cancer screening tool in women with breast implants.

There is no evidence that women with implants have a higher risk of breast cancer than other women. Diagnosis (with biopsy) and treatment options are the same for women with implants as for others.

What happens next?

The mammography report provided to a woman's referring physician will document whether the mammogram is normal or abnormal. If so, it will detail the next steps, including additional breast imaging exams such as ultrasound (commonly used to confirm a fluid-filled cyst), mammographic spot views, magnification views, or a breast biopsy.

This standardized report will include the radiologist's overall impression of the findings, on a scale of one to five as categorized by the breast imaging reporting system (BI-RADS) developed by the American College of Radiology. The categories are negative (no cancer, routine screening); benign; probably benign; suspicious; and probably malignant.

This report is separate from the letter that federal law requires imaging centers to send to women within 30 days of their exam. The letter is not an official radiology report but does state whether the mammogram results were normal or abnormal. If written results of a mammogram are not received within 30 days, do not assume that the exam was normal. Contact the facility where the exam was performed as well as your personal physician who ordered the exam.

If an abnormality is detected and follow-up exams recommended, they should be scheduled promptly. A woman should also confer with her referring physician about these recommendations.

A woman whose mammogram is normal should continue to undergo routine screening, yearly clinical breast exams, and monthly breast self-exams.

Glossary

An explanation of terms you may encounter as you learn more about breast screening

- **Asymptomatic**—Patients who have no symptoms of a disease.

- **Benign**—Not cancer.

- **Biopsy**—Removal of a sample of breast tissue that is evaluated by a pathologist to determine whether cancer is present.

- **Breast imaging reporting system (BI-RADS)**—A standardized system for reporting mammography findings, developed by the American College of Radiology.

- **Calcifications**—There are two types of calcifications: microcalcifications and macrocalcifications. Macrocalcifications are typically larger calcium deposits often related to benign changes in the breasts. Microcalcifications are tiny calcium deposits less than 1/50th of an inch in size. When many microcalcifications are seen in one area, they are referred to as a cluster and may indicate a cancer.

- **Computer aided detection**—Computer software that analyzes mammography images and looks for patterns associated with cancer, and brings them to the attention of the radiologist. Radiologists read breast images on their own, then may use CAD software to re-evaluate the image and focus on areas of concern.

- **Cyst**—A fluid-filled mass. Most cysts are benign. Ultrasound is often used to confirm the presence of a cyst.

- **Density**—Density describes breast tissue with many glands close together that appear as white areas on a mammogram film. Although fairly common, especially in younger women, dense breasts may make microcalcifications and other masses difficult to detect, making the mammogram, in turn, difficult to evaluate.

- **Digital mammography**—Breast images acquired electronically, without film, that can be viewed using a variety of specialized software tools.

- **Diagnostic mammography**—While similar to a screening mammogram in that the same type of imaging equipment is used, a diagnostic mammogram is a more comprehensive exam typically performed to evaluate a specific sign or symptom.

- **Ductal carcinoma in situ (DCIS)**—Cancer that is confined to the ducts of the breast tissue.

- **False-negative**—A mammogram appears normal even though breast cancer is present.

- **False-positive**—A mammogram appears abnormal even when no cancer is present.

- **Fibroadenoma**— A benign fibrous tumor often found in younger women.

- **Invasive breast cancer**—Cancer that has grown beyond the ducts and spread to nearby tissue, lymph nodes under the arm, or other parts of the body.

- **Magnetic resonance imaging (MRI)**—An exam that may help evaluate women who are at high risk for breast cancer, such as those with personal or family history of the disease or with genetic risk factors. It's also sometimes used for women with breast implants.

- **Magnification views**—Use of a special table allows enlarged images of the breast in a particular region of interest. Magnification provides a closer look at the borders and tissue of structures or suspicious areas of a mass.

- **Mass**—A breast tumor. It may be seen on a mammogram or felt when the breast is examined. Masses may also be cysts or fibroadenomas. Some masses may be monitored over time, while others require immediate biopsy.

- **Noninvasive**—Cancer has not spread to surrounding tissues but remains in the ducts. See invasive.

- **Premenopausal**—Women who have not yet entered menopause, typically women under age 50.

- **Prognosis**—A prediction of the probable course and outcome of a disease.

- **Prophylactic mastectomy**—Surgery to remove a breast that is not known to contain breast cancer, for the purpose of reducing cancer risk.

- **Prophylactic oophorectomy**—Surgery to remove one or both ovaries that are not known to contain breast cancer, for the purpose of reducing breast cancer risk.

- **Radiologic technologist**—A registered radiologic technologist is a trained and licensed non-physician who performs medical imaging procedures. The radiologic technologist is responsible for accurately positioning the patient and her breasts in order to obtain the best x-ray image of breast tissue.

- **Radiologist**—A physician trained to evaluate and interpret medical imaging exams, including mammography.

The role of the clinical and self breast exam

The clinical breast exam complements mammography and breast self-exam and is an opportunity for women to discuss changes in their breasts with their doctor. During a clinical breast exam, a physician will feel the breasts and under the arms for lumps or anything else that seems unusual.

The clinical breast exam should be part of a routine check-up. Beginning at age 20, it is recommended that women have a clinical breast exam every two to three years. Women age 40 and older should have one every year.

While no studies have documented the value of the monthly breast self-exam in early detection, it can help women become more familiar with how their breasts normally feel and look. Any change that is seen or felt during the monthly exam does not automatically mean that cancer is present. Most breast lumps are not breast cancer. The most important thing to remember is that a lump that is found—whether during breast self-exam or by accident—should never be ignored. Contact a medical professional to schedule a clinical breast exam.

In some cases, particularly for young women with dense breasts, ultrasound may be used to screen for possible masses as well. Different tissue types reflect sound waves at different rates, giving breast imagers another tool to look for suspicious findings.

■ **Risk factors**—A risk factor is anything that increases the chance of developing disease. Having a risk factor, or several, does not mean someone will get that disease.

■ **Screening mammography**—Screening refers to tests and exams used to find a disease, such as cancer, in people who have no symptoms. The goal of screening mammography is to detect breast cancer at its earliest stage.

■ **Spiculated mass**—Seen on a mammogram as dense regions with radiating lines suggesting breast masses or distortions. The term describes highly suspicious masses that may indicate cancer. Some post-operative scars can be quite spiculated and resemble cancer.

■ **Spot views**—Applies mammographic compression to a smaller area of tissue using a small compression plate or cone. By applying compression to only one area, pressure is increased on that spot, resulting in better tissue separation and ability to see the area in question.

■ **Ultrasound**—A breast imaging exam performed to confirm the presence of a fluid-filled cyst.

DETACH HERE

Questions to Ask

Take this guide with you on your screening visits so you don't forget to ask any important questions.

AT THE MAMMOGRAPHY FACILITY

- Do you have accurate contact information for me and for my referring physician?
- When can I expect to receive written results of my mammogram?
- Is this facility certified by the Food and Drug Administration?
- Is this facility accredited by the American College of Radiology?
- Will I be meeting the radiologist today?
- Do you use double reading, CAD, or any other techniques to increase the accuracy of your reports?

AT YOUR DOCTOR'S OFFICE

- What should I do if I feel a lump in my breast?
- Is there anything in my personal or family history that indicates I should have mammograms more often than the usual screening recommendations?
- Did you receive the results of my mammogram? What does the report mean?

Additional Resources

Many organizations can help answer further questions about breast cancer screening and diagnosis

For breast cancer information or support, visit www.y-me.org or call **Y-ME National Breast Cancer Organization's** 24/7 hotline at 800/221-2141 (English, with interpreters available in 150 languages) or 800/986-9505 (Spanish).

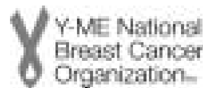
For information about living with cancer, contact **The Association of Oncology Social Work (AOSW)**. Oncology social workers provide a wide range of services directly to persons with cancer and their families including counseling, support, education, and resource identification. Call 215/599-6093 or visit www.aosw.org.

For information about new breast cancer treatments, clinical trials, options for women and families at high risk, and genetic testing for breast cancer, call or visit the **National Cancer Institute** at 800/4-CANCER or www.cancer.gov.

For information about financial, insurance, and practical concerns after a cancer diagnosis, call or visit **Cancer Care** at 800/813-HOPE or www.cancercare.org.

For additional information about coping with breast cancer, contact the **American Cancer Society** to learn about Reach to Recovery, a peer support program offered by trained breast cancer survivors for women and their families. Call 800/ACS-2345 or visit www.cancer.org.

Sponsoring Organizations



Y-ME National Breast Cancer Organization's mission is to ensure, through information, empowerment and peer support, that no one faces breast cancer alone. Y-ME has the only 24-hour hotline staffed entirely by trained breast cancer survivors. Y-ME affiliates provide services such as support groups, early detection workshops, wigs and prostheses for women with limited resources, and advocacy on breast cancer related policies. Visit www.y-me.org or call 800/221-2141 for more information.

The Association of Oncology Social Work (AOSW) is a non-profit, international organization dedicated to the enhancement of psychosocial services to people with cancer and their families through: Networking, Education, Advocacy, Research, and Resource Development. Oncology social workers provide a wide range of services directly to persons with cancer and their families including counseling, support, education, and resource identification. We are as diverse as the clients we serve.

R2 Technology, Inc., headquartered in Sunnyvale, CA, is a recognized leader in computer-aided detection (CAD), an innovative technology that assists radiologists in the early detection of breast cancer, lung nodules, and other lung abnormalities. R2's ImageChecker CAD system is being used successfully by hospitals and imaging centers as an aid to radiologists for the early detection of breast cancer. For information, visit www.r2tech.com.

Diagnostic Imaging *is a monthly news magazine for radiologists. The CMP Healthcare Media group of publications includes such titles as* The AIDS Reader, BioMechanics, Consultant, Geriatric Times, Oncology, *and* Psychiatric Times.

This brochure was prepared by writers at **Diagnostic Imaging** *magazine, a monthly news publication for physicians specializing in medical imaging (www.diagnosticimaging.com).* ***The National Coalition of Breast Cancer Organizations*** *(NABCO) provided valuable guidance and feedback during the development process.*

For additional copies of this patient-education resource:

- **PHYSICIANS**—Call 866/CHECKED or visit www.r2tech.com
- **PATIENTS**—Call 800/221-2140 or visit www.y-me.org