The majority of breast cancers found in the United States today are picked up through routine screening x-rays of the breast. The term screening refers to any test or procedure done on a patient without symptoms, in an attempt to find a cancer before it can cause symptoms. There are several different types of radiological studies available to evaluate the breast for the possibility that a cancer is present.

**MAMMOGRAMS**

A mammogram is an x-ray of the breast. A **screening** mammogram is a routine study, done once a year after the age of 40, on a woman who has no breast problems or symptoms. According to the American Cancer Society (ACS), this annual test should be done on younger women if they have a family history of early breast cancer. The breast tissue is compressed (squeezed) from two different directions and pictures are taken that can be evaluated by the radiologist. The breast is checked for changes from last year, new calcium deposits that are grouped in one area of the breast, or new masses or densities. A letter will be sent directly to you from the radiologist notifying you about the results of your screening mammogram.

A **diagnostic** mammogram is used when there is a breast complaint or symptom, or when an abnormality has been discovered on a routine screening mammogram. Once someone has been diagnosed and treated for breast cancer, they may also be told to have a diagnostic mammogram annually for the first five years after their diagnosis. A diagnostic mammogram is a series of pictures used to evaluate the area of concern. This may involve pictures with special paddles or magnification to better examine the tissue. It may also require the additional step of performing an ultrasound for a complete evaluation. The radiologist will speak to you directly about the findings and recommendations. A biopsy may be required if there is something still of concern.
**TOMOSYNTHESIS (3-D MAMMOGRAPHY)**
The Breast Center at Smilow Cancer Hospital is performing 3-D mammography, also known as digital breast tomosynthesis. This new technology allows the radiologist to view the breast in thin “slices” rather than as a whole. This improves detection of lesions and also reduces false positives due to overlapping normal tissues. We use the new 3-D technology in addition to our standard 2-D imaging. This combination will provide the radiologist an opportunity to compare the familiar standard images with your prior mammograms. The 3-D imaging is performed simultaneously so the length of your exam does NOT change. There is a small increase in radiation dose. However, even with this increase, the total radiation does remains below the federal standards for mammography.

**ULTRASOUND**
A breast ultrasound is a test that evaluates the breast tissue using sound waves. This is most helpful in determining whether a palpable mass is solid (in which case it could be benign or malignant) or a fluid filled sac (a benign cyst). As mentioned above, ultrasound can be used to look at questionable areas seen on the mammogram to better determine what it might represent.

An ultrasound is a painless test where you will be comfortably lying on your back, and the technician in will rub a handheld probe covered in gel over your breast. Biopsies frequently can be done under the guidance of breast ultrasound.

Screening breast ultrasound can be a useful backup tool in evaluating dense breast tissue. Dense breast tissue can result in poorer detection of cancers by mammography. In addition, it is now believed that dense breast tissue slightly increases a woman’s risk for developing breast cancer. For these reasons additional imaging studies such as ultrasound or MRI, may be indicated depending on your particular risk factors. In this case, all areas of both breasts will be evaluated with the sound wave probe. It is important to remember that there are pros and cons of this additional screening test. While ultrasound may detect cancers not found on mammography, it is possible that additional findings may require or additional imaging follow-up or biopsy.

*Revised December 2017*
MRI (MAGNETIC RESONANCE IMAGING)
A breast MRI is a very sensitive examination which uses a powerful magnetic field and a computer to take detailed pictures of the breast tissue. A dye called gadolinium is injected into your vein as part of this scan. This test can be used to help detect abnormalities not easily seen with either mammography or ultrasound. You will lie on your stomach on a table which slides, feet first, inside the magnet. During imaging it can be noisy so headphones will be placed over your ears. MRI is performed for several reasons. It is often used in patients who present with a lymph node that has cancer but the mammogram and ultrasound are negative. If there is a question of cancer invading the chest wall or an implant rupture, MRI may also be useful. Many surgeons will use MRI to better evaluate the extent of a malignancy to help with surgical planning, or to assess the response of a cancer after preoperative chemotherapy. Breast MRI can also be used for screening in high risk individuals. Appropriate patients for high risk screening by breast MRI include:

- Known BRCA mutation carriers or people with a first-degree family history of a BRCA 1-2 gene mutation
- Strong family history (lifetime risk of >20-25% by BRCAPRO or similar risk assessment model)
- Prior chest wall radiation given between the ages of 10-30 years
- Like ultrasound, there are pros and cons to screening breast MRI and false positives requiring additional imaging or biopsy are common.

STAGING STUDIES

Your doctor may want to check you for distant metastatic disease; that is, whether or not the cancer has spread to any other part of your body particularly if your cancer is large or your lymph nodes are suspicious. Staging, or a metastatic work-up, is focused on finding cancer in the sites that are most often involved if cancer has spread beyond the breast and lymph nodes.

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BONE SCAN
One of the most common places for breast cancer to go (outside of the breast and lymph nodes) is to the bones. A bone scan helps to find this cancer. A radioactive tracer is injected into your veins and a series of pictures are taken that help us to find cancer in any bone in your body. If something “lights up”, your doctor may recommend further x-ray tests to look at that bone in more detail.

CT SCAN
Your lungs, liver, adrenal glands and other abdominal and pelvic organs could also be affected by distant metastatic disease (i.e., cancer that has spread beyond the breast and lymph nodes). A CT scan may be done of your chest, abdomen, and/or pelvis. In this test, you lie on your back on a hard table which is then moved into a donut-like scanner. The tube is wider (i.e., less claustrophobic) and less noisy than an MRI. A contrast agent may be injected into your vein, and a series of pictures taken – this only takes a few minutes.

PET-CT
Sometimes, your doctor may recommend a PET-CT which adds a PET scan to the CT scan described above. The PET part is one in which a radioactive labeled sugar is injected into your vein. Areas that are rapidly growing take up the sugar to use as fuel, and “light up”. This can help us decide whether an xray detected spot is more or less likely to be cancer. PET scans require a significant amount of disease to be present in order to be abnormal, and therefore we usually will do a bone scan and a CT scan of your chest, abdomen and pelvis instead.

Please talk to your physician for his or her recommendations about all your imaging studies. We are here to answer your questions and to ensure that you get the very best individualized care.