

# What is breast cancer?

Breast cancer is a malignant tumor that starts in the cells of the breast. A malignant tumor is a group of cancer cells that can grow into (invade) surrounding tissues or spread (metastasize) to distant areas of the body. The disease occurs almost entirely in women, but men can get it, too.

**The remainder of this document refers only to breast cancer in women. For information on breast cancer in men, see our document, [Breast Cancer in Men](#).**

# What should you ask your doctor about breast cancer?

It is important for you to have frank, open discussions with your cancer care team. Don't be afraid to ask questions, no matter how minor you might think they are. Some questions to consider:

What type of breast cancer do I have? How does this affect my treatment options and prognosis?

Has my cancer spread to lymph nodes or internal organs?

What is the stage of my cancer and how does it affect my treatment options and outlook?

Do I need to have other tests done before we can decide on treatment?

Should I consider genetic testing?

Should I think about taking part in a clinical trial?

What treatments are appropriate for me? What do you recommend? Why?

What are the risks and side effects that I should expect?

How effective will breast reconstruction surgery be if I need or want it?

What are the pros and cons of having it done right away or waiting until later?

What will my breasts look and feel like after my treatment? Will I have normal sensation in them?

How long will treatment last? What will it be like? Where will it be done?

What should I do to get ready for treatment?

Will I need a blood transfusion?

Should I follow a special diet or make other lifestyle changes?

What are the chances my cancer will come back with the treatment programs we have discussed? What would we do if that happens?

Will I go through menopause as a result of the treatment?

Will I be able to have children after my treatment?

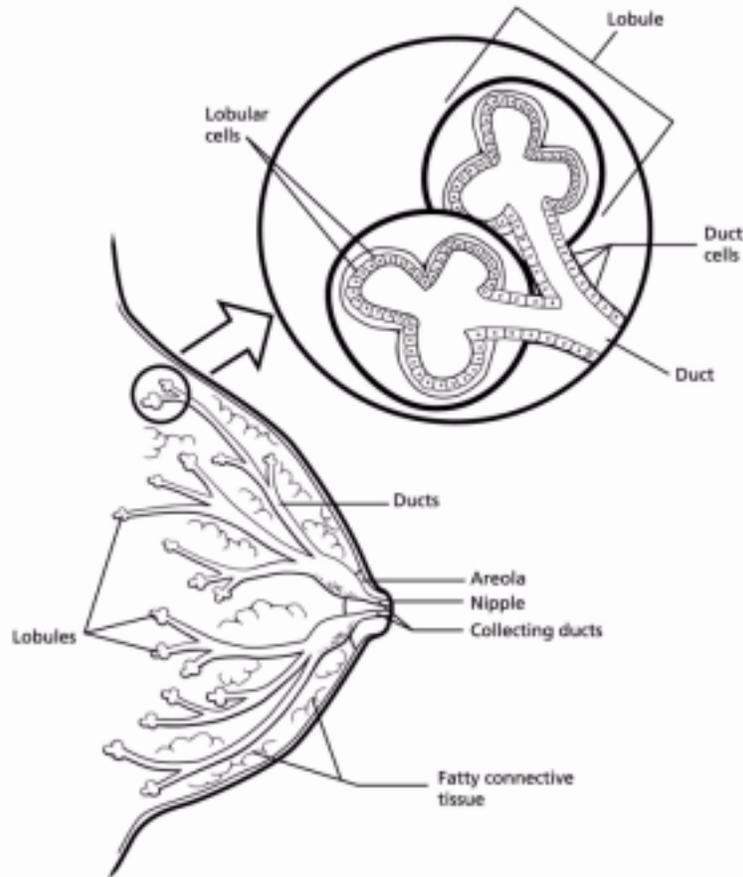
What type of follow-up will I need after treatment?

Be sure to write down any questions that occur to you that are not on this list. For instance, you might want specific information about recovery times so that you can plan your work schedule. Or you may want to ask about second opinions. Taking another person and/or a tape recorder to the appointment can be helpful. Collecting copies of your medical records, pathology reports, and radiology reports may be useful in case you wish to seek a second opinion at a later time.

## The normal breast

To understand breast cancer, it helps to have some basic knowledge about the normal structure of the breasts, shown in the diagram below.

The female breast is made up mainly of *lobules* (milk-producing glands), *ducts* (tiny tubes that carry the milk from the lobules to the nipple), and *stroma* (fatty tissue and connective tissue surrounding the ducts and lobules, blood vessels, and lymphatic vessels).



Most breast cancers begin in the cells that line the ducts (*ductal* cancers). Some begin in the cells that line the lobules (*lobular* cancers), while a small number start in other tissues.

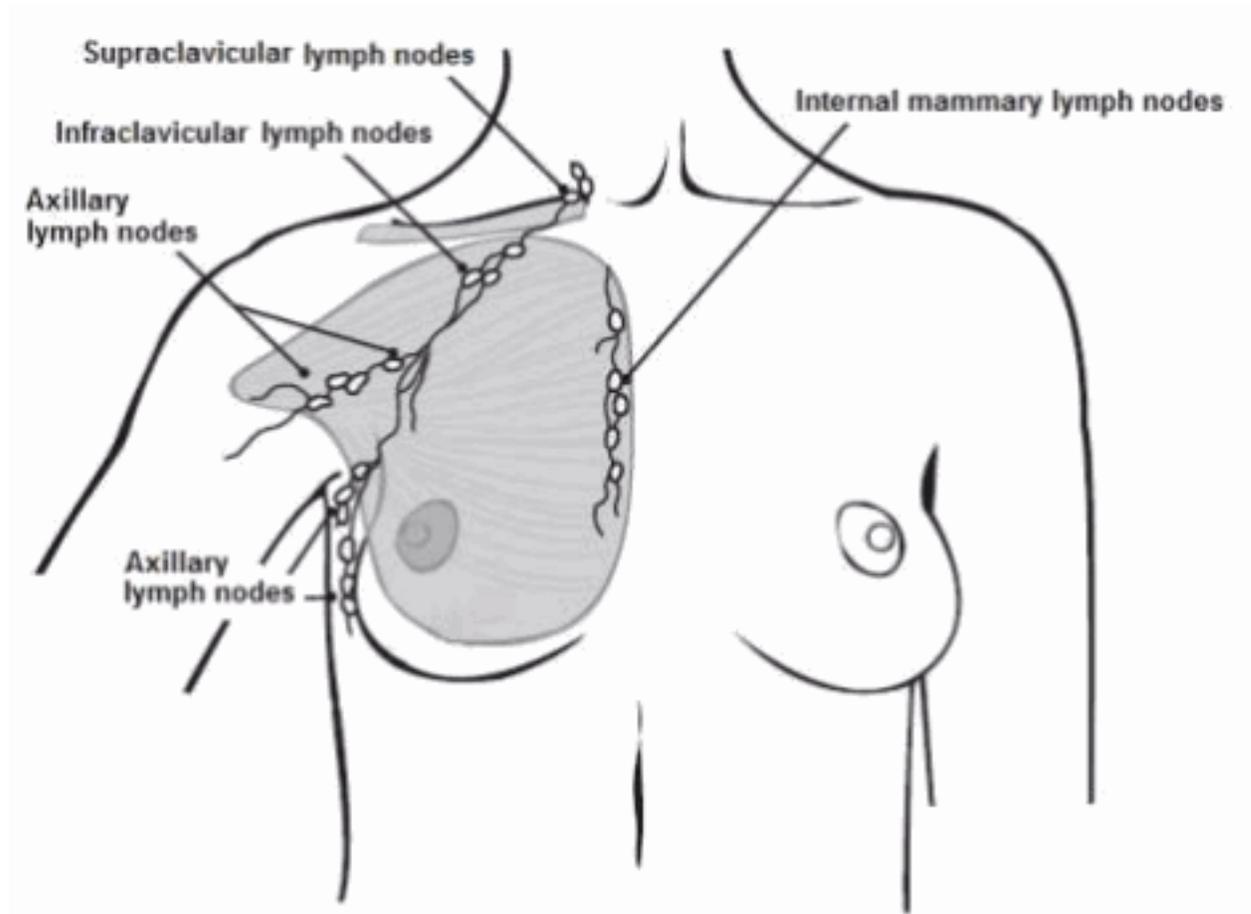
## The lymph (lymphatic) system of the breast

The lymph system is important to understand because it is one way breast cancers can spread. This system has several parts.

Lymph nodes are small, bean-shaped collections of immune system cells (cells that are important in fighting infections) that are connected by lymphatic vessels. Lymphatic vessels are like small veins, except that they carry a clear fluid called *lymph* (instead of blood) away from the breast. Lymph contains tissue fluid and waste products, as well as immune system cells. Breast cancer cells can enter lymphatic vessels and begin to grow in lymph nodes.

Most lymphatic vessels in the breast connect to lymph nodes under the arm (*axillary nodes*). Some lymphatic vessels connect to lymph nodes

inside the chest (*internal mammary nodes*) and those either above or below the collarbone (*supraclavicular or infraclavicular nodes*).



If the cancer cells have spread to lymph nodes, there is a higher chance that the cells could have also gotten into the bloodstream and spread (metastasized) to other sites in the body. The more lymph nodes with breast cancer cells, the more likely it is that the cancer may be found in other organs as well. Because of this, finding cancer in one or more lymph nodes often affects the treatment plan. Still, not all women with cancer cells in their lymph nodes develop metastases, and some women can have no cancer cells in their lymph nodes and later develop metastases.

## **Benign breast lumps**

Most breast lumps are not cancerous (benign). Still, some may need to be biopsied (sampled and viewed under a microscope) to prove they are not cancer.

## **Fibrosis and cysts**

Most lumps turn out to be caused by fibrosis and/or cysts, benign changes in the breast tissue that happen in many women at some time in their lives. (This is sometimes called *fibrocystic changes* and used to be called *fibrocystic disease*.) Fibrosis is the formation of scar-like (fibrous) tissue, and cysts are fluid-filled sacs. These conditions are most often diagnosed by a doctor based on symptoms, such as breast lumps, swelling, and tenderness or pain. These symptoms tend to be worse just before a woman's menstrual period is about to begin. Her breasts may feel lumpy and, sometimes, she may notice a clear or slightly cloudy nipple discharge.

## **Fibroadenomas and intraductal papillomas**

Benign breast tumors such as *fibroadenomas* or *intraductal papillomas* are abnormal growths, but they are not cancerous and do not spread outside the breast to other organs. They are not life threatening.

Still, some benign breast conditions are important because women with these conditions have a higher risk of developing breast cancer. For more information see the section, "[What are the risk factors for breast cancer?](#)" and our document, [Non-cancerous Breast Conditions](#).

## **General breast cancer terms**

Here are some of the key words used to describe breast cancer.

### **Carcinoma**

This is a term used to describe a cancer that begins in the lining layer (epithelial cells) of organs like the breast. Nearly all breast cancers are carcinomas (either ductal carcinomas or lobular carcinomas).

### **Adenocarcinoma**

An adenocarcinoma is a type of carcinoma that starts in glandular tissue (tissue that makes and secretes a substance). The ducts and lobules of the breast are glandular tissues (they make breast milk), so cancers starting in these areas are often called *adenocarcinomas*.

## **Carcinoma in situ**

This term is used for an early stage of cancer, when it is confined to the layer of cells where it began. In breast cancer, *in situ* means that the cancer cells remain confined to ducts (ductal carcinoma in situ). The cells have not grown into (*invaded*) deeper tissues in the breast or spread to other organs in the body. Ductal carcinoma in situ of the breast is sometimes referred to as *non-invasive* or *pre-invasive* breast cancer because it might develop into an invasive breast cancer if left untreated.

When cancer cells are confined to the lobules it is called *lobular carcinoma in situ*. This is not actually a true cancer or pre-cancer, and is discussed more in the section, "[What are the risk factors for breast cancer?](#)"

## **Invasive (infiltrating) carcinoma**

An invasive cancer is one that has already grown beyond the layer of cells where it started (as opposed to carcinoma in situ). Most breast cancers are invasive carcinomas—either invasive ductal carcinoma or invasive lobular carcinoma.

## **Sarcoma**

Sarcomas are cancers that start in connective tissues such as muscle tissue, fat tissue, or blood vessels. Sarcomas of the breast are rare.

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## **Types of breast cancers**

There are several types of breast cancer, but some of them are quite rare. In some cases a single breast tumor can be a combination of these types or be a mixture of invasive and in situ cancer.

### **Ductal carcinoma in situ**

Ductal carcinoma in situ (DCIS; also known as *intraductal carcinoma*) is considered non-invasive or pre-invasive breast cancer. DCIS means that cells that lined the ducts have changed to look like cancer cells. The difference between DCIS and invasive cancer is that the cells have not

spread (*invaded*) through the walls of the ducts into the surrounding breast tissue. DCIS is considered a pre-cancer because some cases can go on to become invasive cancers. Right now, though, there is no good way to know for certain which cases will go on to become invasive cancers and which ones won't.

About 1 in 5 new breast cancer cases will be DCIS. Nearly all women diagnosed at this early stage of breast cancer can be cured.

## **Lobular carcinoma in situ**

This is not a true cancer or pre-cancer, and is discussed in the section [“What are the risk factors for breast cancer?”](#)

## **Invasive (or infiltrating) ductal carcinoma**

This is the most common type of breast cancer. Invasive (or infiltrating) ductal carcinoma (IDC) starts in a milk duct of the breast, breaks through the wall of the duct, and grows into the fatty tissue of the breast. At this point, it may be able to spread (metastasize) to other parts of the body through the lymphatic system and bloodstream. About 8 of 10 invasive breast cancers are infiltrating ductal carcinomas.

## **Invasive (or infiltrating) lobular carcinoma**

Invasive lobular carcinoma (ILC) starts in the milk-producing glands (lobules). Like IDC, it can spread (metastasize) to other parts of the body. About 1 invasive breast cancer in 10 is an ILC. Invasive lobular carcinoma may be harder to detect by a mammogram than invasive ductal carcinoma.

## **Less common types of breast cancer**

**Inflammatory breast cancer:** This uncommon type of invasive breast cancer accounts for about 1% to 3% of all breast cancers. Usually there is no single lump or tumor. Instead, inflammatory breast cancer (IBC) makes the skin on the breast look red and feel warm. It also may give the breast skin a thick, pitted appearance that looks a lot like an orange peel. Doctors now know that these changes are not caused by inflammation or infection, but by cancer cells blocking lymph vessels in the skin. The affected breast may become larger or firmer, tender, or itchy.

In its early stages, inflammatory breast cancer is often mistaken for an infection in the breast (called *mastitis*) and treated as an infection with

antibiotics. If the symptoms are caused by cancer, they will not improve, and a biopsy will find cancer cells. Because there is no actual lump, it might not show up on a mammogram, which can make it even harder to find it early. This type of breast cancer tends to have a higher chance of spreading and a worse outlook (prognosis) than typical invasive ductal or lobular cancer. For more details about this condition, see our document, [Inflammatory Breast Cancer](#).

**Triple-negative breast cancer:** This term is used to describe breast cancers (usually invasive ductal carcinomas) whose cells lack estrogen receptors and progesterone receptors, and do not have an excess of the HER2 protein on their surfaces. (See the section, "[How is breast cancer diagnosed?](#)" for more detail on these receptors.) Breast cancers with these characteristics tend to occur more often in younger women and in African-American women. Triple-negative breast cancers tend to grow and spread more quickly than most other types of breast cancer. Because the tumor cells lack these certain receptors, neither hormone therapy nor drugs that target HER2 are effective treatments. Chemotherapy can still be useful, and is often recommended even for early-stage disease as it lowers the risk of the cancer coming back later.

**Paget disease of the nipple:** This type of breast cancer starts in the breast ducts and spreads to the skin of the nipple and then to the areola, the dark circle around the nipple. It is rare, accounting for only about 1% of all cases of breast cancer. The skin of the nipple and areola often appears crusted, scaly, and red, with areas of bleeding or oozing. The woman may notice burning or itching.

Paget disease is almost always associated with either ductal carcinoma in situ (DCIS) or infiltrating ductal carcinoma. Treatment often requires mastectomy. If no lump can be felt in the breast tissue, and the biopsy shows DCIS but no invasive cancer, the outlook (prognosis) is excellent. If invasive cancer is present, the prognosis is not as good, and the cancer will need to be staged and treated like any other invasive cancer.

**Phyllodes tumor:** This very rare breast tumor develops in the stroma (connective tissue) of the breast, in contrast to carcinomas, which develop in the ducts or lobules. Other names for these tumors include *phyllodes tumor* and *cystosarcoma phyllodes*. These tumors are usually benign but on rare occasions may be malignant.

Benign phyllodes tumors are treated by removing the tumor along with a margin of normal breast tissue. A malignant phyllodes tumor is treated by

removing it along with a wider margin of normal tissue, or by mastectomy. Surgery is often all that is needed, but these cancers might not respond as well to the other treatments used for more common breast cancers. When a malignant phyllodes tumor has spread, it can be treated with the chemotherapy given for soft-tissue sarcomas (this is discussed in detail in our document, [Sarcoma - Adult Soft Tissue Cancer](#)).

**Angiosarcoma:** This form of cancer starts in cells that line blood vessels or lymph vessels. It rarely occurs in the breasts. When it does, it usually develops as a complication of previous radiation treatments. This is an extremely rare complication of breast radiation therapy that can develop about 5 to 10 years after radiation. Angiosarcoma can also occur in the arms of women who develop [lymphedema](#) as a result of lymph node surgery or radiation therapy to treat breast cancer. (For information on lymphedema, see the section, "[How is breast cancer treated?](#)") These cancers tend to grow and spread quickly. Treatment is generally the same as for other sarcomas. See our document, [Sarcoma - Adult Soft Tissue Cancer](#).

## Special types of invasive breast carcinoma

There are some special types of breast cancer that are sub-types of invasive carcinoma. These are often named after features seen when they are viewed under the microscope, like the ways the cells are arranged.

Some of these may have a better prognosis than standard infiltrating ductal carcinoma. These include:

Adenoid cystic (or adenocystic) carcinoma

Low-grade adenosquamous carcinoma (this is a type of metaplastic carcinoma)

Medullary carcinoma

Mucinous (or colloid) carcinoma

Papillary carcinoma

Tubular carcinoma

Some sub-types have the same or maybe worse prognosis than standard infiltrating ductal carcinoma. These include:

Metaplastic carcinoma (most types, including spindle cell and squamous)

Micropapillary carcinoma

Mixed carcinoma (has features of both invasive ductal and lobular)

In general, all of these sub-types are still treated like standard infiltrating ductal carcinoma.

## **What are the key statistics about breast cancer?**

Breast cancer is the most common cancer among American women, except for skin cancers. About 1 in 8 (12%) women in the US will develop invasive breast cancer during their lifetime.

The American Cancer Society's estimates for breast cancer in the United States for 2014 are:

About 232,670 new cases of invasive breast cancer will be diagnosed in women.

About 62,570 new cases of carcinoma in situ (CIS) will be diagnosed (CIS is non-invasive and is the earliest form of breast cancer).

About 40,000 women will die from breast cancer

After increasing for more than 2 decades, female breast cancer incidence rates began decreasing in 2000, then dropped by about 7% from 2002 to 2003. This large decrease was thought to be due to the decline in use of hormone therapy after menopause that occurred after the results of the Women's Health Initiative were published in 2002. This study linked the use of hormone therapy to an increased risk of breast cancer and heart diseases. Incidence rates have been stable in recent years.

Breast cancer is the second leading cause of cancer death in women, exceeded only by lung cancer. The chance that breast cancer will be responsible for a woman's death is about 1 in 36 (about 3%). Death rates

from breast cancer have been declining since about 1989, with larger decreases in women younger than 50. These decreases are believed to be the result of earlier detection through screening and increased awareness, as well as improved treatment.

At this time there are more than 2.8 million breast cancer survivors in the United States. (This includes women still being treated and those who have completed treatment.) Survival rates are discussed in the section [“How is breast cancer staged?”](#)

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## **What are the risk factors for breast cancer?**

A risk factor is anything that affects your chance of getting a disease, such as cancer. Different cancers have different risk factors. For example, exposing skin to strong sunlight is a risk factor for skin cancer. Smoking is a risk factor for cancers of the lung, mouth, larynx (voice box), bladder, kidney, and several other organs.

But risk factors don't tell us everything. Having a risk factor, or even several, does not mean that you will get the disease. Most women who have one or more breast cancer risk factors never develop the disease, while many women with breast cancer have no apparent risk factors (other than being a woman and growing older). Even when a woman with risk factors develops breast cancer, it is hard to know just how much these factors might have contributed.

Some risk factors, like a person's age or race, can't be changed. Others are linked to cancer-causing factors in the environment. Still others are related to personal behaviors, such as smoking, drinking, and diet. Some factors influence risk more than others, and your risk for breast cancer can change over time, due to factors such as aging or lifestyle.

### **Risk factors you cannot change**

#### **Gender**

Simply being a woman is the main risk factor for developing breast cancer. Men can develop breast cancer, but this disease is about 100 times more common among women than men. This is probably because men have less of the female hormones estrogen and progesterone, which can promote breast cancer cell growth

## Aging

Your risk of developing breast cancer increases as you get older. About 1 out of 8 invasive breast cancers are found in women younger than 45, while about 2 of 3 invasive breast cancers are found in women age 55 or older.

## Genetic risk factors

About 5% to 10% of breast cancer cases are thought to be hereditary, meaning that they result directly from gene defects (called *mutations*) inherited from a parent. See the section, "[Do we know what causes breast cancer?](#)" for more information about genes and DNA and how they can affect breast cancer risk.

***BRCA1* and *BRCA2*:** The most common cause of hereditary breast cancer is an inherited mutation in the *BRCA1* and *BRCA2* genes. In normal cells, these genes help prevent cancer by making proteins that keep the cells from growing abnormally. If you have inherited a mutated copy of either gene from a parent, you have a high risk of developing breast cancer during your lifetime.

Although in some families with *BRCA1* mutations the lifetime risk of breast cancer is as high as 80%, on average this risk seems to be in the range of 55 to 65%. For *BRCA2* mutations the risk is lower, around 45%.

Breast cancers linked to these mutations occur more often in younger women and more often affect both breasts than cancers not linked to these mutations. Women with these inherited mutations also have an increased risk for developing other cancers, particularly ovarian cancer.

In the United States *BRCA* mutations are more common in Jewish people of Ashkenazi (Eastern Europe) origin than in other racial and ethnic groups, but they can occur in anyone.

**Changes in other genes:** Other gene mutations can also lead to inherited breast cancers. These gene mutations are much rarer and often do not

increase the risk of breast cancer as much as the BRCA genes. They are not frequent causes of inherited breast cancer.

*ATM*: The *ATM* gene normally helps repair damaged DNA. Inheriting 2 abnormal copies of this gene causes the disease ataxia-telangiectasia. Inheriting 1 mutated copy of this gene has been linked to a high rate of breast cancer in some families.

*TP53*: The *TP53* gene gives instructions for making a protein called p53 that helps stop the growth of abnormal cells. Inherited mutations of this gene cause *Li-Fraumeni syndrome* (named after the 2 researchers who first described it). People with this syndrome have an increased risk of developing breast cancer, as well as several other cancers such as leukemia, brain tumors, and sarcomas (cancer of bones or connective tissue). This is a rare cause of breast cancer.

*CHEK2*: The Li-Fraumeni syndrome can also be caused by inherited mutations in the *CHEK2* gene. Even when it does not cause this syndrome, it can increase breast cancer risk about twofold when it is mutated.

*PTEN*: The *PTEN* gene normally helps regulate cell growth. Inherited mutations in this gene can cause *Cowden syndrome*, a rare disorder in which people are at increased risk for both benign and malignant breast tumors, as well as growths in the digestive tract, thyroid, uterus, and ovaries. Defects in this gene can also cause a different syndrome called Bannayan-Riley-Ruvalcaba syndrome that is not thought to be linked to breast cancer risk.

*CDH1*: Inherited mutations in this gene cause *hereditary diffuse gastric cancer*, a syndrome in which people develop a rare type of stomach cancer at an early age. Women with mutations in this gene also have an increased risk of invasive lobular breast cancer.

*STK11*: Defects in this gene can lead to *Peutz-Jeghers syndrome*. People with this disorder develop pigmented spots on their lips and in their mouths, polyps in the urinary and gastrointestinal tracts, and have an increased risk of many types of cancer, including breast cancer.

**Genetic testing:** Genetic tests can be done to look for mutations in the *BRCA1* and *BRCA2* genes (or some other genes linked to breast cancer

risk). Although testing may be helpful in some situations, the pros and cons need to be considered carefully. For more information, see the section, "[Can breast cancer be prevented?](#)"

## **Family history of breast cancer**

Breast cancer risk is higher among women whose close blood relatives have this disease.

Having one first-degree relative (mother, sister, or daughter) with breast cancer approximately doubles a woman's risk. Having 2 first-degree relatives increases her risk about 3-fold.

The exact risk is not known, but women with a family history of breast cancer in a father or brother also have an increased risk of breast cancer. Altogether, less than 15% of women with breast cancer have a family member with this disease. This means that most (over 85%) women who get breast cancer *do not* have a family history of this disease.

## **Personal history of breast cancer**

A woman with cancer in one breast has a 3- to 4-fold increased risk of developing a new cancer in the other breast or in another part of the same breast. This is different from a recurrence (return) of the first cancer.

## **Race and ethnicity**

Overall, white women are slightly more likely to develop breast cancer than are African-American women, but African-American women are more likely to die of this cancer. However, in women under 45 years of age, breast cancer is more common in African- American women. Asian, Hispanic, and Native-American women have a lower risk of developing and dying from breast cancer.

## **Dense breast tissue**

Breasts are made up of fatty tissue, fibrous tissue, and glandular tissue. Someone is said to have dense breast tissue (as seen on a mammogram) when they have more glandular and fibrous tissue and less fatty tissue. Women with dense breasts have a higher risk of breast cancer than women with less dense breasts. Unfortunately, dense breast tissue can also make mammograms less accurate.

A number of factors can affect breast density, such as age, menopausal status, the use of drugs (such as menopausal hormone therapy), pregnancy, and genetics.

## Certain benign breast conditions

Women diagnosed with certain benign breast conditions might have an increased risk of breast cancer. Some of these conditions are more closely linked to breast cancer risk than others. Doctors often divide benign breast conditions into 3 general groups, depending on how they affect this risk.

**Non-proliferative lesions:** These conditions are not associated with overgrowth of breast tissue. They do not seem to affect breast cancer risk, or if they do, it is to a very small extent. They include:

Fibrosis and/or simple cysts (this used to be called *fibrocystic disease* or *changes*)

Mild hyperplasia

Adenosis (non-sclerosing)

Ductal ectasia

Phyllodes tumor (benign)

A single papilloma

Fat necrosis

Periductal fibrosis

Squamous and apocrine metaplasia

Epithelial-related calcifications

Other benign tumors (lipoma, hamartoma, hemangioma, neurofibroma, adenomyoepithelioma)

Mastitis (infection of the breast) is not a lesion, but is a condition that can occur that does not increase the risk of breast cancer.

**Proliferative lesions without atypia:** These conditions show excessive growth of cells in the ducts or lobules of the breast tissue. They seem to raise a woman's risk of breast cancer slightly (1½ to 2 times normal). They

include:

Usual ductal hyperplasia (without atypia)

Fibroadenoma

Sclerosing adenosis

Several papillomas (called *papillomatosis*)

Radial scar

**Proliferative lesions with atypia:** In these conditions, there is an overgrowth of cells in the ducts or lobules of the breast tissue, with some of the cells no longer appearing normal. They have a stronger effect on breast cancer risk, raising it 3½ to 5 times higher than normal. These types of lesions include:

Atypical ductal hyperplasia (ADH)

Atypical lobular hyperplasia (ALH)

Women with a family history of breast cancer and either hyperplasia or atypical hyperplasia have an even higher risk of developing a breast cancer.

For more information on these conditions, see our document, [Non-cancerous Breast Conditions](#).

## Lobular carcinoma in situ

In lobular carcinoma in situ (LCIS) cells that look like cancer cells are growing in the lobules of the milk-producing glands of the breast, but they do not grow through the wall of the lobules. LCIS (also called *lobular neoplasia*) is sometimes grouped with ductal carcinoma in situ (DCIS) as a non-invasive breast cancer, but it differs from DCIS in that it doesn't seem to become an invasive cancer if it isn't treated.

Women with this condition have a 7- to 11-fold increased risk of developing invasive cancer in either breast. For this reason, women with LCIS should make sure they have regular mammograms and doctor visits.

## Menstrual periods

Women who have had more menstrual cycles because they started menstruating early (before age 12) and/or went through menopause later (after age 55) have a slightly higher risk of breast cancer. The increase in risk may be due to a longer lifetime exposure to the hormones estrogen and progesterone.

## Previous chest radiation

Women who, as children or young adults, had radiation therapy to the chest area as treatment for another cancer (such as [Hodgkin disease](#) or [non-Hodgkin lymphoma](#)) have a significantly increased risk for breast cancer. This varies with the patient's age when they had radiation. If chemotherapy was also given, it may have stopped ovarian hormone production for some time, lowering the risk. The risk of developing breast cancer from chest radiation is highest if the radiation was given during adolescence, when the breasts were still developing. Radiation treatment after age 40 does not seem to increase breast cancer risk.

## Diethylstilbestrol exposure

From the 1940s through the 1960s some pregnant women were given the drug diethylstilbestrol (DES) because it was thought to lower their chances of miscarriage (losing the baby). These women have a slightly increased risk of developing breast cancer. Women whose mothers took DES during pregnancy may also have a slightly higher risk of breast cancer. For more information on DES see our document, [DES Exposure: Questions and Answers](#).

## Lifestyle-related factors and breast cancer risk

### Having children

Women who have had no children or who had their first child after age 30 have a slightly higher breast cancer risk. Having many pregnancies and becoming pregnant at a young age reduce breast cancer risk. Pregnancy reduces a woman's total number of lifetime menstrual cycles, which may be the reason for this effect.

### Birth control

**Oral contraceptives:** Studies have found that women using oral contraceptives (birth control pills) have a slightly greater risk of breast cancer than women who have never used them. This risk seems to go

back to normal over time once the pills are stopped. Women who stopped using oral contraceptives more than 10 years ago do not appear to have any increased breast cancer risk. When thinking about using oral contraceptives, women should discuss their other risk factors for breast cancer with their health care team.

**Depot-medroxyprogesterone acetate** (DMPA; Depo-Provera®) is an injectable form of progesterone that is given once every 3 months as birth control. A few studies have looked at the effect of DMPA on breast cancer risk. Women currently using DMPA seem to have an increase in risk, but the risk doesn't seem to be increased if this drug was used more than 5 years ago.

## **Hormone therapy after menopause**

Hormone therapy with estrogen (often combined with progesterone) has been used for many years to help relieve symptoms of menopause and to help prevent osteoporosis (thinning of the bones). Earlier studies suggested it might have other health benefits as well, but these benefits have not been found in more recent, better designed studies. This treatment goes by many names, such as *post-menopausal hormone therapy* (PHT), *hormone replacement therapy* (HRT), and *menopausal hormone therapy* (MHT).

There are 2 main types of hormone therapy. For women who still have a uterus (womb), doctors generally prescribe both estrogen and progesterone (known as *combined hormone therapy* or *HT*). Progesterone is needed because estrogen alone can increase the risk of cancer of the uterus. For women who no longer have a uterus (those who've had a hysterectomy), estrogen alone can be prescribed. This is commonly known as *estrogen replacement therapy* (ERT) or just *estrogen therapy* (ET).

**Combined hormone therapy:** Using combined hormone therapy after menopause increases the risk of getting breast cancer. It may also increase the chances of dying from breast cancer. This increase in risk can be seen with as little as 2 years of use. Combined HT also increases the likelihood that the cancer may be found at a more advanced stage.

The increased risk from combined hormone therapy appears to apply only to current and recent users. A woman's breast cancer risk seems to return to that of the general population within 5 years of stopping combined treatment.

The word *bioidentical* is sometimes used to describe versions of estrogen and progesterone with the same chemical structure as those found naturally in people. The use of these hormones has been marketed as a safe way to treat the symptoms of menopause. It is important to realize that although there are few studies comparing “bioidentical” or “natural” hormones to synthetic versions of hormones, there is no evidence that they are safer or more effective. The use of these bioidentical hormones should be assumed to have the same health risks as any other type of hormone therapy.

**Estrogen therapy (ET):** The use of estrogen alone after menopause does not appear to increase the risk of developing breast cancer. In fact, some research has suggested that women who have previously had their uterus removed and who take estrogen actually have a lower risk of breast cancer. Women taking estrogen seem to have more problems with strokes and other blood clots, though. Also, when used long term (for more than 10 years), ET has been found to increase the risk of ovarian cancer in some studies.

At this time there appear to be few strong reasons to use post-menopausal hormone therapy (either combined HT or ET), other than possibly for the short-term relief of menopausal symptoms. Along with the increased risk of breast cancer, combined HT also appears to increase the risk of heart disease, blood clots, and strokes. It does lower the risk of colorectal cancer and osteoporosis, but this must be weighed against possible harm, especially since there are other effective ways to prevent and treat osteoporosis.

Although ET does not seem to increase breast cancer risk, it does increase the risk of blood clots and stroke.

The decision to use hormone therapy after menopause should be made by a woman and her doctor after weighing the possible risks and benefits, based on the severity of her menopausal symptoms and the woman's other risk factors for heart disease, breast cancer, and osteoporosis. If a woman and her doctor decide to try hormones for symptoms of menopause, it is usually best to use it at the lowest dose needed to control symptoms and for as short a time as possible.

## **Breastfeeding**

Some studies suggest that breastfeeding may slightly lower breast cancer risk, especially if it is continued for 1½ to 2 years. But this has been a

difficult area to study, especially in countries such as the United States, where breastfeeding for this long is uncommon.

One explanation for this possible effect may be that breastfeeding reduces a woman's total number of lifetime menstrual cycles (similar to starting menstrual periods at a later age or going through early menopause).

## **Drinking alcohol**

The use of alcohol is clearly linked to an increased risk of developing breast cancer. The risk increases with the amount of alcohol consumed. Compared with non-drinkers, women who consume 1 alcoholic drink a day have a very small increase in risk. Those who have 2 to 5 drinks daily have about 1½ times the risk of women who don't drink alcohol. Excessive alcohol consumption is also known to increase the risk of developing several other types of cancer.

## **Being overweight or obese**

Being overweight or obese after menopause increases breast cancer risk. Before menopause your ovaries produce most of your estrogen, and fat tissue produces a small amount of estrogen. After menopause (when the ovaries stop making estrogen), most of a woman's estrogen comes from fat tissue. Having more fat tissue after menopause can increase your chance of getting breast cancer by raising estrogen levels. Also, women who are overweight tend to have higher blood insulin levels. Higher insulin levels have also been linked to some cancers, including breast cancer.

But the connection between weight and breast cancer risk is complex. For example, the risk appears to be increased for women who gained weight as an adult but may not be increased among those who have been overweight since childhood. Also, excess fat in the waist area may affect risk more than the same amount of fat in the hips and thighs. Researchers believe that fat cells in various parts of the body have subtle differences that may explain this.

## **Physical activity**

Evidence is growing that physical activity in the form of exercise reduces breast cancer risk. The main question is how much exercise is needed. In one study from the Women's Health Initiative, as little as 1.25 to 2.5 hours per week of brisk walking reduced a woman's risk by 18%. Walking 10 hours a week reduced the risk a little more.

## **Unclear factors**

### **Diet and vitamin intake**

Many studies have looked for a link between what women eat and breast cancer risk, but so far the results have been conflicting. Some studies have indicated that diet may play a role, while others found no evidence that diet influences breast cancer risk. Studies have looked at the amount of fat in the diet, intake of fruits and vegetables, and intake of meat. No clear link to breast cancer risk was found.

Studies have also looked at vitamin levels, again with inconsistent results. Some studies actually found an increased risk of breast cancer in women with higher levels of certain nutrients. So far, no study has shown that taking vitamins reduces breast cancer risk. This is not to say that there is no point in eating a healthy diet. A diet low in fat, low in red meat and processed meat, and high in fruits and vegetables might have other health benefits.

Most studies have found that breast cancer is less common in countries where the typical diet is low in total fat, low in polyunsaturated fat, and low in saturated fat. But many studies of women in the United States have not linked breast cancer risk to dietary fat intake. Researchers are still not sure how to explain this apparent disagreement. It may be at least partly due to the effect of diet on body weight (see below). Also, studies comparing diet and breast cancer risk in different countries are complicated by other differences (like activity level, intake of other nutrients, and genetic factors) that might also affect breast cancer risk.

More research is needed to understand the effect of the types of fat eaten on breast cancer risk. But it is clear that calories do count, and fat is a major source of calories. High-fat diets can lead to being overweight or obese, which is a breast cancer risk factor. A diet high in fat has also been shown to influence the risk of developing several other types of cancer, and intake of certain types of fat is clearly related to heart disease risk.

### **Chemicals in the environment**

A great deal of research has been reported and more is being done to understand possible environmental influences on breast cancer risk.

Compounds in the environment that have estrogen-like properties are of special interest. For example, substances found in some plastics, certain

cosmetics and personal care products, pesticides (such as DDE), and PCBs (polychlorinated biphenyls) seem to have such properties. These could in theory affect breast cancer risk.

This issue understandably invokes a great deal of public concern, but at this time research does not show a clear link between breast cancer risk and exposure to these substances. Unfortunately, studying such effects in humans is difficult. More research is needed to better define the possible health effects of these and similar substances.

## **Tobacco smoke**

For a long time, studies found no link between cigarette smoking and breast cancer. In recent years though, more studies have found that long-term heavy smoking is linked to a higher risk of breast cancer. Some studies have found that the risk is highest in certain groups, such as women who started smoking when they were young. In 2009, the International Agency for Research on Cancer concluded that there is limited evidence that tobacco smoking causes breast cancer.

An active focus of research is whether secondhand smoke increases the risk of breast cancer. Both mainstream and secondhand smoke contain chemicals that, in high concentrations, cause breast cancer in rodents. Chemicals in tobacco smoke reach breast tissue and are found in breast milk.

The evidence on secondhand smoke and breast cancer risk in human studies is controversial, at least in part because the link between smoking and breast cancer hasn't been clear. One possible explanation for this is that tobacco smoke may have different effects on breast cancer risk in smokers and in those who are just exposed to smoke.

A report from the California Environmental Protection Agency in 2005 concluded that the evidence about secondhand smoke and breast cancer is "consistent with a causal association" in younger, mainly premenopausal women. The 2006 US Surgeon General's report, *The Health Consequences of Involuntary Exposure to Tobacco Smoke*, concluded that there is "suggestive but not sufficient" evidence of a link at this point. In any case, this possible link to breast cancer is yet another reason to avoid secondhand smoke.

## **Night work**

Several studies have suggested that women who work at night—for example, nurses on a night shift—may have an increased risk of developing breast cancer. This is a fairly recent finding, and more studies are looking at this issue. Some researchers think the effect may be due to changes in levels of melatonin, a hormone whose production is affected by the body's exposure to light, but other hormones are also being studied.

## **Controversial factors**

### **Antiperspirants**

Internet e-mail rumors have suggested that chemicals in underarm antiperspirants are absorbed through the skin, interfere with lymph circulation, cause toxins to build up in the breast, and eventually lead to breast cancer.

Based on the available evidence (including what we know about how the body works), there is little if any reason to believe that antiperspirants increase the risk of breast cancer. For more information about this, see our document [\*Antiperspirants and Breast Cancer Risk\*](#).

### **Bras**

Internet e-mail rumors and at least one book have suggested that bras cause breast cancer by obstructing lymph flow. There is no good scientific or clinical basis for this claim. Women who do not wear bras regularly are more likely to be thinner or have less dense breasts, which would probably contribute to any perceived difference in risk.

### **Induced abortion**

Several studies have provided very strong data that neither induced abortions nor spontaneous abortions (miscarriages) have an overall effect on the risk of breast cancer. For more detailed information, see our document, [\*Is Abortion Linked to Breast Cancer?\*](#)

### **Breast implants**

Several studies have found that breast implants do not increase the risk of breast cancer, although silicone breast implants can cause scar tissue to form in the breast. Implants make it harder to see breast tissue on standard mammograms, but additional x-ray pictures called *implant displacement* views can be used to examine the breast tissue more

completely.

Breast implants may be linked to a rare type of lymphoma called *anaplastic large cell lymphoma*. This lymphoma has rarely been found in the breast tissue around the implants. So far, though, there are too few cases to know if the risk of this lymphoma is really higher in women that have implants.

## Do we know what causes breast cancer?

Many risk factors can increase your chance of developing breast cancer, but it is not yet known exactly how some of these risk factors cause cells to become cancerous. Hormones seem to play a role in many cases of breast cancer, but just how this happens is not fully understood.

DNA is the chemical in each of our cells that makes up our genes—the instructions for how our cells function. We usually look like our parents because they are the source of our DNA. But DNA affects more than how we look.

Some genes control when our cells grow, divide into new cells, and die. Genes that speed up cell division are called *oncogenes*. Others that slow down cell division, or cause cells to die at the right time, are called *tumor suppressor genes*. Certain changes (mutations) in DNA that “turn on” oncogenes or “turn off” tumor suppressor genes can cause normal breast cells to become cancerous.

### Inherited gene mutations

Certain inherited DNA mutations can dramatically increase the risk for developing certain cancers and are responsible for many of the cancers that run in some families. For example, the *BRCA* genes (*BRCA1* and *BRCA2*) are tumor suppressor genes. A mutation in one of these genes can be inherited from a parent. When one of these genes are mutated, it no longer suppresses abnormal growth, and cancer is more likely to develop.

Women have already begun to benefit from advances in understanding the genetic basis of breast cancer. Genetic testing can identify some women who have inherited mutations in the *BRCA1* or *BRCA2* tumor suppressor genes (or less commonly in other genes such as *PTEN* or *TP53*). These women can then take steps to reduce their risk of developing breast cancers and to monitor changes in their breasts carefully to find cancer at

an earlier, more treatable stage. These steps are discussed in later sections of this document.

Mutations in tumor suppressor genes like the *BRCA* genes are considered “high-penetrance” because they often lead to cancer. Although many of the women with high-penetrance mutations develop cancer, most cases of cancer (including breast cancer) are not caused by this kind of mutation. More often, low-penetrance mutations or gene variations are a factor in cancer development. Each of these may have a small individual effect on cancer development, but the overall effect on the population can be large because they are common, and people often are affected with more than one at the same time. The genes involved may affect things like hormone levels, metabolism or other things that interact with risk factors for breast cancer. These genes may be responsible for much of the risk of breast cancer that runs in families.

## Acquired gene mutations

Most DNA mutations related to breast cancer occur in single breast cells during a woman's life rather than having been inherited. These *acquired* mutations of oncogenes and/or tumor suppressor genes may result from other factors, like radiation or cancer-causing chemicals. But so far, the causes of most acquired mutations that could lead to breast cancer are still unknown. Most breast cancers have several acquired gene mutations.

Tests to spot acquired gene changes may help doctors more accurately predict the outlook for some women with breast cancer. For example, tests can identify women whose breast cancer cells have too many copies of the *HER2* oncogene. These cancers tend to be more aggressive. At the same time, drugs have been developed that specifically target these cancers and improve outcomes for patients.

## Can breast cancer be prevented?

There is no sure way to prevent breast cancer. But there are things all women can do that might reduce their risk and help increase the odds that if cancer does occur, it will be found at an early, more treatable stage.

## Lowering your risk

You can lower your risk of breast cancer by changing those risk factors that can be changed (see the section, "[What are the risk factors for breast](#)

cancer?").

Body weight, physical activity, and diet have all been linked to breast cancer, so these might be areas where you can take action.

Both increased body weight and weight gain as an adult are linked with a higher risk of breast cancer after menopause. Alcohol also increases risk of breast cancer. Even low levels of alcohol intake have been linked with an increase in risk.

Many studies have shown that moderate to vigorous physical activity is linked with lower breast cancer risk.

A diet that is rich in vegetables, fruit, poultry, fish, and low-fat dairy products has also been linked with a lower risk of breast cancer in some studies. But it is not clear if specific vegetables, fruits, or other foods can lower risk. Most studies have not found that lowering fat intake has much of an effect on breast cancer risk.

At this time, the best advice about diet and activity to possibly reduce the risk of breast cancer is to:

Get regular, intentional physical activity.

Reduce your lifetime weight gain by limiting your calories and getting regular physical activity.

Avoid or limit your alcohol intake.

For more information, see our document, [\*American Cancer Society Guidelines on Nutrition and Physical Activity for Cancer Prevention\*](#).

Women who choose to breastfeed for at least several months may also get an added benefit of reducing their breast cancer risk.

Not using hormone therapy after menopause can help you avoid raising your risk.

It's not clear at this time if environmental chemicals that have estrogen-like properties (like those found in some plastic bottles or certain cosmetics and personal care products) increase breast cancer risk. If there is an increased risk, it is likely to be very small. Still, women who are concerned may choose to avoid products that contain these substances when

possible.

## Finding breast cancer early

Other than lifestyle changes, the most important action a woman can take is to follow the American Cancer Society's guidelines for early detection (outlined in the section, "[Can breast cancer be found early?](#)"). Early detection will not prevent breast cancer, but it can help find it when the likelihood of successful treatment is greatest.

## For women who are or may be at increased risk

If you are a woman at increased risk for breast cancer (for example, because you have a strong family history of breast cancer, a known genetic mutation of a *BRCA* gene, or you have had DCIS, LCIS, or biopsies that have shown pre-cancerous changes), there may be some things you can do to reduce your chances of developing breast cancer. Before deciding which, if any, of these may be right for you, talk with your doctor to understand your risk and how much any of these approaches might lower this risk.

## Genetic testing for *BRCA* gene mutations

Many women may have relatives with breast cancer, but in most cases this is not the result of *BRCA* gene mutations. Genetic testing for these mutations can be expensive and the results are often not clear cut. Testing can have a wide range of consequences that need to be considered. It should only be done when there is a reasonable suspicion that a mutation may be present.

Different expert groups have different recommendations about who should be considered for genetic testing.

For example, the U.S. Preventive Services Task Force (USPSTF) has guidelines aimed at women without a history of cancer. The USPSTF recommends that women with an increased risk of having a *BRCA* mutation based on a family history of breast, ovarian, fallopian tube, and/or primary peritoneal cancer should be referred to a genetics professional about testing. The genetics professional can evaluate that risk further, discuss the pros and cons of testing if the woman is at high risk (this is called genetic counseling), and arrange for the test if the patient wished to proceed. It is important to realize that *BRCA* mutations are rare, and only a small fraction of women who have a family history of breast cancer should

be referred for genetic counseling and testing.

Other medical groups offer guidelines that include women with cancer. For example, the National Comprehensive Cancer Network guidelines advise referring women 60 and under who have triple-negative breast cancer for genetic counseling and testing.

If you are considering genetic testing, it is strongly recommended that you talk first to a genetic counselor, nurse, or doctor qualified to explain and interpret the results of these tests. It is very important to understand what genetic testing can and can't tell you, and to carefully weigh the benefits and risks of testing before these tests are done. Testing is expensive and may not be covered by some health insurance plans.

Most large cancer centers employ a genetic counselor who will assess your risk of carrying a mutated *BRCA* gene, explain the risks and benefits of testing, and check with your insurance company to see if they will cover the test.

For more information, see our document, [Genetic Testing: What You Need to Know](#). You might also want to visit the [National Cancer Institute Web site](#).

## Breast cancer chemoprevention

Chemoprevention is the use of drugs to reduce the risk of cancer. Several drugs have been studied for lowering breast cancer risk.

**Tamoxifen:** [Tamoxifen](#) blocks some of the effects of estrogen on breast tissue. It has been used for many years to reduce the risk of recurrence in localized breast cancer and as a treatment for advanced breast cancer when the tumor is estrogen-receptor positive (see the section, "[How is breast cancer treated?](#)").

Tamoxifen can also lower the risk of getting breast cancer in women who are at increased risk for the disease. It seems to affect the risk of breast cancers that are estrogen receptor–positive (ER-positive), but not those that are estrogen receptor–negative (ER-negative). Most breast cancers that occur in women after menopause are ER-positive.

Results from the Breast Cancer Prevention Trial (BCPT) have shown that women at increased risk for breast cancer are less likely to develop the disease if they take tamoxifen. Women in the study took either tamoxifen

or a placebo pill for 5 years. After 7 years of follow-up, women taking tamoxifen had 42% fewer breast cancers than women who took the placebo, although there was no difference in the risk of dying from breast cancer. Tamoxifen is approved by the US Food and Drug Administration (FDA) for reducing breast cancer risk in women at high risk. It can be used in women even if they haven't gone through menopause.

Tamoxifen has side effects that include increased risks of endometrial (uterine) cancer (in women who have gone through menopause) and serious blood clots, so women should consider the possible benefits and risks of tamoxifen before deciding if it is right for them.

Tamoxifen seems to reduce breast cancer risk in women with *BRCA2* gene mutations who have never had breast cancer, but the same may not be true for those with *BRCA1* mutations.

**Raloxifene:** Like tamoxifen, [raloxifene](#) (Evista®) also blocks the effect of estrogen on breast tissue. A study comparing the effectiveness of the 2 drugs in women after menopause, called the Study of Tamoxifen and Raloxifene (STAR) trial, found that raloxifene worked nearly as well as tamoxifen in reducing the risk of invasive breast cancer and non-invasive cancer (DCIS). Raloxifene also had lower risks of certain side effects such as uterine cancer and blood clots in the legs or lungs, compared to tamoxifen (although the risk of blood clots was still higher than normal). Like tamoxifen, it only lowers the risk of ER-positive breast cancer and not ER-negative tumors.

Raloxifene is FDA approved to help reduce breast cancer risk in women past menopause who have osteoporosis (bone thinning) or are at high risk for breast cancer.

**Aromatase inhibitors:** Drugs such as [anastrozole](#) (Arimidex®), [letrozole](#) (Femara®), and [exemestane](#) (Aromasin®) are also being studied as breast cancer chemopreventive agents in post-menopausal women. These drugs, called aromatase inhibitors, are already being used to help prevent breast cancer recurrences. They work by blocking the production of small amounts of estrogen that post-menopausal women normally make. A recent study showed exemestane can lower the risk of invasive breast cancer by 65% in post-menopausal women who have an increased risk for breast cancer. Like tamoxifen and raloxifene, exemestane lowered the risk of breast cancers that are ER-positive, but not those that are ER-negative.

Exemestane and the other aromatase inhibitors can also have side effects,

such as joint pain and stiffness. These drugs also can cause bone loss, leading to a higher risk of osteoporosis and even broken bones. None of these drugs is currently FDA-approved for reducing the risk of developing breast cancer.

**Other drugs:** Studies are looking at other drugs as well. For example, some studies have found that women who take aspirin or non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen seem to have a lower risk of breast cancer. Studies have also looked to see if drugs called *bisphosphonates* may lower the risk of breast cancer. Bisphosphonates are mainly used to treat osteoporosis, but they are also used to treat breast cancer that has spread to the bone. These, as well as several other drugs and dietary supplements, are being studied to see if they can lower breast cancer risk, but none is approved for reducing breast cancer risk at this time.

Many of the drugs mentioned here are discussed further in the section, "[How is breast cancer treated?](#)" For more information on the possible benefits and risks of chemopreventive drugs see our document, [Medicines to Reduce Breast Cancer Risk](#).

## **Preventive surgery for women with very high breast cancer risk**

For the few women who have a very high risk for breast cancer, surgery to remove the breasts or ovaries may be an option.

**Preventive (prophylactic) mastectomy:** Removing both breasts before cancer is diagnosed can greatly reduce the risk of breast cancer (by up to 97%). Some women diagnosed with cancer in one breast choose to have the other, healthy breast removed as well to prevent a second breast cancer. Breast removal does not completely prevent breast cancer because even a very careful surgeon will leave behind at least a few breast cells. The cells can go on to become cancerous. Some of the reasons for considering this type of surgery may include:

- Mutated *BRCA* genes found by genetic testing

- Strong family history (breast cancer in several close relatives)

- Lobular carcinoma in situ (LCIS) seen on biopsy

- Previous cancer in one breast (especially in someone with a

strong family history)

This type of surgery has been shown to be helpful in studies of large groups of women with certain conditions, but there is no way to know ahead of time if this surgery will benefit any one woman. Some women with *BRCA* mutations will develop breast cancer early in life, and have a very high risk of getting a second breast cancer. A prophylactic mastectomy before the cancer occurs might add many years to their lives. But while most women with *BRCA* mutations develop breast cancer, some don't. These women would not benefit from the surgery, but they would still have to deal with its aftereffects.

Second opinions are strongly recommended before any woman decides to have this surgery. The American Cancer Society Board of Directors has stated that "only very strong clinical and/or pathologic indications warrant doing this type of preventive operation." Nonetheless, after careful consideration, this might be the right choice for some women.

**Prophylactic oophorectomy (ovary removal):** Women with a *BRCA* mutation may reduce their risk of breast cancer by 50% or more by having their ovaries surgically removed before menopause. This is likely because the surgery removes the main sources of estrogen in the body (the ovaries).

It is important that women with a *BRCA* mutation recognize they also have a high risk of developing ovarian cancer. Most doctors recommend that women with *BRCA* mutations have their ovaries surgically removed once they finish having children to lower this risk.

## Can breast cancer be found early?

Screening refers to tests and exams used to find a disease, like cancer, in people who do not have any symptoms. The goal of screening exams, such as mammograms, is to find cancers before they start to cause symptoms. Breast cancers that are found because they can be felt tend to be larger and are more likely to have already spread beyond the breast. In contrast, breast cancers found during screening exams are more likely to be small and still confined to the breast. The size of a breast cancer and how far it has spread are important factors in predicting the prognosis (outlook) for a woman with this disease.

Most doctors feel that early detection tests for breast cancer save many

thousands of lives each year, and that many more lives could be saved if even more women and their health care providers took advantage of these tests. Following the American Cancer Society's guidelines for the early detection of breast cancer improves the chances that breast cancer can be diagnosed at an early stage and treated successfully.

## **American Cancer Society recommendations for early breast cancer detection**

**Women age 40 and older should have a screening mammogram every year and should continue to do so for as long as they are in good health.**

Current evidence supporting mammograms is even stronger than in the past. In particular, recent evidence has confirmed that mammograms offer substantial benefit for women in their 40s. Women can feel confident about the benefits associated with regular mammograms for finding cancer early. However, mammograms also have limitations. A mammogram will miss some cancers, and it sometimes leads to follow up of findings that are not cancer, including biopsies.

Women should be told about the benefits, limitations, and potential harms linked with regular screening. Mammograms can miss some cancers. But despite their limitations, they remain a very effective and valuable tool for decreasing suffering and death from breast cancer.

Mammograms for older women should be based on the individual, her health, and other serious illnesses, such as congestive heart failure, end-stage renal disease, chronic obstructive pulmonary disease, and moderate-to-severe dementia. Age alone should not be the reason to stop having regular mammograms. As long as a woman is in good health and would be a candidate for treatment, she should continue to be screened with a mammogram.

**Women in their 20s and 30s should have a clinical breast exam (CBE) as part of a periodic (regular) health exam by a health professional, at least every 3 years. After age 40, women should have a breast exam by a health professional every year.**

CBE is a complement to mammograms and an opportunity for women and their doctor or nurse to discuss changes in their breasts, early detection testing, and factors in the woman's history that might make her more likely to have breast cancer.

There may be some benefit in having the CBE shortly before the mammogram. The exam should include instruction for the purpose of getting more familiar with your own breasts. Women should also be given information about the benefits and limitations of CBE and breast self-exam (BSE). Breast cancer risk is very low for women in their 20s and gradually increases with age. Women should be told to promptly report any new breast symptoms to a health professional.

**Breast self-exam (BSE) is an option for women starting in their 20s. Women should be told about the benefits and limitations of BSE. Women should report any breast changes to their health professional right away.**

Research has shown that BSE plays a small role in finding breast cancer compared with finding a breast lump by chance or simply being aware of what is normal for each woman. Some women feel very comfortable doing BSE regularly (usually monthly after their period) which involves a systematic step-by-step approach to examining the look and feel of their breasts. Other women are more comfortable simply looking and feeling their breasts in a less systematic approach, such as while showering or getting dressed or doing an occasional thorough exam.

Sometimes, women are so concerned about "doing it right" that they become stressed over the technique. Doing BSE regularly is one way for women to know how their breasts normally look and feel and to notice any changes. The goal, with or without BSE, is to report any breast changes to a doctor or nurse right away.

Women who choose to do BSE should have their BSE technique reviewed during their physical exam by a health professional. It is okay for women to choose not to do BSE or not to do it on a regular schedule. However, by doing the exam regularly, you get to know how your breasts normally look and feel and you can more readily detect any signs or symptoms if a change occurs, such as development of a lump or swelling, skin irritation or dimpling, nipple pain or retraction (turning inward), redness or scaliness of the nipple or breast skin, or a discharge other than breast milk. Should

you notice any changes you should see your health care provider as soon as possible for evaluation. Remember that most of the time, however, these breast changes are not cancer.

**Women at high risk for breast cancer based on certain factors should get an MRI and a mammogram every year.**

This includes women who:

Have a lifetime risk of breast cancer of about 20% to 25% or greater, according to risk assessment tools that are based mainly on family history (see below)

Have a known *BRCA1* or *BRCA2* gene mutation

Have a first-degree relative (parent, brother, sister, or child) with a *BRCA1* or *BRCA2* gene mutation, but have not had genetic testing themselves

Had radiation therapy to the chest when they were between the ages of 10 and 30 years

Have Li-Fraumeni syndrome, Cowden syndrome, or Bannayan-Riley-Ruvalcaba syndrome, or have first-degree relatives with one of these syndromes

**The American Cancer Society recommends against MRI screening for women whose lifetime risk of breast cancer is less than 15%.**

**There is not enough evidence to make a recommendation for or against yearly MRI screening for women who have a moderately increased risk of breast cancer (a lifetime risk of 15% to 20% according to risk assessment tools that are based mainly on family history) or who may be at increased risk of breast cancer based on certain factors, such as:**

Having a personal history of breast cancer, ductal carcinoma in situ (DCIS), lobular carcinoma in situ (LCIS), atypical ductal hyperplasia (ADH), or atypical lobular hyperplasia (ALH)

Having dense breasts (“extremely” or “heterogeneously” dense) as seen on a mammogram

If MRI is used, it should be in addition to, not instead of, a screening

mammogram. This is because while an MRI is a more sensitive test (it's more likely to detect cancer than a mammogram), it may still miss some cancers that a mammogram would detect.

For most women at high risk, screening with MRI and mammograms should begin at age 30 years and continue for as long as a woman is in good health. But because the evidence is limited about the best age at which to start screening, this decision should be based on shared decision making between patients and their health care providers, taking into account personal circumstances and preferences.

Several risk assessment tools, with names like the Gail model, the Claus model, and the Tyrer-Cuzick model, are available to help health professionals estimate a woman's breast cancer risk. These tools give approximate, rather than precise, estimates of breast cancer risk based on different combinations of risk factors and different data sets.

Because the different tools use different risk factors to estimate risk, they may give different risk estimates for the same woman. For example, the Gail model bases its risk estimates on certain personal risk factors, like current age, age at menarche (first menstrual period) and history of prior breast biopsies, along with any history of breast cancer in first-degree relatives. In contrast, the Claus model estimates risk based only on family history of breast cancer in both first and second-degree relatives. These 2 models could easily give different estimates for the same person.

Risk assessment tools (like the Gail model, for example) that are not based mainly on family history are not appropriate to use with the ACS guidelines to decide if a woman should have MRI screening. The use of any of the risk assessment tool and its results should be discussed by a woman and her doctor.

It is recommended that women who get screening MRI do so at a facility that can do an MRI-guided breast biopsy at the same time if needed. Otherwise, the woman will have to have a second MRI exam at another facility at the time of biopsy.

There is no evidence right now that MRI is an effective screening tool for women at average risk. MRI is more sensitive than mammograms, but it also has a higher false-positive rate (it is more likely to find something that turns out not to be cancer). This would lead to unneeded biopsies and other tests in many of these women, which can lead to a lot of worry and anxiety.

The American Cancer Society believes the use of mammograms, MRI (in women at high risk), clinical breast exams, and finding and reporting breast changes early, according to the recommendations outlined above, offers women the best chance to reduce their risk of dying from breast cancer. This combined approach is clearly better than any one exam or test alone.

Without question, a breast physical exam without a mammogram would miss the opportunity to detect many breast cancers that are too small for a woman or her doctor to feel but can be seen on mammograms. Although mammograms are a sensitive screening method, a small percentage of breast cancers do not show up on mammograms but can be felt by a woman or her doctors. For women at high risk of breast cancer, like those with *BRCA* gene mutations or a strong family history, both MRI and mammogram exams of the breast are recommended.

## Mammograms

A mammogram is an x-ray of the breast. A diagnostic mammogram is used to diagnose breast disease in women who have breast symptoms or an abnormal result on a screening mammogram. Screening mammograms are used to look for breast disease in women who are asymptomatic; that is, they appear to have no breast problems. Screening mammograms usually take 2 views (x-ray pictures taken from different angles) of each breast, while diagnostic mammograms may take more views of the breast. For some patients, such as women with breast implants, more pictures may be needed to include as much breast tissue as possible. Women who are breastfeeding can still get mammograms, but these are probably not quite as accurate because the breast tissue tends to be dense.

Breast x-rays have been done for more than 70 years, but the modern mammogram has only existed since 1969. That was the first year x-ray units specifically for breast imaging were available. Modern mammogram equipment designed for breast x-rays uses very low levels of radiation, usually a dose of about 0.1 to 0.2 rads per picture (a rad is a measure of radiation dose).

Strict guidelines ensure that mammogram equipment is safe and uses the lowest dose of radiation possible. Many people are concerned about the exposure to x-rays, but the level of radiation used in modern mammograms does not significantly increase the risk for breast cancer.

To put dose into perspective, if a woman with breast cancer is treated with radiation, she will receive around 5,000 rads. If she had yearly

mammograms beginning at age 40 and continuing until she was 90, she will have received 20 to 40 rads.

For a mammogram, the breast is pressed between 2 plates to flatten and spread the tissue. This may be uncomfortable for a moment, but it is necessary to produce a good, readable mammogram. The compression only lasts a few seconds. The entire procedure for a screening mammogram takes about 20 minutes. This procedure produces a black and white image of the breast tissue either on a large sheet of film or as a digital computer image that is read, or interpreted, by a radiologist (a doctor trained to interpret images from x-rays, ultrasound, MRI, and related tests).

## **Digital mammograms**

A digital mammogram (also known as a *full-field digital mammogram*, or *FFDM*) is like a standard mammogram in that x-rays are used to produce an image of your breast. The differences are in the way the image is recorded, viewed by the doctor, and stored.

Standard mammograms are recorded on large sheets of photographic film. Digital mammograms are recorded and stored on a computer. After the exam, the doctor can look at them on a computer screen and adjust the image size, brightness, or contrast to see certain areas more clearly. Digital images can also be sent electronically to another site for a remote consultation with breast specialists. Most centers offer the digital option, but it may not be available everywhere.

Although digital mammograms have some advantages, it is important to remember that a standard film mammogram also is effective. Nobody should miss having a regular mammogram because a digital mammogram is not available.

## **What the doctor looks for on your mammogram**

The doctor reading your mammogram will look for several types of changes:

Calcifications are tiny mineral deposits within the breast tissue, which look like small white spots on the films. They may or may not be caused by cancer. There are 2 types of calcifications:

Macrocalcifications are coarse (larger) calcium deposits that

are most likely changes in the breasts caused by aging of the breast arteries, old injuries, or inflammation. These deposits are related to non-cancerous conditions and do not require a biopsy. About half the women over 50, and in about 1 of 10 women under 50 have macrocalcifications.

Microcalcifications are tiny specks of calcium in the breast. They may appear alone or in clusters. Microcalcifications seen on a mammogram are of more concern, but still usually do not mean that cancer is present. The shape and layout of microcalcifications help the radiologist judge how likely it is cancer is present. If the calcifications look suspicious for cancer, a biopsy will be done.

A *mass*, which may occur with or without calcifications, is another important change seen on a mammogram. Masses can be many things, including cysts (non-cancerous, fluid-filled sacs) and non-cancerous solid tumors (such as fibroadenomas), but they could also be cancer.

Cysts can be simple fluid-filled sacs (known as *simple cysts*) or can be partially solid (known as *complex cysts*). Simple cysts are benign and don't need to be biopsied. Any other type of mass (such as a complex cyst or a solid tumor) might need to be biopsied to be sure it isn't cancer.

A cyst and a tumor can feel alike on a physical exam. They can also look the same on a mammogram. To confirm that a mass is really a cyst, a breast ultrasound is often done. Another option is to remove (aspirate) the fluid from the cyst with a thin, hollow needle.

If a mass is not a simple cyst (that is, if it is at least partly solid), then you may need to have more imaging tests. Some masses can be watched with periodic mammograms, while others may need to be biopsied. The size, shape, and margins (edges) of the mass help the radiologist determine if cancer is likely to be present.

Having your previous mammograms available for the radiologist is very important. They can show that a mass or calcification has not changed for many years. This would mean that it is probably a benign condition and a biopsy is not needed.

Your mammogram report may also contain an assessment of breast density or state that you have "dense breasts." Breast density is based on how much of your breast is made up fatty tissue vs. how much is fibrous and glandular tissue.

Dense breasts are not abnormal and about half of women have dense breasts on a mammogram. Although dense breast tissue can make it harder to find cancers on a mammogram, at this time, experts do not agree what other tests, if any, should be done in addition to mammograms in women with dense breasts.

## Limitations of mammograms

A mammogram cannot prove that an abnormal area is cancer. To confirm cancer is present, a small amount of tissue must be removed and looked at under a microscope. This procedure, called a *biopsy*, is described in the section, "[How is breast cancer diagnosed?](#)"

You should also be aware that mammograms are done to find breast cancers that cannot be felt. If you have a breast lump, you should have it checked by your doctor and consider having it biopsied even if your mammogram result is normal.

For some women, such as those with breast implants, additional pictures may be needed. Breast implants make it harder to see breast tissue on standard mammograms, but additional x-ray pictures with implant displacement and compression views can be used to more completely examine the breast tissue.

Mammograms are not perfect at finding breast cancer. They do not work as well in women with dense breasts, since dense breasts can hide a tumor. Dense breasts are more common in younger women, pregnant women and women who are breastfeeding, but any woman can have dense breasts.

This can be a problem for younger women who need breast screening because they are at high risk for breast cancer (because of gene mutations, a strong family history of breast cancer, or other factors). This is one of the reasons that the American Cancer Society recommends MRI scans in addition to mammograms for screening in these women. (MRI scans are described below.)

At this time, American Cancer Society guidelines do not have recommendations for additional testing to screen women with dense breasts who aren't at high risk of breast cancer from other factors.

For more information on these tests, also see the section, "[How is breast cancer diagnosed?](#)" and our document, [Mammograms and Other Breast](#)

## *Imaging Procedures.*

### **What to expect when you have a screening mammogram**

To have a mammogram you must undress above the waist. The facility will give you a wrap to wear.

A technologist will be there to position your breasts for the mammogram. Most technologists are women. You and the technologist are the only ones in the room during the mammogram.

To get a high-quality mammogram picture with excellent image quality, it is necessary to flatten the breast slightly. The technologist places the breast on the mammogram machine's lower plate, which is made of metal and has a drawer to hold the x-ray film or the camera to produce a digital image. The upper plate, made of plastic, is lowered to compress the breast for a few seconds while the technician takes a picture.

The whole procedure takes about 20 minutes. The actual breast compression only lasts a few seconds.

You will feel some discomfort when your breasts are compressed, and for some women compression can be painful. Try not to schedule a mammogram when your breasts are likely to be tender, as they can be just before or during your period.

All mammogram facilities are now required to send your results to you within 30 days. Generally, you will be contacted within 5 working days if there is a problem with the mammogram.

Being called back for more testing does not mean that you have cancer. In fact, less than 10% of women who are called back for more tests are found to have breast cancer. Being called back occurs fairly often, and it usually just means an additional image or an ultrasound needs to be done to look at an area more clearly. This is more common for first mammograms (or when there is no previous mammogram to look at) and in mammograms done in women before menopause. It may be slightly less common for digital mammograms.

Of every 1,000 mammograms, only 2 to 4 lead to a diagnosis of cancer.

If you are a woman aged 40 or over, you should get a mammogram every year. You can schedule the next one while you're at the facility and/or request a reminder.

## **Tips for having a mammogram**

Here are some useful suggestions for making sure that you will receive a quality mammogram:

If it is not posted visibly near the receptionist's desk, ask to see the US Food and Drug Administration (FDA) certificate that is issued to all facilities that offer mammography. The FDA requires all facilities to meet high professional standards of safety and quality in order to be a provider of mammography services. A facility may not provide mammography without certification.

Use a facility that either specializes in mammography or does many mammograms a day.

If you are satisfied that the facility is of high quality, continue to go there on a regular basis so that your mammograms can be compared from year to year.

If you are going to a facility for the first time, bring a list of the places, dates of mammograms, biopsies, or other breast treatments you have had before.

If you have had mammograms at another facility, you should make every attempt to get those mammograms to bring with you to the new facility (or have them sent there) so that they can be compared to the new ones.

On the day of the exam don't wear deodorant or antiperspirant. Some of these contain substances that can interfere with the reading of the mammogram by appearing on the x-ray film as white spots.

You may find it easier to wear a skirt or pants, so that you'll only need to remove your blouse for the exam.

Schedule your mammogram when your breasts are not tender or swollen to help reduce discomfort and to ensure a good picture. Try to avoid the week just before your period.

Always describe any breast symptoms or problems that you

are having to the technologist who is doing the mammogram. Be prepared to describe any medical history that could affect your breast cancer risk — such as surgery, hormone use, or family or personal history of breast cancer. Discuss any new findings or problems in your breasts with your doctor or nurse before having a mammogram.

If you do not hear from your doctor within 10 days, do not assume that your mammogram was normal—call your doctor or the facility.

## **Help with mammogram costs**

Medicare, Medicaid, and most private health insurance plans cover mammogram costs or a percentage of them. Low-cost mammograms are available in most communities. Call us at 1-800-227-2345 for information about facilities in your area.

Breast cancer screening is now more available to medically underserved women through the National Breast and Cervical Cancer Early Detection Program (NBCCEDP). This program screens women without health insurance for breast and cervical cancer for free or at very low cost. Although the program is administered by each state, the Centers for Disease Control and Prevention (CDC) match funds and support for each state program. Each state's Department of Health has information on how to contact the nearest program.

The program is only designed to provide screening. But if a cancer is discovered, it will cover further diagnostic testing and a surgical consultation.

The Breast and Cervical Cancer Prevention and Treatment Act gives states Medicaid funds to pay for treating breast and cervical cancers that are detected through the NBCCEDP. This helps women focus on fighting their disease, instead of worrying about how to pay for treatment. All states participate in this program.

To learn more about these programs, please contact the CDC at 1-800-CDC INFO (1-800-232-4636) or online at [www.cdc.gov/cancer/nbccedp](http://www.cdc.gov/cancer/nbccedp).

## **Clinical breast exam**

A clinical breast exam (CBE) is an exam of your breasts by a health care

professional, such as a doctor, nurse practitioner, nurse, or doctor's assistant. For this exam, you undress from the waist up. The health care professional will first look at your breasts for abnormalities in size or shape, or changes in the skin of the breasts or nipple. Then, using the pads of the fingers, the examiner will gently feel (palpate) your breasts.

Special attention will be given to the shape and texture of the breasts, location of any lumps, and whether such lumps are attached to the skin or to deeper tissues. The area under both arms will also be examined.

The CBE is a good time for women who don't know how to examine their breasts to learn the proper technique from their health care professionals. Ask your doctor or nurse to teach you and watch your technique.

## **Breast awareness and self-exam**

Beginning in their 20s, women should be told about the benefits and limitations of breast self-exam (BSE). Women should know how their breasts normally look and feel and report any new breast changes to a health professional as soon as they are found. Finding a breast change does not necessarily mean there is a cancer.

A woman can notice changes by being aware of how her breasts normally look and feel and by feeling her breasts for changes (breast awareness), or by choosing to use a step-by-step approach (with a BSE) and using a specific schedule to examine her breasts.

If you choose to do BSE, the information below is a step-by-step approach for the exam. The best time for a woman to examine her breasts is when they are not tender or swollen. Women who examine their breasts should have their technique reviewed during their periodic health exams by their health care professional.

Women with breast implants can do BSE, too. It may be helpful to have the surgeon help identify the edges of the implant so that you know what you are feeling. There is some thought that the implants push out the breast tissue and may actually make it easier to examine. Women who are pregnant or breastfeeding can also choose to examine their breasts regularly.

It is acceptable for women to choose not to do BSE or to do BSE once in a while. Women who choose not to do BSE should still be aware of the normal look and feel of their breasts and report any changes to their doctor

right away.

## How to examine your breasts

Lie down and place your right arm behind your head. The exam is done while lying down, not standing up. This is because when lying down the breast tissue spreads evenly over the chest wall and is as thin as possible, making it much easier to feel all the breast tissue.

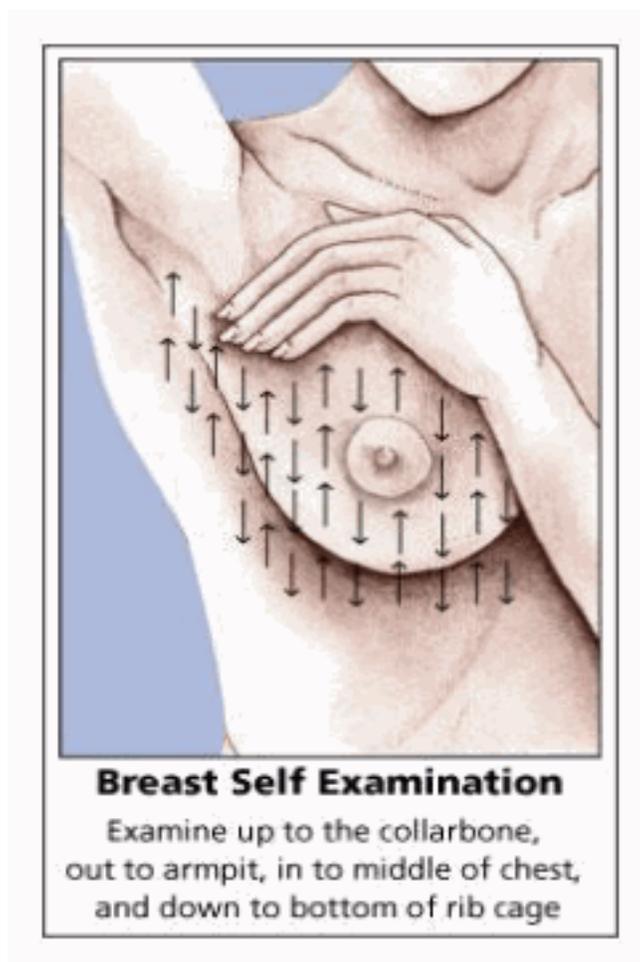
Use the finger pads of the 3 middle fingers on your left hand to feel for lumps in the right breast. Use overlapping dime-sized circular motions of the finger pads to feel the breast tissue.



Use 3 different levels of pressure to feel all the breast tissue.

Light pressure is needed to feel the tissue closest to the skin; medium pressure to feel a little deeper; and firm pressure to feel the tissue closest to the chest and ribs. It is normal to feel a firm ridge in the lower curve of each breast, but you should tell your doctor if you feel anything else out of the ordinary. If you're not sure how hard to press, talk with your doctor or nurse. Use each pressure level to feel the breast tissue before moving on to the next spot.

Move around the breast in an up and down pattern starting at an imaginary line drawn straight down your side from the underarm and moving across the breast to the middle of the chest bone (sternum or breastbone). Be sure to check the entire breast area going down until you feel only ribs and up to the neck or collar bone (clavicle).



There is some evidence to suggest that the up-and-down pattern (sometimes called the *vertical pattern*) is the most effective pattern for covering the entire breast, without missing any breast

tissue.

Repeat the exam on your left breast, putting your left arm behind your head and using the finger pads of your right hand to do the exam.

While standing in front of a mirror with your hands pressing firmly down on your hips, look at your breasts for any changes of size, shape, contour, or dimpling, or redness or scaliness of the nipple or breast skin. (The pressing down on the hips position contracts the chest wall muscles and enhances any breast changes.)

Examine each underarm while sitting up or standing and with your arm only slightly raised so you can easily feel in this area. Raising your arm straight up tightens the tissue in this area and makes it harder to examine.

This procedure for doing breast self-exam is different from some previous recommendations. These changes represent an extensive review of the medical literature and input from an expert advisory group. There is evidence that this position (lying down), the area felt, pattern of coverage of the breast, and use of different amounts of pressure increase a woman's ability to find abnormal areas.

## **Magnetic resonance imaging (MRI)**

MRI scans use radio waves and strong magnets instead of x-rays. The energy from the radio waves is absorbed and then released in a pattern formed by the type of body tissue and by certain diseases. A computer translates the pattern into a very detailed image of parts of the body. For breast MRI to look for cancer, a contrast liquid called *gadolinium* is injected into a vein before or during the scan to show details better.

MRI scans can take a long time – often up to an hour. For a breast MRI, you have to lie inside a narrow tube, face down on a platform specially designed for the procedure. The platform has openings for each breast that allow them to be imaged without compression. The platform contains the sensors needed to capture the MRI image. It is important to remain very still throughout the exam.

Lying in the tube can feel confining and might upset people with claustrophobia (a fear of enclosed spaces). The machine also makes loud buzzing and clicking noises that you may find disturbing. Some places will

give you headphones with music to block this noise out. MRIs are also expensive, although insurance plans generally pay for them in some situations, such as once cancer is diagnosed.

MRI machines are quite common, but they need to be specially adapted to look at the breast. It's important that MRI scans of the breast be done on one of these specially adapted machines and that the MRI facility can also do a MRI guided biopsy if it is needed. Otherwise, the entire scan will need to be repeated at another facility when the biopsy is done.

For certain women at high risk for breast cancer, screening MRI is recommended along with a yearly mammogram. It is not generally recommended as a screening tool by itself, because although it is a sensitive test, it may still miss some cancers that mammograms would detect. (For more details on how a breast MRI is done, see the section, "[How is breast cancer diagnosed?](#)")

MRI is more sensitive in detecting cancers than mammograms, but it is more likely to find something that turns out not to be cancer (called a *false positive*). These false positive findings have to be checked out to know that cancer isn't present, which means coming back for further tests and/or biopsies. This is why MRI is not recommended as a screening test for women at average risk of breast cancer, as it would result in unneeded biopsies and other tests in a large portion of these women.

MRI is more expensive than mammography. Most insurance that pays for mammogram screening will also pay for MRI screening if a woman can be shown to be at high risk, but it's a good idea to check first with your insurance company before having the test. It can help to go to a center with a high-risk clinic, where the staff can help getting approval for breast MRIs

## Signs and symptoms of breast cancer

Widespread use of screening mammograms has increased the number of breast cancers found before they cause any symptoms. Still, some breast cancers are not found by mammogram, either because the test was not done or because, even under ideal conditions, mammograms do not find every breast cancer.

The most common symptom of breast cancer is a new **lump** or mass. A painless, hard mass that has irregular edges is more likely to be

cancerous, but breast cancers can be tender, soft, or rounded. They can even be painful. For this reason, it is important to have any new breast mass or lump or breast change checked by a health care professional experienced in diagnosing breast diseases.

Other possible signs of breast cancer include:

- Swelling of all or part of a breast (even if no distinct lump is felt)
- Skin irritation or dimpling
- Breast or nipple pain
- Nipple retraction (turning inward)
- Redness, scaliness, or thickening of the nipple or breast skin
- Nipple discharge (other than breast milk)

Sometimes a breast cancer can spread to lymph nodes under the arm or around the collar bone and cause a lump or swelling there, even before the original tumor in the breast tissue is large enough to be felt. Swollen lymph nodes should also be reported to your doctor.

Although any of these symptoms can be caused by things other than breast cancer, if you have them, they should be reported to your doctor so that he or she can find the cause.

## How is breast cancer diagnosed?

Breast cancer is sometimes found after symptoms appear, but many women with early breast cancer have no symptoms. This is why getting the recommended screening tests (as described in the section, "[Can breast cancer be found early?](#)") before any symptoms develop is so important.

If something suspicious is found during a screening exam, or if you have any of the symptoms of breast cancer described in the previous section, your doctor will use one or more methods to find out if the disease is present. If cancer is found, other tests will be done to determine the stage (extent) of the cancer.

### Medical history and physical exam

If you think you have any signs or symptoms that might mean breast cancer, be sure to see your doctor as soon as possible. Your doctor will ask you questions about your symptoms, any other health problems, and possible risk factors for benign breast conditions or breast cancer.

Your breasts will be thoroughly examined for any lumps or suspicious areas and to feel their texture, size, and relationship to the skin and chest muscles. Any changes in the nipples or the skin of your breasts will be noted. The lymph nodes in your armpit and above your collarbones may be palpated (felt), because enlargement or firmness of these lymph nodes might indicate spread of breast cancer. Your doctor will also do a complete physical exam to judge your general health and whether there is any evidence of cancer that may have spread.

If breast symptoms and/or the results of your physical exam suggest breast cancer might be present, more tests will probably be done. These might include imaging tests, looking at samples of nipple discharge, or doing biopsies of suspicious areas.

## **Imaging tests used to evaluate breast disease**

Imaging tests use x-rays, magnetic fields, sound waves, or radioactive substances to create pictures of the inside of your body. Imaging tests may be done for a number of reasons, including to help find out whether a suspicious area might be cancerous, to learn how far cancer may have spread, and to help determine if treatment is working.

### **Diagnostic mammograms**

A mammogram is an x-ray of the breast. Screening mammograms are used to look for breast disease in women who have no signs or symptoms of a breast problem. Screening mammograms usually take 2 views (x-ray pictures taken from different angles) of each breast.

Diagnostic mammograms are used to diagnose breast disease in women who have breast symptoms (like a lump or nipple discharge) or an abnormal result on a screening mammogram. A diagnostic mammogram includes more images of the area of concern. In some cases, special images known as *cone* or *spot views with magnification* are used to make a small area of abnormal breast tissue easier to evaluate.

A diagnostic mammogram can show:

That the abnormality is not worrisome at all. In these cases the woman can usually return to having routine yearly mammograms.

That a lesion (area of abnormal tissue) has a high likelihood of being benign (not cancer). In these cases, it is common to ask the woman to come back sooner than usual for her next mammogram, usually in 4 to 6 months.

That the lesion is more suspicious, and a biopsy is needed to tell if it is cancer.

Even if the mammograms show no tumor, if you or your doctor can feel a lump, a biopsy is usually needed to make sure it isn't cancer. One exception would be if an ultrasound exam finds that the lump is a simple cyst (a fluid-filled sac), which is very unlikely to be cancerous.

## **Magnetic resonance imaging (MRI) of the breast**

Breast MRI was discussed in detail in the section, "[Can breast cancer be found early?](#)"

MRI can be used along with mammograms for screening women who have a high risk of developing breast cancer, or it can be used to better examine suspicious areas found by a mammogram. MRI is also sometimes used for women who have been diagnosed with breast cancer to better determine the actual size of the cancer and to look for any other cancers in the breast. It is not yet clear how helpful this is in planning surgery in someone known to have breast cancer. In someone known to have breast cancer, it is sometimes used to look at the opposite breast, to be sure that it does not contain any tumors.

If an abnormal area in the breast is found, it can often be biopsied using an MRI for guidance. This is discussed in more detail in the "Biopsy" section.

## **Breast ultrasound**

Ultrasound, also known as *sonography*, uses sound waves to outline a part of the body. For this test, a small, microphone-like instrument called a *transducer* is placed on the skin (which is often first lubricated with ultrasound gel). It emits sound waves and picks up the echoes as they bounce off body tissues. The echoes are converted by a computer into a black and white image that is displayed on a computer screen. This test is painless and does not expose you to radiation.

Ultrasound has become a valuable tool to use along with mammography because it is widely available and less expensive than other options, such as MRI. The use of ultrasound instead of mammograms for breast cancer screening is not recommended. Usually, breast ultrasound is used to target a specific area of concern found on the mammogram. Ultrasound helps distinguish between cysts (fluid-filled sacs) and solid masses and sometimes can help tell the difference between benign and cancerous tumors.

Ultrasound may be most helpful in women with very dense breasts. Clinical trials are now looking at the benefits and risks of adding breast ultrasound to screening mammograms in women with dense breasts and a higher risk of breast cancer.

## Ductogram

This test, also called a *galactogram*, sometimes helps determine the cause of nipple discharge. In this test a very thin plastic tube is placed into the opening of the duct in the nipple that the discharge is coming from. A small amount of contrast medium is injected, which outlines the shape of the duct on an x-ray image and shows if there is a mass inside the duct.

## Newer imaging tests

Newer tests like scintimammography and tomosynthesis are not used commonly and are still being studied to determine their usefulness. They are described in the section, "[What's new in breast cancer research and treatment?](#)"

## Other tests

These tests may be done for the purposes of research, but they have not yet been found to be helpful in diagnosing breast cancer in most women.

## Nipple discharge exam

If you are having nipple discharge, some of the fluid may be collected and looked at under a microscope to see if any cancer cells are in it. Most nipple discharges or secretions are not cancer. In general, if the secretion appears milky or clear green, cancer is very unlikely. If the discharge is red or red-brown, suggesting that it contains blood, it might possibly be caused by cancer, although an injury, infection, or benign tumors are more likely causes.

Even when no cancer cells are found in a nipple discharge, doctors cannot be sure breast cancer is not present. If a patient has a suspicious mass, it will be necessary to biopsy the mass, even if the nipple discharge does not contain cancer cells.

## **Ductal lavage and nipple aspiration**

Ductal lavage is an experimental test developed for women who have no symptoms of breast cancer but are at very high risk for the disease. It is not a test to screen for or diagnose breast cancer, but it may help give a more accurate picture of a woman's risk of developing it.

Ductal lavage can be done in a doctor's office or an outpatient facility. An anesthetic cream is applied to numb the nipple area. Gentle suction is then used to help draw tiny amounts of fluid from the milk ducts up to the nipple surface, which helps locate the ducts' natural openings. A tiny tube (called a *catheter*) is then inserted into a duct opening. Saline (salt water) is slowly infused into the catheter to gently rinse the duct and collect cells. The ductal fluid is drawn through the catheter and sent to a lab, where the cells are looked at under a microscope.

Ductal lavage is not done if a woman isn't at high risk for breast cancer. It is not clear if it will ever be useful. The test has not been shown to detect cancer early. It is more likely to be helpful as a test of cancer risk rather than as a screening test for cancer. More studies are needed to better define the usefulness of this test.

Nipple aspiration also looks for abnormal cells developing in the ducts, but is much simpler, because nothing is inserted into the breast. The device for nipple aspiration uses small cups that are placed on the woman's breasts. The device warms the breasts, gently compresses them, and applies light suction to bring nipple fluid to the surface of the breast. The nipple fluid is then collected and sent to a lab for analysis. As with ductal lavage, the procedure may be useful as a test of cancer risk but is not an appropriate screening test for cancer. The test has not been shown to detect cancer early.

## **Biopsy**

A biopsy is done when mammograms, other imaging tests, or the physical exam finds a breast change (or abnormality) that is possibly cancer. A biopsy is the only way to tell if cancer is really present.

During a biopsy, a sample of the suspicious area is removed to be looked at under a microscope, by a specialized doctor with many years of training called a *pathologist*. The pathologist sends your doctor a report that gives a diagnosis for each sample taken. Information in this report will be used to help manage your care. For information to help you understand your pathology report, see [Breast Pathology](#) on our website or call 1-800-227-2345.

There are several types of biopsies, such as fine needle aspiration biopsy, core (large needle) biopsy, and surgical biopsy. Each has its pros and cons. The choice of which to use depends on your specific situation. Some of the factors your doctor will consider include how suspicious the lesion appears, how large it is, where in the breast it is located, how many lesions are present, other medical problems you might have, and your personal preferences. You might want to discuss the pros and cons of different biopsy types with your doctor.

Often, after the tissue sample is removed, the doctor will place a tiny metal clip or marker at the biopsy site. The clip cannot be felt and should not cause any problems, but it is helpful in finding the area again on future mammograms and for surgery. Some patients who have cancer are given chemotherapy or other treatments before surgery that can shrink the tumor so much that it can't be felt or seen on mammogram. The clip can be used to direct the surgeon to the area where the tumor was so the correct area of the breast can be removed.

## **Fine needle aspiration biopsy**

In a fine needle aspiration (FNA) biopsy, the doctor uses a very thin, hollow needle attached to a syringe to withdraw (aspirate) a small amount of tissue from a suspicious area, which is then looked at under a microscope. The needle used for an FNA biopsy is thinner than the one used for blood tests.

If the area to be biopsied can be felt, the needle can be guided into the area of the breast change while the doctor is feeling (palpating) it.

If the lump can't be felt easily, the doctor might use ultrasound to watch the needle on a screen as it moves toward and into the mass.

A local anesthetic (numbing medicine) may or may not be used. Because such a thin needle is used for the biopsy, the process of getting the anesthetic may actually be more uncomfortable than the biopsy itself.

Once the needle is in place, fluid is drawn out. If the fluid is clear, the lump is probably a benign cyst. Bloody or cloudy fluid can mean either a benign cyst or, very rarely, a cancer. If the lump is solid, small tissue fragments are drawn out. A pathologist will look at the biopsy tissue or fluid under a microscope to determine if it is cancerous.

An FNA biopsy is the easiest type of biopsy to have, but it has some disadvantages. It can sometimes miss a cancer if the needle is not placed among the cancer cells. And even if cancer cells are found, it is usually not possible to determine if the cancer is invasive. In some cases there may not be enough cells to perform some of the other lab tests that are routinely done on breast cancer specimens. If the FNA biopsy does not provide a clear diagnosis, or your doctor is still suspicious, a second biopsy or a different type of biopsy should be done.

## **Core needle biopsy**

A core biopsy uses a larger needle to sample breast changes felt by the doctor or pinpointed by ultrasound or mammogram. (When mammograms taken from different angles are used to pinpoint the biopsy site, this is known as a stereotactic core needle biopsy.) In some centers, the biopsy can be guided by an MRI scan.

The needle used in core biopsies is larger than the one used in FNA. It removes a small cylinder (core) of tissue (about 1/16- to 1/8-inch in diameter and 1/2-inch long) from a breast abnormality. Several cores are often removed. The biopsy is done using local anesthesia (you are awake but the area is numbed) in an outpatient setting.

Because it removes larger pieces of tissue, a core needle biopsy is more likely than an FNA to provide a clear diagnosis, although it might still miss some cancers.

## **Vacuum-assisted biopsies**

Vacuum-assisted biopsies can be done with systems such as the Mammotome® or ATEC® (Automated Tissue Excision and Collection). For these procedures the skin is numbed and a small incision (about 1/4 inch) is made. A hollow probe is inserted through the incision into the abnormal area of breast tissue. The probe can be guided into place using x-rays or ultrasound (or MRI in the case of the ATEC system). A cylinder of tissue is then suctioned in through a hole in the side of the probe, and a rotating knife within the probe cuts the tissue sample from the rest of the breast.

Several samples can be taken from the same incision. Vacuum-assisted biopsies are done as an outpatient procedure. No stitches are needed, and there is minimal scarring. This method usually removes more tissue than core biopsies.

## **Surgical (open) biopsy**

Usually, breast cancer can be diagnosed using needle biopsy. Rarely, surgery is needed to remove all or part of the lump for microscopic examination. This is referred to as a *surgical biopsy* or an *open biopsy*. Most often, the surgeon removes the entire mass or abnormal area as well as a surrounding margin of normal-appearing breast tissue. This is called an *excisional biopsy*. If the mass is too large to be removed easily, only part of it may be removed. This is called an *incisional biopsy*.

In rare cases, a surgical biopsy can be done in the doctor's office, but it is most often done in the hospital's outpatient department under local anesthesia (you are awake, but your breast is numbed), often with intravenous sedation (medicine given to make you drowsy). This type of biopsy can also be done under general anesthesia (you are asleep).

If the breast change cannot be felt, a mammogram may be used to place a wire into the correct area to guide the surgeon. This technique is called *wire localization* or *stereotactic wire localization*. After the area is numbed with local anesthetic, a thin hollow needle is placed in the breast, and x-ray views are used to guide the needle to the suspicious area. Once the tip of the needle is in the right spot, a thin wire is inserted through the center of the needle. A small hook at the end of the wire keeps it in place. The hollow needle is then removed. The surgeon can then use the wire as a guide to the abnormal area to be removed. The surgical specimen is sent to the lab to be looked at under a microscope (see below).

A surgical biopsy is more involved than an FNA biopsy or a core needle biopsy. It typically requires several stitches and may leave a scar. The larger the amount of tissue removed, the more likely it is that you will notice a change in the shape of your breast afterward.

Core needle biopsy is usually enough to make a diagnosis, but sometimes an open biopsy may be needed depending on where the lesion is, or if a core biopsy is not conclusive.

All biopsies can cause bleeding and can lead to swelling. This can make it seem like the breast lump is larger after the biopsy. This is generally

nothing to worry about and the bleeding and bruising resolve quickly in most cases.

## **Lymph node biopsy**

If the lymph nodes under the arm are enlarged (either by feel or on an imaging test like mammography or ultrasound), they may be checked for cancer spread. Most often, a needle biopsy is done at the time of the needle biopsy of the breast tumor.

Even if no lymph nodes are enlarged, the lymph nodes under the arm are usually checked for cancer spread when the breast tumor is removed at surgery. This is done with a sentinel lymph node biopsy and/or an axillary lymph node dissection. These procedures are described in detail in the section, "[How is breast cancer treated?](#)"

## **Laboratory examination of breast cancer tissue**

The biopsy samples of breast tissue are looked at in the lab to determine whether breast cancer is present and if so, what type it is. Certain lab tests may be done that can help determine how quickly a cancer is likely to grow and (to some extent) what treatments are likely to be effective. Sometimes these tests aren't done until the entire tumor is removed by either breast-conserving surgery or mastectomy.

If a benign condition is diagnosed, you will need no further treatment. Still, it is important to find out from your doctor if the benign condition puts you at higher risk for breast cancer in the future and what type of follow-up you might need.

If the diagnosis is cancer, there should be time for you to learn about the disease and to discuss treatment options with your cancer care team, friends, and family. It is usually not necessary to rush into treatment. You might want to get a second opinion before deciding what treatment is best for you.

## **Breast cancer type**

The tissue removed during the biopsy (or during surgery) is first looked at under a microscope to see if cancer is present and whether it is a carcinoma or some other type of cancer (like a sarcoma). If there is enough tissue, the pathologist may be able to determine if the cancer is in situ (not invasive) or invasive. The biopsy is also used to determine the

cancer's type, such as invasive ductal carcinoma or invasive lobular carcinoma. The different types of breast cancer are defined in the section, "[What is breast cancer?](#)"

With an FNA biopsy, not as many cells are removed and they often become separated from the rest of the breast tissue, so it is often only possible to say that cancer cells are present without being able to say if the cancer is in situ or invasive.

The most common types of breast cancer, invasive ductal and invasive lobular cancer, generally are treated in the same way.

## **Breast cancer grade**

A pathologist also assigns a grade to the cancer, which is based on how closely the biopsy sample looks like normal breast tissue and how rapidly the cancer cells are dividing. The grade can help predict a woman's prognosis. In general, a lower grade number indicates a slower-growing cancer that is *less* likely to spread, while a higher number indicates a faster-growing cancer that is *more* likely to spread. The tumor grade is one factor in deciding if further treatment is needed after surgery.

Histologic tumor grade (sometimes called the *Bloom-Richardson grade*, *Nottingham grade*, *Scarff-Bloom-Richardson grade*, or *Elston-Ellis grade*) is based on the arrangement of the cells in relation to each other: whether they form tubules; how closely they resemble normal breast cells (nuclear grade); and how many of the cancer cells are in the process of dividing (mitotic count). This system of grading is used for invasive cancers but not for in situ cancers.

Grade 1 (well differentiated) cancers have relatively normal-looking cells that do not appear to be growing rapidly and are arranged in small tubules.

Grade 2 (moderately differentiated) cancers have features between grades 1 and 3.

Grade 3 (poorly differentiated) cancers, the highest grade, lack normal features and tend to grow and spread more aggressively.

## **Ductal carcinoma in situ (DCIS)**

DCIS is also graded, but the grade is based only on how abnormal the

cancer cells appear (nuclear grade). The presence of necrosis (areas of dead or dying cancer cells) is also noted. The term *comedocarcinoma* is often used to describe DCIS with necrosis. If a breast duct is filled with a plug of dead and dying cells, the term *comedonecrosis* may be used. The terms *comedocarcinoma* and *comedonecrosis* are linked to a higher grade of DCIS.

Other important factors that can affect the prognosis for a woman with DCIS, include the surgical margin (how close the cancer is to the edge of the specimen) and the size (amount of breast tissue affected by DCIS). In situ cancers that are large, have a high nuclear grade, or necrosis are more likely to contain an area of invasive cancer and are also more likely to come back after treatment. If cancer cells are at or near the edge of the sample it also raises the risk of DCIS coming back later.

## **Estrogen receptor (ER) and progesterone receptor (PR) status**

Receptors are proteins in or on certain cells that can attach to certain substances, such as hormones, that circulate in the blood. Normal breast cells and some breast cancer cells contain receptors that attach to estrogen and progesterone. These 2 hormones often fuel the growth of breast cancer cells.

An important step in evaluating a breast cancer is to test a portion of the cancer removed during the biopsy (or surgery) to see if they have estrogen and progesterone receptors. Cancer cells may contain neither, one, or both of these receptors. Breast cancers that have estrogen receptors are often referred to as *ER-positive* (or ER+) cancers, while those containing progesterone receptors are called *PR-positive* (or PR+) cancers. If either type of receptor is present, the cancer is said to be *hormone receptor-positive*.

Hormone receptor–positive breast cancers tend to grow more slowly and are much more likely to respond to hormone therapy than breast cancers without these receptors.

All breast cancers, should be tested for these hormone receptors either on the biopsy sample or when they are removed with surgery. About 2 of 3 breast cancers have at least one of these receptors. This percentage is higher in older women than in younger women.

## HER2/neu status

About 1 of 5 breast cancers have too much of a growth-promoting protein called HER2/neu (often just shortened to HER2). The *HER2/neu* gene instructs the cells to make this protein. Tumors with increased levels of HER2/neu are referred to as *HER2-positive*.

Women with HER2-positive breast cancers have too many copies of the *HER2/neu* gene, resulting in greater than normal amounts of the HER2/neu protein. These cancers tend to grow and spread more aggressively than other breast cancers.

All newly diagnosed breast cancers should be tested for HER2/neu because HER2-positive cancers are much more likely to benefit from treatment with drugs that target the HER2/neu protein, such as [trastuzumab](#) (Herceptin®) and [lapatinib](#) (Tykerb®). See the section, "[How is breast cancer treated?](#)" for more information on these drugs.

A biopsy or surgery sample is usually tested in 1 of 2 ways:

Immunohistochemistry (IHC): In this test, special antibodies that identify the HER2/neu protein are applied to the sample, which cause cells to change color if many copies are present. This color change can be seen under a microscope. The test results are reported as 0, 1+, 2+, or 3+.

Fluorescent in situ hybridization (FISH): This test uses fluorescent pieces of DNA that specifically stick to copies of the *HER2/neu* gene in cells, which can then be counted under a special microscope.

Many breast cancer specialists feel the FISH test is more accurate than IHC. However, it is more expensive and takes longer to get the results. Often the IHC test is used first. If the results are 1+ (or 0), the cancer is considered HER2-negative. People with HER2-negative tumors are not treated with drugs (like trastuzumab) that target HER2. If the test comes back 3+, the cancer is HER2-positive. Patients with HER2-positive tumors may be treated with drugs like trastuzumab. When the result is 2+, the HER2 status of the tumor is not clear. This usually leads to testing the tumor with FISH. Some institutions also use FISH to confirm HER2 status that is 3+ by IHC and some perform only FISH.

A newer type of test, known as *chromogenic in situ hybridization (CISH)*,

works similarly to FISH, by using small DNA probes to count the number of *HER2* genes in breast cancer cells. But this test looks for color changes (not fluorescence) and doesn't require a special microscope, which could make it less expensive. Right now, it is not being used as much as IHC or FISH.

## Tests of ploidy and cell proliferation rate

The ploidy of cancer cells refers to the amount of DNA they contain. If there's a normal amount of DNA in the cells, they are said to be *diploid*. If the amount is abnormal, then the cells are described as *aneuploid*. Tests of ploidy may help determine prognosis, but they rarely change treatment and are considered optional. They are not usually recommended as part of a routine breast cancer work-up.

The *S-phase fraction* is the percentage of cells in a sample that are replicating (copying) their DNA. DNA replication means that the cell is getting ready to divide into 2 new cells. The rate of cancer cell division can also be estimated by a Ki-67 test. If the S-phase fraction or Ki-67 labeling index is high, it means that the cancer cells are dividing more rapidly, which indicates a more aggressive cancer.

## Tests of gene patterns

Researchers have found that looking at the patterns of a number of different genes at the same time (sometimes referred to as *gene expression profiling*) can help predict whether or not an early-stage breast cancer is likely to come back after initial treatment. Two such tests, which look at different sets of genes, are now available: the Oncotype DX® and the MammaPrint®

**Oncotype DX®:** The Oncotype DX test may be helpful when deciding whether additional (adjuvant) treatment with chemotherapy (after surgery) might be useful in women with certain early-stage breast cancers that usually have a low chance of coming back (such as those that are hormone receptor-positive).

The test looks at a set of 21 genes in cells from tumor samples to determine a 'recurrence score', which is a number between 0 and 100:

Women with a recurrence score of 17 or below have a low risk of recurrence (cancer coming back after treatment) if they are treated with hormone therapy. These women would probably not

benefit from chemotherapy.

Women with a score of 18 to 30 are at intermediate risk and some might benefit from chemotherapy.

Women with a score of 31 or more are at high risk and are likely to benefit from chemotherapy in addition to hormone therapy.

The test estimates risk and helps predict who would be likely to benefit from chemotherapy. Still, it cannot tell for certain if any particular woman will have a recurrence with or without chemotherapy. It is a tool that can be used, along with other factors, to help guide women and their doctors when deciding whether more treatment might be useful.

**MammaPrint®:** This test can be used to help determine how likely breast cancers are to recur in a distant part of the body after initial treatment.

The test looks at the activity of 70 different genes to determine if the cancer is low risk or high risk. So far though, it hasn't been studied to see if the results are useful in guiding treatment.

**Usefulness of these tests:** Many doctors use these tests (along with other information) to help make decisions about offering chemotherapy, but they aren't needed in all cases. These tests are now being looked at further in large clinical trials. In the meantime, women might want to ask their doctors if these tests might be useful for them.

## Classifying breast cancer

Research on patterns of gene expression has also suggested some newer ways to classify breast cancers. The current types of breast cancer are based largely on how tumors look under a microscope. A newer classification, based on molecular features, divides breast cancers into 4 groups. This testing, called the *PAM50*, is currently available but it isn't clear that it is any more helpful in guiding treatment than tests of hormone receptors and HER2:

**Luminal A and luminal B types:** The luminal types are estrogen receptor (ER)-positive. The gene expression patterns of these cancers are similar to normal cells that line the breast ducts and glands (the inside of a duct or gland is called its *lumen*). Luminal A cancers are low grade, tend to grow fairly slowly, and have the best prognosis. Luminal B cancers generally grow somewhat faster than luminal A cancers and their outlook is not quite as good.

**HER2 type:** These cancers have extra copies of the *HER2* gene and sometimes some others. They usually have a high-grade appearance under the microscope. These cancers tend to grow more quickly and have a worse prognosis, although they often can be treated successfully with [targeted therapies](#) such as trastuzumab (Herceptin) and lapatinib (Tykerb) which are usually given along with chemotherapy.

**Basal type:** Most of these cancers are of the so-called *triple-negative* type, that is, they lack estrogen or progesterone receptors and have normal amounts of HER2. The gene expression patterns of these cancers are similar to cells in the deeper basal layers of breast ducts and glands. This type is more common among women with *BRCA1* gene mutations. For reasons that are not well understood, this cancer is also more common among younger and African-American women.

These are high-grade cancers that tend to grow quickly and have a poor outlook. Hormone therapy and anti-HER2 therapies like trastuzumab and lapatinib are not effective against these cancers, although chemotherapy can be helpful. A great deal of research is being done to find better ways to treat these cancers.

It is hoped that these new breast cancer classifications might someday allow doctors to better tailor breast cancer treatments, but more research is needed in this area before this will be possible.

## **More on testing biopsy tissue to classify cancer**

For more information on how biopsy tissue is looked at and tested by pathologists, see our document [Testing Biopsy and Cytology Specimens for Cancer](#).

## **Imaging tests that look for breast cancer spread**

Once breast cancer is diagnosed, one or more of the following tests may be done. These tests aren't often done for early breast cancer. Which tests (if any) are done depends on how likely it is the cancer has spread, based on the size of the tumor, the presence of lymph node spread, and any symptoms you are having.

### **Chest x-ray**

This test may be done to see whether the breast cancer has spread to your lungs.

## **Mammogram**

If they haven't been done already, more extensive mammograms may be done to get more thorough views of the breasts. This is to check for any other abnormal areas that could be cancer as well. This test is described in the section, "[How is breast cancer diagnosed?](#)"

## **Bone scan**

A bone scan can help show if a cancer has spread (metastasized) to your bones. It can be more useful than standard x-rays because it can show all of the bones of the body at the same time and can find small areas of cancer spread not seen on plain x-rays.

For this test, a small amount of low-level radioactive material is injected into a vein (intravenously, or IV). The substance settles in areas of bone changes throughout the entire skeleton in a couple of hours. You then lie on a table for about 30 minutes while a special camera detects the radioactivity and creates a picture of your skeleton.

Areas of bone changes appear as "hot spots" on your skeleton—that is, they attract the radioactivity. These areas may suggest the presence of metastatic cancer, but arthritis or other bone diseases can also cause the same pattern. To distinguish between these conditions, your cancer care team may use other imaging tests such as simple x-rays or CT or MRI scans to get a better look at the areas that light up, or they may even take biopsy samples of the bone.

## **Computed tomography (CT) scan**

The CT scan is an x-ray test that produces detailed cross-sectional images of your body. Instead of taking one picture, like a regular x-ray, a CT scanner takes many pictures as it rotates around you while you lie on a table. A computer then combines these pictures into images of slices of the part of your body being studied. In women with breast cancer, this test is most often used to look at the chest and/or abdomen to see if the cancer has spread to other organs such as the lungs or liver.

A CT scanner has been described as a large donut, with a narrow table in the middle opening. You will need to lie still on the table while the scan is being done. CT scans take longer than regular x-rays, and you might feel a bit confined by the ring while the pictures are being taken.

Before the test, you may be asked to drink 1 to 2 pints of a liquid called *oral contrast*. This helps outline the intestine so that certain areas are not mistaken for tumors. You may also receive an IV (intravenous) line through which a different kind of contrast dye (IV contrast) is injected. This helps better outline structures in your body.

The injection might cause some flushing (a feeling of warmth, especially in the face). Some people are allergic and get hives. Rarely, more serious reactions like trouble breathing or low blood pressure can occur. Medicine can be given to prevent and treat allergic reactions. Be sure to tell the doctor if you have ever had a reaction to any contrast material used for x-rays.

**CT guided needle biopsy:** If an abnormality is seen on a CT scan, but it is not clear if it is cancer, it may need to be biopsied. The CT scan can guide a biopsy needle precisely into a suspected area of cancer spread. For this procedure, you stay on the CT scanning table while a radiologist advances a biopsy needle through the skin and toward the location of the mass. CT scans are repeated until the doctors are sure that the needle is within the mass. The biopsy sample is then removed and sent to be looked at under a microscope.

## **Magnetic resonance imaging (MRI) scan**

MRI scans use radio waves and strong magnets instead of x-rays to take pictures of the body. This use of this test to look at the breast was discussed in the section “Can breast cancer be found early?”

MRI scans are also used to look for cancer that has spread to various parts of the body, just like CT scans. MRI scans are particularly helpful in looking at the brain and spinal cord.

There are some differences in using this test to look at the breast and other areas of the body. First, you lie face up in the machine. Second, the contrast material called *gadolinium* is not always needed to look at other areas of the body. Also, you might have the option of having the scan in a less confining machine known as an "open" MRI machine. The images from an open machine are not always as good, though, so this might not always be an option.

## **Ultrasound**

The use of this test to look at the breast was discussed earlier in this

section. But ultrasound can also be used to look for cancer that has spread to some other parts of the body.

Abdominal ultrasound can be used to look for tumors in your liver or other abdominal organs. When you have an abdominal ultrasound exam, you simply lie on a table and a technician moves the transducer on the skin over the part of your body being examined. Usually, the skin is first lubricated with gel.

## **Positron emission tomography (PET) scan**

For a PET scan, glucose (a form of sugar) that contains a radioactive atom is injected into the bloodstream. Because cancer cells grow rapidly, they absorb large amounts of the radioactive sugar. After about an hour, a special camera is used to create a picture of areas of radioactivity in the body.

A PET scan is useful when your doctor thinks the cancer might have spread but doesn't know where. The picture is not finely detailed like a CT or MRI scan, but it provides helpful information about your whole body. Some newer machines are able to do both a PET and CT scan at the same time (PET/CT scan). This lets the radiologist compare areas of higher radioactivity on the PET with the appearance of that area on the CT.

So far, most studies show PET scans aren't very helpful in early breast cancer, but they may be used for very large tumors, inflammatory breast cancer, or for breast cancers that are known to have spread.

## **How is breast cancer staged?**

The stage describes the extent of the cancer in the body. It is based on whether the cancer is invasive or non-invasive, the size of the tumor, how many lymph nodes are involved, and if it has spread to other parts of the body. The cancer's stage is one of the most important factors in determining prognosis and treatment options.

Staging is the process of finding out how widespread a cancer is when it is diagnosed. Depending on the results of your physical exam and biopsy, your doctor may want you to have certain imaging tests such as a chest x-ray, mammograms of both breasts, bone scans, computed tomography (CT) scans, magnetic resonance imaging (MRI), and/or positron emission tomography (PET) scans. Blood tests may also be done to evaluate your

overall health and sometimes can indicate if the cancer has spread to certain organs.

## **The American Joint Committee on Cancer (AJCC) TNM system**

A staging system is a standardized way for the cancer care team to summarize information about how far a cancer has spread. The most common system used to describe the stages of breast cancer is the American Joint Committee on Cancer (AJCC) TNM system.

The stage of a breast cancer can be based either on the results of physical exam, biopsy, and imaging tests (called the *clinical stage*), or on the results of these tests plus the results of surgery (called the *pathologic stage*). The staging described here is the pathologic stage, which includes the findings after surgery, when the pathologist has looked at the breast mass and nearby lymph nodes. Pathologic staging is likely to be more accurate than clinical staging, as it allows the doctor to get a firsthand impression of the extent of the cancer.

The TNM staging system classifies cancers based on their T, N, and M stages:

The letter T followed by a number from 0 to 4 describes the tumor's size and spread to the skin or to the chest wall under the breast. Higher T numbers mean a larger tumor and/or wider spread to tissues near the breast.

The letter N followed by a number from 0 to 3 indicates whether the cancer has spread to lymph nodes near the breast and, if so, how many lymph nodes are affected.

The letter M followed by a 0 or 1 indicates whether the cancer has spread to distant organs -- for example, the lungs or bones.

### **Primary tumor (T) categories:**

**TX:** Primary tumor cannot be assessed.

**T0:** No evidence of primary tumor.

**Tis:** Carcinoma in situ (DCIS, LCIS, or Paget disease of the nipple with no associated tumor mass)

**T1** (includes T1a, T1b, and T1c): Tumor is 2 cm (3/4 of an inch) or less across.

**T2:** Tumor is more than 2 cm but not more than 5 cm (2 inches) across.

**T3:** Tumor is more than 5 cm across.

**T4** (includes T4a, T4b, T4c, and T4d): Tumor of any size growing into the chest wall or skin. This includes inflammatory breast cancer.

### **Nearby lymph nodes (N; based on looking at them under a microscope):**

Lymph node staging for breast cancer has changed as technology has evolved. Earlier methods were useful in finding large deposits of cancer cells in the lymph nodes, but could miss microscopic areas of cancer spread. Newer methods have made it possible to find smaller and smaller deposits of cancer cells. Experts haven't been sure what to do with the new information. Do tiny deposits of cancer cells affect outlook the same way that larger deposits do? How much cancer in the lymph node is needed to see a change in outlook or treatment?

These questions are still being studied, but for now, a deposit of cancer cells must contain at least 200 cells or be at least 0.2 mm across (less than 1/100 of an inch) for it to change the N stage. An area of cancer spread that is smaller than 0.2 mm (or less than 200 cells) doesn't change the stage, but is recorded with abbreviations that reflect the way the cancer spread was detected. The abbreviation "i+" means that a small number of cancer cells (called *isolated tumor cells*) were seen in routine stains or when a special type of staining technique, called *immunohistochemistry*, was used.

The abbreviation "mol+" is used if the cancer could only be found using a technique called *RT-PCR*. RT-PCR is a molecular test that can find very small numbers of cells that cannot be seen even using special stains. However, this test is not often used for finding breast cancer cells in lymph nodes because the results do not influence treatment decisions.

If the area of cancer spread is at least 0.2 mm (or 200 cells), but still not larger than 2 mm, it is called a *micrometastasis* (one mm is about the size of the width of a grain of rice). Micrometastases are counted only if there aren't any larger areas of cancer spread. Areas of cancer spread larger than 2 mm are known to affect outlook and do change the N stage. These

larger areas are sometimes called *macrometastases*, but are more often just called *metastases*.

**NX:** Nearby lymph nodes cannot be assessed (for example, if they were removed previously).

**N0:** Cancer has not spread to nearby lymph nodes.

**N0(i+):** Tiny amounts of cancer are found in underarm lymph nodes by using either routine or special stains. The area of cancer spread contains less than 200 cells and is smaller than 0.2 mm.

**N0(mol+):** Cancer cells cannot be seen in underarm lymph nodes (even using special stains), but traces of cancer cells were detected using RT-PCR.

**N1:** Cancer has spread to 1 to 3 axillary (underarm) lymph node(s), and/or tiny amounts of cancer are found in internal mammary lymph nodes (those near the breast bone) on sentinel lymph node biopsy.

**N1mi:** Micrometastases (tiny areas of cancer spread) in 1 to 3 lymph nodes under the arm. The areas of cancer spread in the lymph nodes are 2 mm or less across (but at least 200 cancer cells or 0.2mm across).

**N1a:** Cancer has spread to 1 to 3 lymph nodes under the arm with at least one area of cancer spread greater than 2 mm across.

**N1b:** Cancer has spread to internal mammary lymph nodes, but this spread could only be found on sentinel lymph node biopsy (it did not cause the lymph nodes to become enlarged).

**N1c:** Both N1a and N1b apply.

**N2:** Cancer has spread to 4 to 9 lymph nodes under the arm, or cancer has enlarged the internal mammary lymph nodes (either N2a or N2b, but not both).

**N2a:** Cancer has spread to 4 to 9 lymph nodes under the arm, with at least one area of cancer spread larger than 2 mm.

**N2b:** Cancer has spread to one or more internal mammary lymph nodes, causing them to become enlarged.

**N3:** Any of the following:

**N3a:** either

Cancer has spread to 10 or more axillary lymph nodes, with at least one area of cancer spread greater than 2mm, OR

Cancer has spread to the lymph nodes under the clavicle (collar bone), with at least one area of cancer spread greater than 2mm.

**N3b:** either:

Cancer is found in at least one axillary lymph node (with at least one area of cancer spread greater than 2 mm) and has enlarged the internal mammary lymph nodes, OR

Cancer has spread to 4 or more axillary lymph nodes (with at least one area of cancer spread greater than 2 mm), and tiny amounts of cancer are found in internal mammary lymph nodes on sentinel lymph node biopsy.

**N3c:** Cancer has spread to the lymph nodes above the clavicle with at least one area of cancer spread greater than 2mm.

## **Metastasis (M):**

**MX:** Distant spread (metastasis) cannot be assessed.

**M0:** No distant spread is found on x-rays (or other imaging procedures) or by physical exam.

**cM0(i +):** Small numbers of cancer cells are found in blood or bone marrow (found only by special tests), or tiny areas of cancer spread (no larger than 0.2 mm) are found in lymph nodes away from the breast.

**M1:** Cancer has spread to distant organs. (The most common sites are bone, lung, brain, and liver.)

## **Breast cancer stage grouping**

Once the T, N, and M categories have been determined, this information is combined in a process called *stage grouping*. Cancers with similar stages tend to have a similar outlook and are often treated in a similar way. Stage is expressed in Roman numerals from stage I (the least advanced stage) to stage IV (the most advanced stage). Non-invasive cancer is listed as

stage 0.

**Stage 0: Tis, N0, M0:** This is *ductal carcinoma in situ (DCIS)*, a pre-cancer of the breast. Many consider DCIS the earliest form of breast cancer. In DCIS, cancer cells are still within a duct and have not invaded deeper into the surrounding fatty breast tissue. *Lobular carcinoma in situ (LCIS)* sometimes also is classified as stage 0 breast cancer, but most oncologists believe it is not a true cancer or pre-cancer. Paget disease of the nipple (without an underlying tumor mass) is also stage 0. In all cases the cancer has not spread to lymph nodes or distant sites.

**Stage IA: T1, N0, M0:** The tumor is 2 cm (about 3/4 of an inch) or less across (T1) and has not spread to lymph nodes (N0) or distant sites (M0).

**Stage IB: T0 or T1, N1mi, M0:** The tumor is 2 cm or less across (or is not found) (T0 or T1) with micrometastases in 1 to 3 axillary lymph nodes (the cancer in the lymph nodes is greater than 0.2mm across and/or more than 200 cells but is not larger than 2 mm)(N1mi). The cancer has not spread to distant sites (M0).

**Stage IIA:** One of the following applies:

**T0 or T1, N1 (but not N1mi), M0:** The tumor is 2 cm or less across (or is not found) (T1 or T0) and either:

It has spread to 1 to 3 axillary lymph nodes, with the cancer in the lymph nodes larger than 2 mm across (N1a), OR

Tiny amounts of cancer are found in internal mammary lymph nodes on sentinel lymph node biopsy (N1b), OR

It has spread to 1 to 3 lymph nodes under the arm and to internal mammary lymph nodes (found on sentinel lymph node biopsy) (N1c).

**OR**

**T2, N0, M0:** The tumor is larger than 2 cm but less than 5 cm across (T2) but hasn't spread to the lymph nodes (N0).

The cancer hasn't spread to distant sites (M0).

**Stage IIB:** One of the following applies:

**T2, N1, M0:** The tumor is larger than 2 cm but less than 5 cm across (T2). It has spread to 1 to 3 axillary lymph nodes and/or tiny amounts of cancer are found in internal mammary lymph nodes on sentinel lymph node biopsy (N1). The cancer hasn't spread to distant sites (M0).

**OR**

**T3, N0, M0:** The tumor is larger than 5 cm across but does not grow into the chest wall or skin and has not spread to lymph nodes (T3, N0). The cancer hasn't spread to distant sites (M0).

**Stage IIIA:** One of the following applies:

**T0 to T2, N2, M0:** The tumor is not more than 5 cm across (or cannot be found) (T0 to T2). It has spread to 4 to 9 axillary lymph nodes, or it has enlarged the internal mammary lymph nodes (N2). The cancer hasn't spread to distant sites (M0).

**OR**

**T3, N1 or N2, M0:** The tumor is larger than 5 cm across but does not grow into the chest wall or skin (T3). It has spread to 1 to 9 axillary nodes, or to internal mammary nodes (N1 or N2). The cancer hasn't spread to distant sites (M0).

**Stage IIIB: T4, N0 to N2, M0:** The tumor has grown into the chest wall or skin (T4), and one of the following applies:

It has not spread to the lymph nodes (N0).

It has spread to 1 to 3 axillary lymph nodes and/or tiny amounts of cancer are found in internal mammary lymph nodes on sentinel lymph node biopsy (N1).

It has spread to 4 to 9 axillary lymph nodes, or it has enlarged the internal mammary lymph nodes (N2).

The cancer hasn't spread to distant sites (M0).

Inflammatory breast cancer is classified as T4d and is at least stage IIIB. If it has spread to many nearby lymph nodes (N3) it could be stage IIIC, and if it has spread to distant lymph nodes or organs (M1) it would be stage IV.

**Stage IIIc: any T, N3, M0:** The tumor is any size (or can't be found), and one of the following applies:

Cancer has spread to 10 or more axillary lymph nodes (N3).

Cancer has spread to the lymph nodes under the clavicle (collar bone) (N3).

Cancer has spread to the lymph nodes above the clavicle (N3).

Cancer involves axillary lymph nodes and has enlarged the internal mammary lymph nodes (N3).

Cancer has spread to 4 or more axillary lymph nodes, and tiny amounts of cancer are found in internal mammary lymph nodes on sentinel lymph node biopsy (N3).

The cancer hasn't spread to distant sites (M0).

**Stage IV: any T, any N, M1:** The cancer can be any size (any T) and may or may not have spread to nearby lymph nodes (any N). It has spread to distant organs or to lymph nodes far from the breast (M1). The most common sites of spread are the bone, liver, brain, or lung,

If you have any questions about the stage of your cancer and what it might mean in your case, be sure to ask your doctor.

## Breast cancer survival rates by stage

Survival rates are often used by doctors as a standard way of discussing a person's prognosis (outlook). Some patients with breast cancer may want to know the survival statistics for people in similar situations, while others may not find the numbers helpful, or may even not want to know them. If you decide that you do not want to read them, skip to the [next section](#).

The 5-year observed survival rate refers to the percentage of patients who live at least 5 years after being diagnosed with cancer. Many of these patients live much longer than 5 years after diagnosis.

A relative survival rate (like the numbers below) compares the observed

survival with what would be expected for people without the cancer. This helps to correct for the deaths caused by something besides cancer and is a more accurate way to describe the effect of cancer on survival. (Relative survival rates are at least as high as observed survival, and in most cases are higher.)

In order to get 5-year survival rates, doctors have to look at people who were treated at least 5 years ago. Improvements in treatment since then may result in a more favorable outlook for people now being diagnosed with breast cancer.

Survival rates are often based on previous outcomes of large numbers of people who had the disease, but they cannot predict what will happen in any particular person's case. Many other factors may affect a person's outlook, such as your age and health and the presence of hormone receptors on the cancer cells. Your doctor can tell you how the numbers below may apply to you, as he or she is familiar with the aspects of your particular situation.

The available statistics do not divide survival rates by all of the substages, such as IA and IB. The rates for these substages are likely to be close to the rate for the overall stage. For example, the survival rate for stage IA is likely to be slightly higher than that listed for stage I, while the survival rate for stage IB would be expected to be slightly lower.

The rates below come from the National Cancer Institute's SEER database. They are based on the previous version of AJCC staging. In that version stage II also included patients that would now be considered stage IB.

<b>S t a g e</b>	<b>5-year Relative Survival Rate</b>		
	0		100%

I	100%
II	93%
III	72%
IV	22%

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## How is breast cancer treated?

*This information represents the views of the doctors and nurses serving on the American Cancer Society's Cancer Information Database Editorial Board. These views are based on their interpretation of studies published in medical journals, as well as their own professional experience.*

*The treatment information in this document is not official policy of the Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor.*

*Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask him or her questions about your treatment options.*

This section starts with general comments about the types of treatments used for breast cancer. This is followed by a discussion of the typical treatment options based on the stage of the cancer (and a small section on breast cancer treatment during pregnancy).

### General types of treatment for breast cancer

The main types of treatment for breast cancer are:

[Surgery](#)

[Radiation therapy](#)

Chemotherapy

Hormone therapy

Targeted therapy

Bone-directed therapy

Treatments can be classified into broad groups, based on how they work and when they are used.

## Local versus systemic therapy

Local therapy is intended to treat a tumor at the site without affecting the rest of the body. Surgery and radiation therapy are examples of local therapies.

Systemic therapy refers to drugs which can be given by mouth or directly into the bloodstream to reach cancer cells anywhere in the body.

Chemotherapy, hormone therapy, and targeted therapy are systemic therapies.

## Adjuvant and neoadjuvant therapy

Patients who have no detectable cancer after surgery are often given additional treatment to help keep the cancer from coming back. This is known as *adjuvant therapy*. Doctors believe that even in the early stages of breast cancer, cancer cells may break away from the primary breast tumor and begin to spread. These cells can't be felt on a physical exam or seen on x-rays or other imaging tests, and they cause no symptoms. But they can go on to become new tumors in nearby tissues, other organs, and bones. The goal of adjuvant therapy is to kill these hidden cells. Both systemic therapy (like chemotherapy, hormone therapy, and targeted therapy) and radiation can be used as adjuvant therapy.

Most, but not all, patients benefit from adjuvant therapy. How much you might benefit depends on the stage and characteristics of the cancer and what type of surgery you had. Generally speaking, if the tumor is larger or the cancer has spread to lymph nodes, it is more likely to have spread through the bloodstream, and you are more likely to see a benefit. But there are other features, some of which have been previously discussed, that may determine if a patient should get adjuvant therapy.

Recommendations about adjuvant therapy are discussed in the sections on these treatments and in the section on treatment by stage.

Some patients are given treatment, such as chemotherapy or hormone therapy, **before** surgery. The goal of this treatment is to shrink the tumor in the hope it will allow a less extensive operation to be done. This is called *neoadjuvant therapy*. Many patients who get neoadjuvant therapy will not need adjuvant therapy, or will not need as much.

## Surgery for breast cancer

Most women with breast cancer have some type of surgery. Surgery is often needed to remove a breast tumor. Options for this include breast-conserving surgery and mastectomy. The breast can be reconstructed at the same time as surgery or later on. Surgery is also used to check the lymph nodes under the arm for cancer spread. Options for this include a sentinel lymph node biopsy and an axillary (armpit) lymph node dissection.

### Breast-conserving surgery

This type of surgery is sometimes called *partial (or segmental) mastectomy*. It only removes a part of the affected breast, but how much is removed depends on the size and location of the tumor and other factors. If radiation therapy is to be given after surgery, small metallic clips (which will show up on x-rays) may be placed inside the breast during surgery to mark the area for the radiation treatments.

*Lumpectomy* removes only the breast lump and a surrounding margin of normal tissue. Radiation therapy is usually given after a lumpectomy. If adjuvant chemotherapy is to be given as well, radiation is usually delayed until the chemotherapy is completed.

*Quadrantectomy* removes more breast tissue than a lumpectomy. For a quadrantectomy, one-quarter of the breast is removed. Radiation therapy is usually given after surgery. Again, this may be delayed if chemotherapy is to be given as well.

If cancer cells are found at any of the edges of the piece of tissue removed, it is said to have *positive margins*. When no cancer cells are found at the edges of the tissue, it is said to have *negative or clear margins*. The presence of positive margins means that some cancer cells may have been left behind after surgery. If the pathologist finds positive margins in the tissue removed with surgery, the surgeon may need to go back and remove more tissue. This operation is called a *re-excision*. If the surgeon can't remove enough breast tissue to get clear surgical margins, a mastectomy may be needed.

The distance from the tumor to the margin is also important. Even if the margins are “clear”, they could be “close”—meaning that the distance between the edge of the tumor and edge of the tissue removed is too small and more surgery may be needed, as well. Surgeons can disagree on what is an adequate (or good) margin.

For most women with stage I or II breast cancer, breast-conserving surgery (BCS) plus radiation therapy is as effective as mastectomy. Survival rates of women treated with these 2 approaches are the same. But breast-conserving surgery is not an option for all women with breast cancer (see the section, "Choosing between breast-conserving surgery and mastectomy" below).

Radiation therapy can sometimes be omitted as a part of breast-conserving therapy. This is somewhat controversial, so women may consider BCS without radiation therapy if they are at least 70 years old and ALL of the following are true:

They have a tumor that measures 2 cm or less across that has been completely removed (with clear margins).

The tumor is hormone receptor-positive, and the women are getting hormone therapy (such as tamoxifen or an aromatase inhibitor).

No lymph nodes contained cancer.

You should discuss this possibility with your health care team.

**Possible side effects:** Side effects of these operations can include pain, temporary swelling, tenderness, and hard scar tissue that forms in the surgical site. As with all operations, bleeding and infection at the surgery site are also possible.

The larger the portion of breast removed, the more likely it is that you will see a change in the shape of the breast afterward. If the breasts look very different after surgery, it may be possible to have some type of reconstructive surgery (see the section, "Reconstructive surgery"), or to have the size of the unaffected breast reduced to make the breasts more symmetrical. It may even be possible to have this done during the initial surgery. It's very important to talk with your doctor (and possibly a plastic surgeon) before surgery to get an idea of how your breasts are likely to look afterward, and to learn what your options might be.

## Mastectomy

Mastectomy is surgery to remove the entire breast. All of the breast tissue is removed, sometimes along with other nearby tissues.

**Simple mastectomy:** In this procedure, also called *total mastectomy*, the surgeon removes the entire breast, including the nipple, but does not remove underarm lymph nodes or muscle tissue from beneath the breast. Sometimes both breasts are removed (a double mastectomy), often as preventive surgery in women at very high risk for breast cancer. Most women, if they are hospitalized, can go home the next day. This is the most common type of mastectomy used to treat breast cancer.

**Skin-sparing mastectomy:** For some women considering immediate reconstruction, a skin-sparing mastectomy can be done. In this procedure, most of the skin over the breast (other than the nipple and areola) is left intact. This can work as well as a simple mastectomy. The amount of breast tissue removed is the same as with a simple mastectomy.

This approach is only used when immediate breast reconstruction is planned. It may not be suitable for larger tumors or those that are close to the surface of the skin. Implants or tissue from other parts of the body are used to reconstruct the breast. This approach has not been used for as long as the more standard type of mastectomy, but many women prefer it because it offers the advantage of less scar tissue and a reconstructed breast that seems more natural.

A variation of the skin-sparing mastectomy is the *nipple-sparing mastectomy*. This procedure is more often an option for women who have a small early-stage cancer near the outer part of the breast, with no signs of cancer in the skin or near the nipple. In this procedure, the breast tissue is removed, but the breast skin and nipple are left in place. This is followed by breast reconstruction. The surgeon often removes the breast tissue beneath the nipple (and areola) during the procedure, to check for cancer cells. If cancer is found in this tissue, the nipple must be removed. Even when no cancer is found under the nipple, some doctors give the nipple tissue a dose of radiation during or after the surgery to try and reduce the risk of the cancer coming back.

There are still some problems with nipple-sparing surgeries. Afterward, the nipple does not have a good blood supply, so sometimes it can wither away or become deformed. Because the nerves are also cut, there is little or no feeling left in the nipple. In women with larger breasts, the nipple may

look out of place after the breast is reconstructed. As a result, many doctors feel that this surgery is best done in women with small to medium sized breasts. This procedure leaves less visible scars, but if it isn't done properly, it can leave behind more breast tissue than other forms of mastectomy. This could result in a higher risk of cancer developing than for a skin-sparing or simple mastectomy. This was a problem in the past, but improvements in technique have helped make this surgery safer. Still, many experts consider nipple-sparing procedures too risky to be a standard treatment of breast cancer.

**Modified radical mastectomy:** This procedure is a simple mastectomy and removal of axillary (underarm) lymph nodes. Surgery to remove these lymph nodes is discussed in further detail later in this section.

**Radical mastectomy:** In this extensive operation, the surgeon removes the entire breast, axillary lymph nodes, and the pectoral (chest wall) muscles under the breast. This surgery was once very common, but less extensive surgery (such as modified radical mastectomy) has been found to be just as effective. This meant that the disfigurement and side effects of a radical mastectomy were not needed, so this surgery is rarely done now. This operation may still be done for large tumors that are growing into the pectoral muscles under the breast.

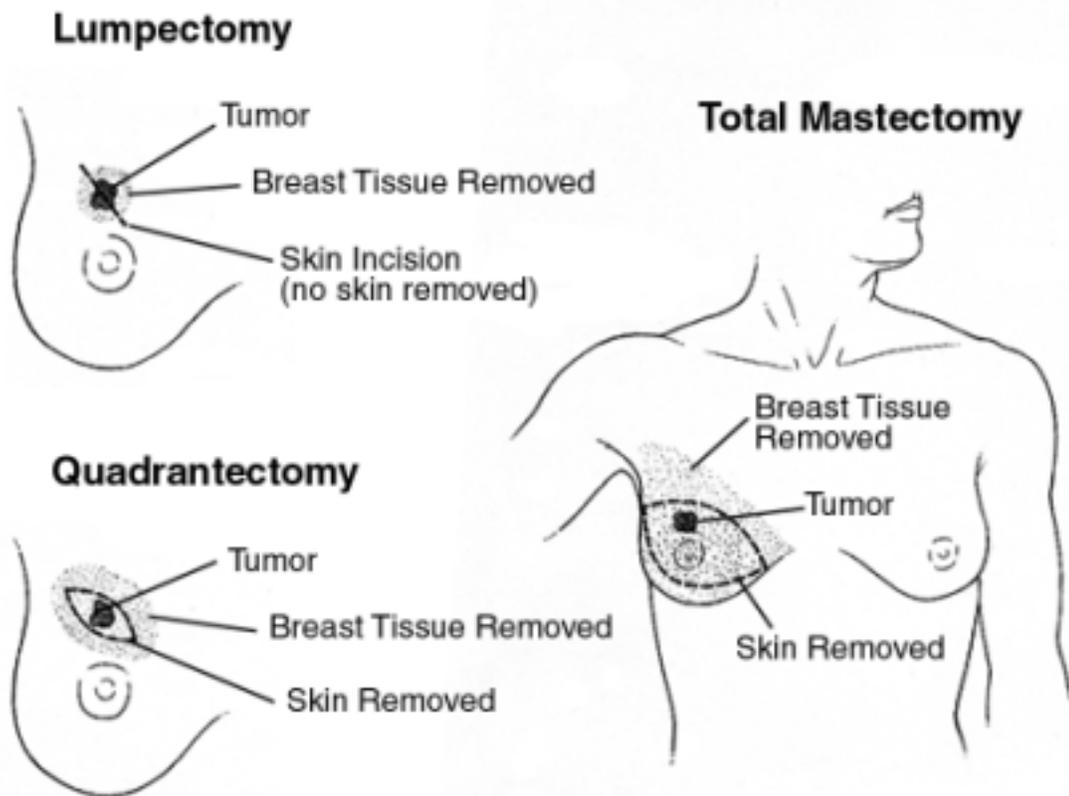
**Possible side effects:** Aside from post-surgical pain and the obvious change in the shape of the breast(s), possible side effects of mastectomy include wound infection, hematoma (buildup of blood in the wound), and seroma (buildup of clear fluid in the wound). If axillary lymph nodes are also removed, other side effects may occur (see the section, "Lymph node surgery").

## **Choosing between breast-conserving surgery and mastectomy**

Many women with early-stage cancers can choose between breast-conserving surgery and mastectomy.

The main advantage of breast-conserving surgery (BCS) is that a woman keeps most of her breast. A disadvantage is the usual need for radiation therapy—most often for 5 to 6 weeks—after surgery. A small number of women having breast-conserving surgery may not need radiation while some women who have a mastectomy will still need radiation therapy to the breast area.

When deciding between BCS and mastectomy, be sure to get all the facts. You may have an initial gut preference for mastectomy as a way to "take it all out as quickly as possible." This feeling can lead women to prefer mastectomy even when their surgeons don't. But the fact is that in most cases, mastectomy does not give you any better chance of long-term survival or a better outcome from treatment. Studies following thousands of women for more than 20 years show that when BCS can be done, doing mastectomy instead does not provide any better chance of survival.



Most women and their doctors prefer BCS and radiation therapy when it's a reasonable option, but your choice will depend on a number of factors, such as:

- How you feel about losing your breast
- How you feel about getting radiation therapy
- How far you would have to travel and how much time it would take to have radiation therapy

Whether you think you will want to have more surgery to reconstruct your breast after having a mastectomy

Your preference for mastectomy as a way to get rid of all your cancer as quickly as possible

Your fear of the cancer coming back

For some women, mastectomy may clearly be a better option. For example, breast conserving surgery is usually not recommended for:

Women who have already had radiation therapy to the affected breast

Women with 2 or more areas of cancer in the same breast that are too far apart to be removed through 1 surgical incision, while keeping the appearance of the breast satisfactory

Women whose initial BCS along with re-excision(s) has not completely removed the cancer

Women with certain serious connective tissue diseases such as scleroderma or lupus, which may make them especially sensitive to the side effects of radiation therapy

Pregnant women who would require radiation while still pregnant (risking harm to the fetus)

Women with large tumors (greater than 5 cm [2 inches] across) that didn't shrink very much with neoadjuvant chemotherapy (although this also depends on the size of the breast)

Women with inflammatory breast cancer

Women with a cancer that is large relative to their breast size

Other factors may need to be taken into account as well. For example, young women with breast cancer and a known *BRCA* mutation are at very high risk for a second cancer. These women often consider having the other breast removed to reduce this risk, and so may choose mastectomy for the breast with cancer as well. A double mastectomy may be done to treat the cancer and reduce the risk of a second breast cancer.

It is important to understand that having a mastectomy instead of breast-conserving surgery plus radiation *only* lowers your risk of developing a

second breast cancer in the same breast. It does not lower the chance of the cancer coming back in other parts of the body. It is important that you don't rush into making a decision, but instead take your time deciding whether a mastectomy or breast-conserving surgery plus radiation is right for you.

## **Lymph node surgery**

To determine if the breast cancer has spread to axillary (underarm) lymph nodes, one or more of these lymph nodes may be removed and looked at under the microscope. This is an important part of staging and determining treatment and outcomes. When the lymph nodes contain cancer cells, there is a higher chance that cancer cells have also spread through the bloodstream to other parts of the body. The presence of cancer cells in the lymph nodes under the arm is often an important factor in deciding what treatment, if any, is needed after surgery (adjuvant therapy).

**Axillary lymph node dissection (ALND):** In this procedure, anywhere from about 10 to 40 (though usually less than 20) lymph nodes are removed from the area under the arm (axilla) and checked for cancer spread. ALND is usually done at the same time as the mastectomy or BCS, but it can be done in a second operation. This was once the most common way to check to see if breast cancer has spread to nearby lymph nodes, and it is still done in some patients. For example, an ALND may be done if a previous biopsy has shown one or more of the underarm lymph nodes have cancer cells.

**Sentinel lymph node biopsy (SLNB):** Although axillary lymph node dissection (ALND) is a safe operation and has low rates of most side effects, removing many lymph nodes increases the chance that the patient will have lymphedema after surgery (this side effect is discussed further on). To lower the risk of lymphedema, the doctors may use a sentinel lymph node biopsy (SLNB) procedure to check the lymph nodes for cancer. This procedure is a way of learning if cancer has spread to lymph nodes without removing as many of them.

In this procedure the surgeon finds and removes the first lymph node(s) to which a tumor is likely to drain. This lymph node, known as the *sentinel node*, is the one most likely to contain cancer cells if they have started to spread. To do this, the surgeon injects a radioactive substance and/or a blue dye into the tumor, the area around it, or the area around the nipple. Lymphatic vessels will carry these substances into the sentinel node(s).

A special device can be used to detect radioactivity in the nodes that the radioactive substance flows into or can look for lymph nodes that have turned blue. These are separate ways to find the sentinel node, but are often done together as a double check. The surgeon then cuts the skin over the area and removes the node(s) containing the dye (or radiation). A pathologist then looks closely at these nodes (often 2 or 3). (Because fewer nodes are removed than in an ALND, each one is looked at more closely for any cancer).

The lymph node can sometimes be checked for cancer during surgery. If cancer is found in the sentinel lymph node, the surgeon may go on to do a full axillary dissection. If no cancer cells are seen in the lymph node at the time of the surgery, or if the sentinel node is not checked at the time of the surgery, the lymph node(s) will be examined more closely over the next several days. If cancer is found in the lymph node, the surgeon may recommend a full ALND at a later time.

If there is no cancer in the sentinel node(s), it's very unlikely that the cancer has spread to other lymph nodes, so no further lymph node surgery is needed. The patient can avoid the potential side effects of a full ALND.

Until recently, if the sentinel node(s) had cancer cells, the surgeon would do a full ALND to see how many other lymph nodes were involved. But more recently, studies have shown that this may not always be needed. In some cases, it may be just as safe to leave the rest of the lymph nodes behind. This is based on certain factors, such as what type of surgery is used to remove the tumor, the size of the tumor, and what treatment is planned after surgery. Based on the studies that have looked at this, skipping the ALND may be an option for patients with tumors 5 cm (2 inches) or smaller who are having breast-conserving surgery followed by radiation. Because this hasn't been studied well in women who have had mastectomy, it isn't clear that skipping the ALND would be safe for them.

SLNB is done to see if a breast cancer has spread to nearby lymph nodes. This procedure is not done if any of the lymph nodes are known to contain cancer. If any of the lymph nodes under the arm or around the collar bone are swollen, they may be checked for cancer spread directly. Most often, a needle biopsy (either a fine needle aspiration biopsy or a core needle biopsy) is done. In these procedures, the surgeon inserts a needle into the lymph node to remove a small amount of tissue, which is then looked at under a microscope. If cancer cells are found, a full ALND is recommended.

Although SLNB has become a common procedure, it requires a great deal of skill. It should be done only by a surgeon who has experience with this technique. If you are thinking about having this type of biopsy, ask your health care team if they do them regularly.

**Possible side effects:** As with any operation, pain, swelling, bleeding, and infection are possibilities.

The main possible long-term effect of removing axillary lymph nodes is lymphedema (swelling) of the arm. Because any excess fluid in the arms normally travels back into the bloodstream through the lymphatic system, removing the lymph nodes sometimes blocks the drainage from the arm, causing this fluid to build up. This results in arm swelling.

Up to 30% of women who have a full ALND develop lymphedema. It also occurs in up to 3% of women who have a sentinel lymph node biopsy. It may be more common if radiation is given after surgery. Sometimes the swelling lasts for only a few weeks and then goes away. Other times, the swelling lasts a long time. Ways to help prevent or reduce the effects of lymphedema are discussed in the section, "[What happens after treatment for breast cancer?](#)" If your arm is swollen, tight, or painful after lymph node surgery, be sure to tell someone on your cancer care team right away. More information about lymphedema can be found in our document, *Lymphedema: What Every Woman With Breast Cancer Should Know*.

You may also have limited movement in your arm and shoulder after surgery. This is more common after an ALND than a SLNB. Your doctor may give you exercises to ensure that you do not have permanent problems with movement (a frozen shoulder). Numbness of the skin on the upper, inner arm is another common side effect because the nerve that controls sensation here travels through the lymph node area.

Some women notice a rope-like structure that begins under the arm and can extend down towards the elbow. This, sometimes called *axillary web syndrome* or *lymphatic cording*, is more common after an ALND than SLNB. Symptoms may not appear for weeks or even months after surgery. It can cause pain and limit movement of the arm and shoulder. This often goes away without treatment, although some patients seem to find physical therapy helpful.

## **Reconstructive surgery**

After having a mastectomy (or some breast-conserving surgeries), a

woman might want to consider having the breast mound rebuilt; this is called *breast reconstruction*. These procedures are done to restore the breast's appearance after surgery.

If you are thinking about having reconstructive surgery, it is a good idea to talk about it with your surgeon and a plastic surgeon experienced in breast reconstruction **before** your cancer surgery. This will allow you to consider all reconstruction options. You'll want your breast surgeon and your plastic surgeon to work together to come up with a treatment plan that will put you in the best possible position for reconstruction in case you decide to pursue it, even if you want to wait and have reconstructive surgery later.

Decisions about the type of reconstruction and when it will be done depend on each woman's medical situation and personal preferences. You may have a choice between having breast reconstruction at the same time as the mastectomy (immediate reconstruction) or at a later time (delayed reconstruction). There are several types of reconstructive surgery. Some use saline (salt water) or silicone implants, while others use tissues from other parts of your body (called an *autologous tissue reconstruction*).

To learn about different reconstruction options, see our document, [Breast Reconstruction After Mastectomy](#). You may also find it helpful to talk with a woman who has had the type of reconstruction you might be considering. Our Reach To Recovery volunteers can help you with this. You can find out more about our [Reach To Recovery](#) program on cancer.org or by calling 1-800-227-2345.

## **Some things you can expect**

For many, the thought of surgery is frightening. But with a better understanding of what to expect before, during, and after the operation, many fears can be relieved.

**Before surgery:** Usually, you meet with your surgeon at least a few days before the operation to discuss the procedure and your medical history. This is a good time to ask specific questions about the surgery and go over potential risks. Be sure you understand what the extent of the surgery is likely to be and what you should expect afterward. If you are thinking about breast reconstruction, ask about this as well.

You will be asked to sign a consent form, giving the doctor permission to perform the surgery. You might also be asked to give consent for researchers to use any tissue or blood that is not needed for diagnostic

purposes. This may not be of direct use to you, but it may be very helpful to women in the future.

Ask your doctor if you will possibly need a blood transfusion. If the doctors think a transfusion might be needed, you might be asked to donate blood beforehand. If you do not receive your own blood, it is important to know that in the United States, blood transfusion from another person is nearly as safe as receiving your own blood.

You will probably be told not to eat or drink anything starting the night before the surgery.

You will also meet with the anesthesiologist or nurse anesthetist, the health professional who will be giving you the anesthesia during your surgery.

### **During surgery:**

You will have an IV (intravenous) line put in (usually in a vein in your arm), which the medical team will use to give medicines that may be needed during the surgery. Usually you will be hooked up to an electrocardiogram (EKG) machine and have a blood pressure cuff on your arm, so your heart rhythm and blood pressure can be checked during the surgery.

General anesthesia (where you are asleep) is used for most breast surgery. The length of the operation depends on the type of surgery being done. For example, a mastectomy with axillary lymph node dissection will usually take from 2 to 3 hours.

**After surgery:** After your surgery, you will be taken to the recovery room, where you will stay until you are awake and your condition and vital signs (blood pressure, pulse, and breathing) are stable. How long you stay in the hospital depends on the type of surgery being done, your overall state of health and whether you have any other medical problems, how well you do during the surgery, and how you feel after the surgery. Decisions about the length of your stay should be made by you and your doctor and not dictated by what your insurance will pay, but it is important to check your insurance coverage before surgery.

In general, women having a mastectomy and/or axillary lymph node dissection stay in the hospital for 1 or 2 nights and then go home. However, some women may be placed in a 23-hour, short-stay observation unit before going home.

Less involved operations such as breast-conserving surgery and sentinel lymph node biopsy are usually done in an outpatient surgery center, and an overnight stay in the hospital is usually not needed.

You may have a dressing (bandage) over the surgery site that may wrap snugly around your chest. You may have one or more drains (plastic or rubber tubes) coming out from the breast or underarm area to remove blood and lymph fluid that collects during the healing process. You will be taught how to care for the drains, which may include emptying and measuring the fluid and identifying problems the doctor or nurse needs to know about. Most drains stay in place for 1 or 2 weeks. When drainage has decreased to about 30 cc (1 fluid ounce) each day, the drain will usually be removed.

Most doctors will want you to start moving your arm soon after surgery so that it won't get stiff.

How long it takes to recover from breast cancer surgery depends on what procedures were done. Most women can return to their regular activities within 2 weeks after a BCS with ALND, while recovery time is often shorter for BCS plus a SLNB. It can take up to 4 weeks after a mastectomy. Recovery time is longer if reconstruction was done as well, and it can take months to return to full activity after some procedures (for more information about recovery after breast reconstruction, please see our document *Breast Reconstruction After Mastectomy*). Still, these times can vary from person to person, so you should talk to your doctor about what you can expect.

Even after the doctor clears you to return to your regular level of activity, though, you could still feel some effects of surgery. You might feel stiff or sore for some time. The skin of your chest or underarm area may feel tight. These feelings tend to improve over time. Some women have problems with pain, numbness, or tingling in the chest and arm that continues for a long time after surgery. This, sometimes called *post-mastectomy pain syndrome*, is discussed in more detail later.

Many women who have breast-conserving surgery or mastectomy are often surprised by how little pain they have in the breast area. But they are less happy with the strange sensations (numbness, pinching/pulling feeling) they may feel in the underarm area.

Ask a member of your health care team how to care for your surgery site and arm. Usually, you and your caregivers will get written instructions

about care after surgery. These instructions should include:

The care of the surgical wound and dressing

How to monitor drainage and take care of the drains

How to recognize signs of infection

Bathing and showering after surgery

When to call the doctor or nurse

When to begin using the arm and how to do arm exercises to prevent stiffness

When to resume wearing a bra

When to begin using a prosthesis and what type to use (after mastectomy)

What to eat and not to eat

Use of medicines, including pain medicines and possibly antibiotics

Any restrictions of activity

What to expect regarding sensations or numbness in the breast and arm

What to expect regarding feelings about body image

When to see your doctor for a follow-up appointment

Referral to a Reach To Recovery volunteer. Through our Reach To Recovery program, a specially trained volunteer who has had breast cancer can provide information, comfort, and support (see our document, [Reach To Recovery](#) for more information).

Most patients see their surgeon about 7 to 14 days after the surgery. Your doctor should explain the results of your pathology report and talk to you about the need for further treatment. If you will need more treatment, you will be referred to a radiation oncologist and/or a medical oncologist. If you are thinking about breast reconstruction, you may be referred to a plastic surgeon as well.

## **Chronic pain after breast surgery**

Some women have problems with nerve (neuropathic) pain in the chest wall, armpit, and/or arm after surgery that doesn't go away over time. This is called post-mastectomy pain syndrome (PMPS) because it was first described in women who had mastectomies, but it occurs after breast-conserving therapy, as well. Studies have shown that between 20% and 30% of women develop symptoms of PMPS after surgery. The classic symptoms of PMPS are pain and tingling in the chest wall, armpit, and/or arm. Pain may also be felt in the shoulder or surgical scar. Other common complaints include numbness, shooting or pricking pain, or unbearable itching. Most women with PMPS say their symptoms are not severe.

PMPS is thought to be linked to damage done to the nerves in the armpit and chest during surgery. But the causes are not known. Women who are younger, had a full ALND (not just SLNB), or who were treated with radiation after surgery are more likely to have problems with PMPS. Because ALNDs are done less often now, PMPS is less common than it once was.

It is important to talk to your doctor about any pain you are having. PMPS can cause you to not use your arm the way you should and over time you could lose the ability to use it normally.

PMPS can be treated. Opioids (narcotics) are medicines commonly used to treat pain, but they don't always work well for nerve pain. But there are medicines and treatments that do work for this kind of pain. Talk to your doctor to get the pain control you need.

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## **Radiation therapy for breast cancer**

Radiation therapy is treatment with high-energy rays or particles that destroy cancer cells. Radiation to the breast is often given after breast-conserving surgery to help lower the chance that the cancer will come back in the breast or nearby lymph nodes. Radiation may also be recommended after mastectomy in patients either with a cancer larger than 5 cm, or when cancer is found in the lymph nodes.

Radiation is also used to treat cancer that has spread to other areas, for example to the bones or brain.

Radiation therapy can be given in 2 main ways.

## **External beam radiation**

This is the most common type of radiation therapy for women with breast cancer. The radiation is focused from a machine outside the body on the area affected by the cancer.

The extent of radiation depends on whether mastectomy or breast-conserving surgery (BCS) was done and whether or not lymph nodes are involved.

If mastectomy was done and no lymph nodes had cancer, radiation is targeted at the chest wall and the places where any drains exited the body.

If BCS was done, most often the entire breast gets radiation, and an extra boost of radiation is given to the area in the breast where the cancer was removed to prevent it from coming back in that area. The boost is often given after the treatments to whole breast end. It uses the same machine, but the beams are directed to aim at the site you cancer was removed. Most women don't notice different side effects from boost radiation than from whole breast radiation.

If cancer was found in the lymph nodes under the arm, radiation may be given to this area as well. In some cases, the area treated may also include supraclavicular lymph nodes (nodes above the collarbone) and internal mammary lymph nodes (nodes beneath the breast bone in the center of the chest).

When given after surgery, external radiation therapy is usually not started until the tissues have been able to heal, often a month or longer. If chemotherapy is to be given as well, radiation therapy is usually delayed until chemotherapy is complete.

Before your treatments start, the radiation team will take careful measurements to determine the correct angles for aiming the radiation beams and the proper dose of radiation. They will make some ink marks or small tattoos on your skin that they will use later as a guide to focus the radiation on the right area. You might want to ask your health care team if these marks will be permanent.

Lotions, powders, deodorants, and antiperspirants can interfere with external beam radiation therapy, so your health care team may tell you not to use them until treatments are complete.

External radiation therapy is much like getting an x-ray, but the radiation is more intense. The procedure itself is painless. Each treatment lasts only a few minutes, but the setup time—getting you into place for treatment—usually takes longer.

Breast radiation is most commonly given 5 days a week (Monday thru Friday) for about 5 to 6 weeks.

**Accelerated breast irradiation:** The standard approach of giving external radiation for 5 days a week over many weeks can be inconvenient for many women. Some doctors are now using other schedules, such as giving slightly larger daily doses over only 3 weeks.

Giving radiation in larger doses using fewer treatments is known as *hypofractionated radiation therapy*. This approach was studied in a large group of women who had been treated with BCS and who did not have cancer spread to underarm lymph nodes.

When compared with giving the radiation over 5 weeks, giving it over only 3 weeks was just as good at keeping the cancer from coming back in the same breast over the first 10 years after treatment. Newer approaches now being studied give radiation over an even shorter period of time. In one approach, larger doses of radiation are given each day, but the course of radiation is shortened to only 5 days. *Intraoperative radiation therapy* (IORT) is another approach that gives a single large dose of radiation in the operating room right after BCS (before the breast incision is closed).

**3D-conformal radiotherapy:** In this technique, the radiation is given with special machines so that it is better aimed at the area where the tumor was. This allows more of the healthy breast to be spared. Treatments are given twice a day for 5 days. Because only part of the breast is treated, this is considered to be a form of *accelerated partial breast irradiation*.

Other forms of accelerated partial breast irradiation are described in the section, “Brachytherapy.” It is hoped that these approaches may prove to be at least equal to the current, standard breast irradiation, but few studies have compared these new methods directly to standard radiation therapy. It is not known if all of the newer methods will still be as good as standard radiation after many years. This is why many doctors still consider them

experimental. Women who are interested in these approaches may want to ask their doctor about taking part in clinical trials of accelerated breast irradiation now going on.

**Possible side effects of external radiation:** The main short-term side effects of external beam radiation therapy are swelling and heaviness in the breast, sunburn-like skin changes in the treated area, and fatigue. Your health care team may advise you to avoid exposing the treated skin to the sun because it may make the skin changes worse. Most skin changes get better within a few months. Changes to the breast tissue usually go away in 6 to 12 months, but it can take up to 2 years.

In some women, the breast becomes smaller and firmer after radiation therapy. Having radiation may also affect a woman's options in terms of breast reconstruction later on. Radiation can also raise the risk of problems if it is given after reconstruction, especially tissue flap procedures. Women who have had breast radiation may have problems breastfeeding later on. Radiation to the breast can also sometimes damage some of the nerves to the arm. This is called *brachial plexopathy* and can lead to numbness, pain, and weakness in the shoulder, arm and hand.

Radiation therapy of axillary lymph nodes also can cause lymphedema (see the section, "[What happens after treatment for breast cancer?](#)").

In rare cases, radiation therapy may weaken the ribs, which could lead to a fracture. In the past, parts of the lungs and heart were more likely to get some radiation, which could lead to long-term damage of these organs in some women. Modern radiation therapy equipment allows doctors to better focus the radiation beams, so these problems are rare today.

A very rare complication of radiation to the breast is the development of another cancer called *angiosarcoma* (see the section, "[What is breast cancer?](#)"). These rare cancers can grow and spread quickly.

## **Brachytherapy**

Brachytherapy, also known as *internal radiation*, is another way to deliver radiation therapy. Instead of aiming radiation beams from outside the body, radioactive seeds or pellets are placed into the breast tissue next to the cancer. It is often used in patients who had BCS as a way to add an extra boost of radiation to the tumor site (along with external radiation to the whole breast). It may also be used by itself (instead of radiation to the whole breast). Tumor size, location, and other factors may limit who can

get brachytherapy.

There are different types of brachytherapy.

**Interstitial brachytherapy:** In this approach, several small, hollow tubes called *catheters* are inserted into the breast around the area that the cancer was removed and are left in place for several days. Radioactive pellets are inserted into the catheters for short periods of time each day and then removed. This method of brachytherapy has been around longer (and has more evidence to support it), but it is not used as much anymore.

**Intracavitary brachytherapy:** This is the most common way to give brachytherapy in breast cancer patients and is considered a form of accelerated partial breast irradiation. A device is put into the space left from BCS and is left in place until treatment is complete. There are several different devices that can be used: MammoSite®, SAVI®, Axxent®, and Contura®. They all go into the breast as a small catheter (tube). The end of the device inside the breast is then expanded so that it stays securely in the right place for the entire treatment. The other end of the catheter sticks out of the breast.

For each treatment, one or more sources of radiation (often pellets) is placed down through the tube and into the device for a short time and then removed. Treatments are given twice a day for 5 days as an outpatient. After the last treatment, the device is collapsed down again and removed.

Early studies of intracavitary brachytherapy as the only radiation after BCS had promising results, but didn't directly compare this technique with standard whole breast external beam radiation.

One study that compared outcomes between intracavitary brachytherapy and whole breast radiation after BCS found that women treated with brachytherapy were twice as likely to go on to get a mastectomy of the treated breast (most likely because cancer was found again in that breast). The overall risk was still low, however, with about 4% of the women in the brachytherapy group needing mastectomy versus only 2% of the women in the whole breast radiation group.

This study raises questions about whether irradiating only the area around the cancer will reduce the chances of the cancer coming back as much as giving radiation to the whole breast. More studies comparing the 2 approaches are needed to see if brachytherapy should be used instead of whole breast radiation.

Intracavitary brachytherapy can also have side effects, including redness, bruising, breast pain, infection, and a break-down of an area of fat tissue in the breast. As with whole breast radiation, weakness and fracture of the ribs can also occur.

More information about radiation therapy can be found in our document, [Understanding Radiation Therapy](#).

## Chemotherapy for breast cancer

Chemotherapy (*chemo*) is treatment with cancer-killing drugs that may be given intravenously (injected into a vein) or by mouth. The drugs travel through the bloodstream to reach cancer cells in most parts of the body. Chemo is given in cycles, with each period of treatment followed by a recovery period. Treatment usually lasts for several months.

If you'd like more information on a drug used in your treatment or a specific drug mentioned in this section, see our [Guide to Cancer Drugs](#), or call us with the names of the medicines you're taking.

### When is chemotherapy used?

There are several situations in which chemo may be recommended.

**After surgery (adjuvant chemotherapy):** When therapy is given to patients with no evidence of cancer after surgery, it is called *adjuvant therapy*. Surgery is used to remove all of the cancer that can be seen, but adjuvant therapy is used to kill any cancer cells that may have been left behind but can't be seen. Adjuvant therapy after breast-conserving surgery or mastectomy reduces the risk of breast cancer coming back. Radiation, chemo, targeted therapy, and hormone therapy can all be used as adjuvant treatments.

Even in the early stages of the disease, cancer cells may break away from the primary breast tumor and spread through the bloodstream. These cells don't cause symptoms, they don't show up on imaging tests, and they can't be felt during a physical exam. But if they are allowed to grow, they can establish new tumors in other places in the body. The goal of adjuvant chemo is to kill undetected cells that have traveled from the breast.

**Before surgery (neoadjuvant chemotherapy):** Chemo given before surgery is called *neoadjuvant chemotherapy*. Often, neoadjuvant therapy uses the same treatments that are used as adjuvant therapy, only they are

given (or at least started) before surgery instead of after. In terms of survival, there is no difference between giving chemo before or after surgery. The major benefit of neoadjuvant chemo is that it can shrink large cancers so that they are small enough to be removed with less extensive surgery. The other advantage of neoadjuvant chemo is that doctors can see how the cancer responds to the chemo drugs. If the tumor does not shrink with the first set of drugs, your doctor will know that other chemo drugs are needed.

Some breast cancers are too big to be surgically removed at the time of diagnosis. These cancers are referred to as *locally advanced* and have to be treated with chemo to shrink them so they can be removed with surgery.

**For advanced breast cancer:** Chemo can also be used as the main treatment for women whose cancer has spread outside the breast and underarm area, either when it is diagnosed or after initial treatments. The length of treatment depends on whether the cancer shrinks, how much it shrinks, and how a woman tolerates treatment.

## How is chemotherapy given?

In most cases (especially adjuvant and neoadjuvant treatment), chemo is most effective when combinations of more than one drug are used. Many combinations are being used, and it's not clear that any single combination is clearly the best. Clinical studies continue to compare today's most effective treatments against something that may be better.

The most common chemo drugs used for early breast cancer include the anthracyclines (such as doxorubicin/Adriamycin® and epirubicin/Ellence®) and the taxanes (such as paclitaxel/Taxol® and docetaxel/Taxotere®). These may be used in combination with certain other drugs, like fluorouracil (5-FU) and cyclophosphamide (Cytosan®).

Some of the most commonly used drug combinations for early breast cancer are:

CAF (or FAC): cyclophosphamide, doxorubicin (Adriamycin), and 5-FU

TAC: docetaxel (Taxotere), doxorubicin (Adriamycin), and cyclophosphamide

AC → T: doxorubicin (Adriamycin) and cyclophosphamide followed by paclitaxel (Taxol) or docetaxel (Taxotere).

FEC: → T, 5-FU, epirubicin, and cyclophosphamide followed by docetaxel (Taxotere) or paclitaxel (Taxol)

TC: docetaxel (Taxotere) and cyclophosphamide

TCH: docetaxel, carboplatin, and trastuzumab (Herceptin) for HER2/neu positive tumors

Other combinations that are less often used include

CMF: cyclophosphamide (Cytoxan®), methotrexate, and 5-fluorouracil (fluorouracil, 5-FU)

A → CMF: doxorubicin (Adriamycin), followed by CMF

EC: epirubicin (Ellence) and cyclophosphamide

AC: doxorubicin (Adriamycin) and cyclophosphamide

The targeted drug trastuzumab (Herceptin) may be given along with chemo for early stage breast cancer when the cancer cells test positive for HER2 (this drug is discussed in the section about targeted therapy).

Many other chemo drugs are useful in treating women with breast cancer, such as:

Platinum agents (cisplatin, carboplatin)

Vinorelbine (Navelbine®)

Capecitabine (Xeloda®)

Liposomal doxorubicin (Doxil®)

Gemcitabine (Gemzar®)

Mitoxantrone

Ixabepilone (Ixempra®)

Albumin-bound paclitaxel (Abraxane®)

Eribulin (Halaven®)

Targeted therapy drugs such as trastuzumab and lapatinib (Tykerb) may be used with these chemo drugs for tumors that are HER2-positive (these drugs are discussed in more detail in the "[Targeted therapy for breast cancer](#)" section).

Doctors give chemo in cycles, with each period of treatment followed by a

rest period to give the body time to recover from the effects of the drugs. Chemo begins on the first day of each cycle, but the schedule varies depending on the drugs used. For example, with some drugs, the chemo is given only on the first day of the cycle. With others, it is given every day for 14 days, or weekly for 2 weeks. Then, at the end of the cycle, the chemo schedule repeats to start the next cycle. Cycles are most often 2 or 3 weeks long, but they vary according to the specific drug or combination of drugs. Some drugs are given more often. Adjuvant and neoadjuvant chemo is often given for a total time of 3 to 6 months, depending on the drugs that are used. Treatment may be longer for advanced breast cancer and is based on how well it is working and what side effects the patient has.

**Dose-dense chemotherapy:** Doctors have found that giving the cycles of certain chemo agents closer together can lower the chance that the cancer will come back and improve survival in some women. This usually means giving the same chemo that may be given every 3 weeks (such as AC → T), but giving it every 2 weeks. A drug (growth factor) to help boost the white blood cell count is given after chemo to make sure the white blood cell count returns to normal in time for the next cycle. This approach can be used for neoadjuvant and adjuvant treatment. It can lead to more side effects and be harder to take, so it isn't for everyone.

## **Possible side effects**

Chemo drugs work by attacking cells that are dividing quickly, which is why they work against cancer cells. But other cells in the body, like those in the bone marrow, the lining of the mouth and intestines, and the hair follicles, also divide quickly. These cells are also likely to be affected by chemo, which can lead to side effects. Some women have many side effects; others may only have few.

Chemo side effects depend on the type of drugs, the amount taken, and the length of treatment. Some of the most common possible side effects include:

Hair loss

Mouth sores

Loss of appetite or increased appetite

Nausea and vomiting

## Low blood cell counts

Chemo can affect the blood forming cells of the bone marrow, which can lead to:

Increased chance of infections (from low white blood cell counts)

Easy bruising or bleeding (from low blood platelet counts)

Fatigue (from low red blood cell counts and other reasons)

These side effects usually last a short time and go away after treatment is finished. It's important to tell your health care team if you have any side effects, as there are often ways to lessen them. For example, drugs can be given to help prevent or reduce nausea and vomiting.

Other side effects are also possible. Some of these are more common with certain chemo drugs. Your cancer care team will tell you about the possible side effects of the specific drugs you are getting.

**Menstrual changes:** For younger women, changes in menstrual periods are a common side effect of chemo. Premature menopause (not having any more menstrual periods) and infertility (not being able to become pregnant) may occur and may be permanent. Some chemo drugs are more likely to cause this than others. The older a woman is when she receives chemotherapy, the more likely it is that she will become infertile or go through menopause as a result. When this happens, there is an increased risk of bone loss and osteoporosis. There are medicines that can treat or help prevent problems with bone loss.

Even if your periods have stopped while you were on chemo, you may still be able to get pregnant. Getting pregnant while receiving chemo could lead to birth defects and interfere with treatment. This is why it's important that women who are pre-menopausal before treatment and are sexually active discuss using birth control with their doctor. Patients who have finished treatment (like chemo) can safely go on to have children, but it's not safe to get pregnant while on treatment.

If you are pregnant when you get breast cancer, you still can be treated. Certain chemo drugs can be given safely during the last 2 trimesters of pregnancy. This is discussed in detail in the section, "Treatment of breast cancer during pregnancy."

If you think you might want to have children after being treated for breast cancer, talk with your doctor before you start treatment. You can read our document [Fertility and Women With Cancer](#) for more information.

**Neuropathy:** Many drugs used to treat breast cancer, including the taxanes (docetaxel and paclitaxel), platinum agents (carboplatin, cisplatin), vinorelbine, erubulin, and ixabepilone, can damage nerves outside of the brain and spinal cord. This can sometimes lead to symptoms (mainly in the hands and feet) like numbness, pain, burning or tingling sensations, sensitivity to cold or heat, or weakness. In most cases this goes away once treatment is stopped, but it might last a long time in some women. Neuropathy is discussed in more detail in our document, [Peripheral Neuropathy Caused By Chemotherapy](#).

**Heart damage:** Doxorubicin, epirubicin, and some other drugs may cause permanent heart damage (called *cardiomyopathy*). The risk of this occurring depends on how much of the drug is given, and is highest if the drug is used for a long time or in high doses. Doctors watch closely for this side effect. Most doctors check the patient's heart function with a test like a MUGA or an echocardiogram before starting one of these drugs. They also carefully control the doses, watch for symptoms of heart problems, and may repeat the heart test to monitor function. If the heart function begins to decline, treatment with these drugs will be stopped. Still, in some patients, heart damage takes a long time to develop. Signs might not appear until months or years after treatment stops. Heart damage from these drugs happens more often if the targeted therapy drug trastuzumab is used as well, so doctors are more cautious when these drugs are used together.

**Hand-foot syndrome:** Certain chemo drugs, such as capecitabine and liposomal doxorubicin, can irritate the palms of the hands and the soles of the feet. This is called *hand-foot syndrome*. Early symptoms include numbness, tingling, and redness. If it gets worse, the hands and feet can become swollen and uncomfortable or even painful. The skin may blister, leading to peeling of the skin or even open sores. There is no specific treatment, although some creams may help. These symptoms gradually get better when the drug is stopped or the dose is decreased. The best way to prevent severe hand-foot syndrome is to tell your doctor when early symptoms come up, so that the drug dose can be changed. This syndrome can also occur when the drug 5-FU is given as an IV infusion over several days (this is not commonly given to treat breast cancer).

**Chemo brain:** Another possible side effect of chemo is "chemo brain." Many women who are treated for breast cancer report a slight decrease in

mental functioning. They may have some problems with concentration and memory, which may last a long time. Although many women have linked this to chemo, it also has been seen in women who did not get chemo as a part of their treatment. Still, most women function well after treatment. In studies that have found chemo brain to be a side effect of treatment, the symptoms most often go away in a few years. For more information, see our document, [Chemo brain](#).

**Increased risk of leukemia:** Very rarely, certain chemo drugs can permanently damage the bone marrow, leading to a disease called [myelodysplastic syndrome](#) or even acute myeloid leukemia, a life-threatening cancer of white blood cells. When this happens it is usually within 10 years after treatment. In most women, the benefits of chemo in preventing breast cancer from coming back or in extending life are likely to far exceed the risk of this rare but serious complication.

**Feeling unwell or tired:** Many women do not feel as healthy after receiving chemo as they did before. There is often a residual feeling of body pain or achiness and a mild loss of physical functioning. These may be very subtle changes that are only revealed by closely questioning women who have undergone chemo.

Fatigue is another common (but often overlooked) problem for women who have received chemo. This may last up to several years. It can often be helped, so it is important to let your doctor or nurse know about it. For more information on what you can do about fatigue, see our document, [Fatigue in People with Cancer](#). Exercise, naps, and conserving energy may be recommended. If there are sleep problems, they can be treated. Sometimes there is depression, which may be helped by counseling and/or medicines.

For more information about chemotherapy, see our document, [Understanding Chemotherapy: A Guide for Patients and Families](#).

## Hormone therapy for breast cancer

Hormone therapy is another form of systemic therapy. It is most often used as an adjuvant therapy to help reduce the risk of the cancer coming back after surgery, but it can be used as neoadjuvant treatment, as well. It is also used to treat cancer that has come back after treatment or has spread.

A woman's ovaries are the main source of the hormone *estrogen* until menopause. After menopause, smaller amounts are still made in the body's fat tissue, where a hormone made by the adrenal gland is converted into estrogen.

Estrogen promotes the growth of cancers that are hormone receptor-positive. About 2 out of 3 of breast cancers are hormone receptor-positive — they contain receptors for the hormones estrogen (ER-positive cancers) and/or progesterone (PR-positive cancers). Most types of hormone therapy for breast cancer either stop estrogen from acting on breast cancer cells or lower estrogen levels. This kind of treatment is helpful for hormone receptor-positive breast cancers, but it does not help patients whose tumors are hormone receptor negative (both ER- and PR-negative).

If you'd like more information on a drug used in your treatment or a specific drug mentioned in this section, see our [Guide to Cancer Drugs](#) , or call us with the names of the medicines you're taking.

## Drugs that block estrogen

**Tamoxifen:** Tamoxifen blocks estrogen receptors in breast cancer cells. This stops estrogen from binding to them and telling the cells to grow and divide. While tamoxifen acts like an anti-estrogen in breast cells, it acts like an estrogen in other tissues, like the uterus and the bones. Because it acts like estrogen in some tissues but like an anti-estrogen in others, it is called a *selective estrogen receptor modulator* or SERM.

For women with hormone receptor-positive invasive breast cancer, taking tamoxifen after surgery for 5 years reduces the chances of the cancer coming back by about half and helps patients live longer. It also lowers the risk of a new breast cancer in the other breast. Some recent studies have shown that taking it for 10 years can be even more helpful.

For women who have been treated for ductal carcinoma in situ (DCIS) that is hormone receptor-positive, taking tamoxifen for 5 years lowers the chance of the DCIS coming back. It also lowers the chance of getting an invasive breast cancer.

Tamoxifen can also stop the growth and even shrink tumors in women with metastatic breast cancer. It can also be used to reduce the risk of developing breast cancer in women at high risk.

This drug is taken by mouth, most often as a pill.

The most common side effects of these drugs include fatigue, hot flashes, vaginal dryness or discharge, and mood swings.

Some patients with bone metastases may have a "tumor flare" with pain and swelling in the muscles and bones. This usually subsides quickly, but in some rare cases the patient may also develop a high calcium level in the blood that cannot be controlled. If this occurs, the treatment may need to be stopped for a time.

Rare, but more serious side effects are also possible. These drugs can increase the risk of developing cancers of the uterus ([endometrial cancer](#) and [uterine sarcoma](#)) in women who have gone through menopause. Tell your doctor right away about any unusual vaginal bleeding (a common symptom of both of these cancers). Most uterine bleeding is not from cancer, but this symptom always needs prompt attention.

Blood clots are another possible serious side effect. They usually form in the legs (called *deep venous thrombosis* or DVT), but sometimes a piece of clot may break off and end up blocking an artery in the lungs (*pulmonary embolism* or PE). Call your doctor or nurse right away if you develop pain, redness, or swelling in your lower leg (calf), shortness of breath, or chest pain because these can be symptoms of a DVT or PE.

Rarely, tamoxifen has been associated with strokes in post-menopausal women so tell your doctor if you have severe headaches, confusion, or trouble speaking or moving.

These drugs might also increase the risk of a heart attack.

Depending on a woman's menopausal status, tamoxifen can have different effects on the bones. In pre-menopausal women, tamoxifen can cause some bone thinning, but in post-menopausal women it is often good for bone strength. The effects of toremifene on bones are less clear.

The benefits of taking these drugs outweigh the risks for almost all women with hormone receptor-positive invasive breast cancer.

**Toremifene (Fareston®):** Toremifene is a drug similar to tamoxifen. It is also a SERM and has similar side effects. It is only approved to treat metastatic breast cancer. This drug is not likely to work if tamoxifen has been used and stopped working.

**Fulvestrant (Faslodex®):** Fulvestrant is a drug that first blocks the

estrogen receptor and then also eliminates it temporarily. It is not a SERM – it acts like an anti-estrogen throughout the body.

Fulvestrant is used to treat advanced (metastatic breast cancer), most often after other hormone drugs (like tamoxifen and often an aromatase inhibitor) have stopped working.

It is given by injections into the buttocks. For the first month, the shots are given 2 weeks apart. After that, it is given once a month. Common short-term side effects can include hot flashes, night sweats, mild nausea, and fatigue .Because it blocks estrogen, in theory it could weaken bones (osteoporosis) if it is taken for a long time.

It is currently only approved by the FDA for use in post-menopausal women with advanced breast cancer that no longer responds to tamoxifen or toremifene. It is sometimes used “off-label” in pre-menopausal women, often combined with a luteinizing-hormone releasing hormone (LHRH) agonist to turn off the ovaries (see below).

## **Treatments to lower estrogen levels**

**Aromatase inhibitors (AIs):** Three drugs that stop estrogen production in post-menopausal women have been approved to treat both early and advanced breast cancer: letrozole (Femara), anastrozole (Arimidex), and exemestane (Aromasin). They work by blocking an enzyme (aromatase) in fat tissue that is responsible for making small amounts of estrogen in post-menopausal women. They cannot stop the ovaries from making estrogen, so they are only effective in women whose ovaries aren't working (like after menopause). These drugs are taken daily as pills. So far, each of these drugs seems to work as well as the others in treating breast cancer.

Several studies have compared these drugs to tamoxifen as adjuvant (after surgery) hormone therapy in post-menopausal women. Using these drugs, either alone or after tamoxifen, has been shown to better reduce the risk of the cancer coming back later than using just tamoxifen for 5 years. Schedules that are known to be helpful include:

Tamoxifen for 2 to 3 years, followed by an aromatase inhibitor (AI) to complete 5 years of treatment

Tamoxifen for 5 years, followed by an AI for 5 years

An AI for 5 years

Most doctors now recommend post-menopausal women whose cancers are hormone receptor–positive use an AI at some point during adjuvant therapy. Right now, standard treatment is to use these drugs for about 5 years (or alternate with tamoxifen for a total of at least 5 years). We don't yet know if giving an AI for more than 5 years would be more helpful. Studies now being done should help answer this question.

For women with early-stage breast cancer who have not gone through menopause when they are first diagnosed, tamoxifen is used first, and then an AI may be given later if they go through menopause during treatment.

The AIs tend to have fewer serious side effects than tamoxifen—they don't cause uterine cancers and very rarely cause blood clots. They can, however, cause muscle pain and joint stiffness and/or pain. The joint pain may be similar to a new feeling of having arthritis in many different joints at one time. This side effect may improve by switching to a different AI, but it has led some women to stop drug treatment. If this occurs, most doctors recommend using tamoxifen to complete 5 years of hormone treatment.

Because aromatase inhibitors remove all estrogens from women after menopause, they also cause bone thinning, sometimes leading to osteoporosis and even fractures. Many women treated with an aromatase inhibitor are also treated with medicine to strengthen their bones, such as bisphosphonates or denosumab (these drugs are discussed in the section “Bone-directed therapy for breast cancer”).

**Ovarian ablation:** In pre-menopausal women, removing or shutting down the ovaries (ovarian ablation), the main source of estrogens, effectively makes the woman post-menopausal. This may allow some other hormone therapies to work better and is most often used to treat metastatic breast cancer, but is being studied in patients with early-stage disease.

Permanent ovarian ablation can be done by surgically removing the ovaries. This operation is called an *oophorectomy*. More often, ovarian ablation is done with drugs called *luteinizing hormone-releasing hormone* (LHRH) analogs, such as goserelin (Zoladex®) or leuprolide (Lupron®). These drugs stop the signal that the body sends to ovaries to make estrogens. They can be used alone or with tamoxifen as hormone therapy in pre-menopausal women. They are also sometimes used along with aromatase inhibitors in pre-menopausal women with advanced breast cancer.

Chemotherapy drugs may also damage the ovaries of pre-menopausal women so they no longer produce estrogen. In some women, ovarian function returns months or years later, but in others, the damage to the ovaries is permanent and leads to menopause. This can sometimes be a helpful (if unintended) consequence of chemotherapy with regard to breast cancer treatment, although it leaves the woman infertile.

All of these methods can cause a woman to have symptoms of menopause, including hot flashes, night sweats, vaginal dryness, and mood swings.

## **Less commonly used types of hormone therapy**

These options were used more often in the past, but are rarely given now.

Megestrol acetate (Megace®) is a progesterone-like drug used that can be used as a hormone treatment of advanced breast cancer, usually for women whose cancers do not respond to the other hormone treatments. Its major side effect is weight gain, and it is sometimes used in higher doses to reverse weight loss in patients with advanced cancer.

Androgens (male hormones) may rarely be considered after other hormone treatments for advanced breast cancer have been tried. They are sometimes effective, but they can cause masculine characteristics to develop such as an increase in body hair and a deeper voice.

Another option that may rarely be tried when the cancer is no longer responding to other hormone drugs is giving high doses of estrogen. The main risk is of serious blood clots (like DVTs and PEs). Patients also have trouble with nausea.

## **Targeted therapy for breast cancer**

As researchers have learned more about the gene changes in cells that cause cancer, they have been able to develop newer drugs that specifically target these changes. These targeted drugs work differently from standard chemotherapy (chemo) drugs. They often have different (and less severe) side effects.

If you'd like more information on a drug used in your treatment or a specific drug mentioned in this section, see our [Guide to Cancer Drugs](#) , or call us

with the names of the medicines you're taking.

## Drugs that target the HER2/neu protein

In about 1 in 5 patients with breast cancer, the cancer cells have too much of a growth-promoting protein known as HER2/neu (or just HER2) on their surface. Breast cancers with too much of this protein tend to grow and spread more aggressively without special treatment. A number of drugs have been developed that target this protein.

None of these drugs are safe during pregnancy because they can cause harm or even death to the fetus. Women who had not gone through menopause before starting treatment need to use effective birth control while on any of these drugs.

**Trastuzumab (Herceptin):** Trastuzumab is a type of drug known as a *monoclonal antibody*—a man-made version of a very specific immune system protein. It attaches to HER2 and can help slow the growth of cancer cells with too much HER2. It may also stimulate the immune system to more effectively attack the cancer.

Trastuzumab is given as an injection into a vein (IV), usually once a week or as a larger dose every 3 weeks.

Trastuzumab is often used as adjuvant therapy for HER2-positive cancers to reduce the risk of the cancer coming back. It is given with chemo at first, and then on its own, usually for a total of a year of treatment. This may also be started before surgery as neoadjuvant therapy.

Trastuzumab is also used to treat HER2-positive advanced breast cancers that return after treatment or continue to grow during treatment. Treatment that combines trastuzumab with chemo generally works better than chemo alone. If a cancer gets worse while a patient is getting trastuzumab and chemo, often the trastuzumab is continued and the chemo is changed.

Compared with chemo drugs, the side effects of trastuzumab are relatively mild. These side effects are rare and may include fever and chills, weakness, nausea, vomiting, cough, diarrhea, and headache. These side effects are generally mild and occur less often after the first dose.

A more serious potential side effect is heart damage leading to a problem called *congestive heart failure*. For most (but not all) women, this effect is temporary and has improved when the drug is stopped. The risk of heart

problems is higher when trastuzumab is given with certain chemo drugs such as doxorubicin (Adriamycin) and epirubicin (Ellence). For this reason heart function is checked regularly during treatment with trastuzumab. Major symptoms of congestive heart failure are shortness of breath, leg swelling, and severe fatigue. Women having these symptoms should call their doctor right away.

**Ado-trastuzumab emtansine (TDM-1, Kadcyla™):** Ado-trastuzumab emtansine is a type of drug known as an antibody-drug conjugate. It is made up of the same monoclonal antibody found in trastuzumab attached to a chemo drug known as DM-1. In this type of drug, the antibody acts as a homing device, taking the chemo drug directly to the cancer cells.

This drug is given by itself (without chemo) to treat advanced breast cancer. It is given as an injection into a vein (IV) every 3 weeks. Common side effects include fatigue, nausea, muscle and bone pain, low platelet counts, headache, and constipation. This drug can also cause more serious side effects, such as severe allergic reactions, liver damage, heart damage, and lung problems.

**Pertuzumab (Perjeta®):** Like trastuzumab, pertuzumab is a monoclonal antibody that attaches to the HER2 protein. It seems to target a different part of the protein than trastuzumab does. This drug can be used along with docetaxel (Taxotere) and trastuzumab to treat advanced breast cancer. This 3 drug combination can also be used to treat earlier-stage breast cancers before surgery (as neoadjuvant therapy).

This drug is given as an infusion into a vein every 3 weeks. When given with trastuzumab and docetaxel, common side effects included diarrhea, hair loss, nausea, fatigue, rash, and low white blood cell counts (sometimes with fever). Many side effects, such as hair loss, nausea, and fatigue occur at about the same rate as in those who get just docetaxel and trastuzumab.

Like trastuzumab, pertuzumab cannot be given to patients with poor heart function as it can weaken the heart. Your doctor will check tests of heart function before starting this drug and again every few months during treatment with pertuzumab.

**Lapatinib (Tykerb):** Lapatinib is another drug that targets the HER2 protein. This drug is given as a pill to women with advanced HER2-positive breast cancer that is no longer helped by chemo and trastuzumab. It has also been studied as an adjuvant therapy in patients with HER2-positive

cancer. The chemo drug capecitabine (Xeloda) is often given in combination with lapatinib to treat metastatic breast cancer. It may also be given with letrozole (Femara) in patients with HER2-positive advanced breast cancer that is also ER-positive.

In one study, giving lapatinib along with trastuzumab helped patients with advanced breast cancer live longer than giving it alone.

The most common side effects of this drug include diarrhea, nausea, vomiting, rash, and hand-foot syndrome (this was discussed in the section about chemotherapy). Diarrhea is a common side effect and can be severe, so it is very important to let your health care team know about any changes in bowel habits as soon as they happen.

In rare cases lapatinib may cause liver problems or a decrease in heart function (that can lead to shortness of breath), although this seems to go away once treatment is finished.

## **Everolimus (Afinitor®)**

Everolimus is a type of targeted therapy that blocks mTOR, a protein in cells that normally promotes their growth and division. By blocking this protein, everolimus can help stop cancer cells from growing. Everolimus may also stop tumors from developing new blood vessels, which can help limit their growth. In treating breast cancer, this drug seems to help hormone therapy drugs work better.

Everolimus is a pill taken once a day.

This drug is approved to treat advanced hormone receptor-positive, HER2-negative, breast cancer in women who have gone through menopause. It is meant to be used with exemestane (Aromasin) in these women if their cancers have grown while they were being treated with either letrozole or anastrozole (or the cancer started growing shortly after treatment with these drugs was stopped). This approval was based on a study that showed that giving everolimus with exemestane was better than exemestane alone in shrinking tumors and stopping their growth in post-menopausal women with hormone receptor-positive, HER2-negative breast cancer that had stopped responding to letrozole or anastrozole.

Common side effects of this drug include mouth sores, diarrhea, nausea, fatigue, feeling weak or tired, low blood counts, shortness of breath, and cough. Everolimus can also increase blood lipids (cholesterol and

triglycerides) and blood sugars, so your doctor will check your blood work periodically while you are on this drug. It can also increase your risk of serious infections, so your doctor will watch you closely for infection while you are on treatment.

Everolimus is also being studied for use for earlier stage breast cancer, with other hormone therapy drugs, and combination with other treatments. This is discussed further in the section, "[What's new in breast cancer research and treatment?](#)"

## **Bevacizumab (Avastin®)**

Tumors need to develop and maintain new blood vessels to grow. Drugs that target these blood vessels are helpful against a variety of cancers, and have been studied for use in breast cancer.

Bevacizumab is a monoclonal antibody that has been used in patients with metastatic breast cancer. This antibody is directed against vascular endothelial growth factor, a protein that helps tumors form new blood vessels.

Bevacizumab is given by intravenous (IV) infusion. It is most often used in combination with chemo.

Rare, but possibly serious side effects include bleeding, holes forming in the colon (requiring surgery to correct), and slow wound healing.

More common side effects include high blood pressure, tiredness, blood clots, low white blood cell counts, headaches, mouth sores, loss of appetite, and diarrhea. High blood pressure is very common, so it is very important that your doctor watches your blood pressure carefully during treatment.

Bevacizumab was first approved by the US Food and Drug Administration (FDA) as part of the treatment for metastatic breast cancer in 2008. The approval was based on a study in which the women who received bevacizumab with the chemo drug paclitaxel (Taxol) had a longer time without their cancers growing than the women who received paclitaxel alone.

New study results presented at a July 2010 FDA meeting did not show a real benefit for the women receiving bevacizumab as a part of their treatment. Although bevacizumab seemed to slow cancer growth for a

short-time in some of the women, it didn't help them live longer. Those given bevacizumab also had much more severe side effects. The FDA concluded that the risks of this drug outweigh the benefits in the treatment of metastatic breast cancer. On November 18, 2011, the FDA withdrew the breast cancer "indication" for bevacizumab. This does not mean that the drug will become unavailable, since it is still FDA-approved to treat some other cancers. It does mean that the company making bevacizumab can't market the drug for breast cancer—the company can't tell doctors or patients that the drug is useful in treating breast cancer. At this time, women who are taking bevacizumab can continue to do so, but they should discuss this treatment with their doctors.

More information about monoclonal antibodies can be found in our document, *Immunotherapy*.

For more information about targeted therapy drugs, see our document [Targeted Therapy](#).

## **Bone-directed therapy for breast cancer**

When cancer spreads to bones, it can cause pain and lead to bones breaking (fractures) and other problems. Drugs like bisphosphonates and denosumab can lower the risk of these problems.

If you'd like more information on a drug used in your treatment or a specific drug mentioned in this section, see our [Guide to Cancer Drugs](#), or call us with the names of the medicines you're taking.

### **Bisphosphonates**

Bisphosphonates are drugs that can be used to help strengthen bones and reduce the risk of fractures and pain in bones that have been weakened by metastatic breast cancer. Examples include pamidronate (Aredia®) and zoledronic acid (Zometa®). They are given intravenously (IV).

Bisphosphonates may also help against bone thinning (osteoporosis) that can result from treatment with aromatase inhibitors or from early menopause as a side effect of chemotherapy. There are a number of medicines, including some oral forms of bisphosphonates, to treat loss of

bone strength when it is not caused by cancer spread to the bones.

Bisphosphonates can have side effects, including flu-like symptoms and bone pain. They can also lead to kidney problems, so patients with poor kidney function may not be able to be treated with these drugs.

A rare but very distressing side effect of bisphosphonates is osteonecrosis (damage) in the jaw bones or ONJ. It can be triggered by having a tooth removed while getting treated with a bisphosphonate. ONJ often appears as an open sore in the jaw that won't heal. It can lead to loss of teeth or infections of the jaw bone. Doctors don't know why this happens or how to treat it, other than to stop the bisphosphonates. Maintaining good oral hygiene by flossing, brushing, making sure that dentures fit properly, and having regular dental checkups may help prevent this. Most doctors recommend that patients have a dental checkup and have any tooth or jaw problems treated before they start taking a bisphosphonate.

## **Denosumab**

A newer drug called *denosumab* (Xgeva®, Prolia®) is also now available to help reduce the risk of problems from breast cancer metastasis to the bone. It works differently from bisphosphonates.

In studies of patients with breast cancer that had spread to the bone, it seemed to help prevent problems like fractures (breaks) better than zoledronic acid. It also can help bones even after bisphosphonates stop working.

In patients with cancer spread to bones, this drug is injected under the skin every 4 weeks. Side effects include low blood levels of calcium and phosphate, as well as ONJ. This drug does not seem to affect the kidneys, so it is safe to give to patients with kidney problems.

Denosumab can also be used to strengthen bones in breast cancer patients with weak bones who are being treated with aromatase inhibitors. When it is used for this purpose, it is given less often (usually every 6 months).

For more information about treating cancer spread to bones, see our document [Bone Metastases](#).

## Clinical trials for breast cancer

You may have had to make a lot of decisions since you've been told you have cancer. One of the most important decisions you will make is choosing which treatment is best for you. You may have heard about clinical trials being done for your type of cancer. Or maybe someone on your health care team has mentioned a clinical trial to you.

Clinical trials are carefully controlled research studies that are done with patients who volunteer for them. They are done to get a closer look at promising new treatments or procedures.

If you would like to take part in a clinical trial, you should start by asking your doctor if your clinic or hospital conducts clinical trials. You can also call our clinical trials matching service for a list of clinical trials that meet your medical needs. You can reach this service at 1-800-303-5691 or on our website at [www.cancer.org/clinicaltrials](http://www.cancer.org/clinicaltrials). You can also get a list of current clinical trials by calling the National Cancer Institute's Cancer Information Service toll-free at 1-800-4-CANCER (1-800-422-6237) or by visiting the NCI clinical trials website at [www.cancer.gov/clinicaltrials](http://www.cancer.gov/clinicaltrials).

There are requirements you must meet to take part in any clinical trial. If you do qualify for a clinical trial, you decide whether or not to enter (enroll in) it.

Clinical trials are one way to get state-of-the-art cancer treatment. They are the only way for doctors to learn better methods to treat cancer. Still, they are not right for everyone.

You can get a lot more information on clinical trials in our document called *Clinical Trials: What You Need to Know*. You can read it on our website or call our toll-free number (1-800-227-2345) and have it sent to you.

## Complementary and alternative therapies for breast cancer

When you have cancer you are likely to hear about ways to treat your cancer or relieve symptoms that your doctor hasn't mentioned. Everyone from friends and family to Internet groups and web sites might offer ideas

for what might help you. These methods can include [vitamins](#), [herbs](#), and special diets, or other methods such as [acupuncture](#) or [massage](#), to name a few.

## What exactly are complementary and alternative therapies?

Not everyone uses these terms the same way, and they are used to refer to many different methods, so it can be confusing. We use *complementary* to refer to treatments that are used *along with* your regular medical care. *Alternative* treatments are used *instead of* a doctor's medical treatment.

**Complementary methods:** Most complementary treatment methods are not offered as cures for cancer. Mainly, they are used to help you feel better. Some methods that are used along with regular treatment are meditation to reduce stress, acupuncture to help relieve pain, or peppermint tea to relieve nausea. Some complementary methods are known to help, while others have not been tested. Some have been proven not to be helpful, and a few have even been found harmful.

**Alternative treatments:** Alternative treatments may be offered as cancer cures. These treatments have not been proven safe and effective in clinical trials. Some of these methods may pose danger, or have life-threatening side effects. But the biggest danger in most cases is that you may lose the chance to be helped by standard medical treatment. Delays or interruptions in your medical treatments may give the cancer more time to grow and make it less likely that treatment will help.

## Finding out more

It is easy to see why people with cancer think about alternative methods. You want to do all you can to fight the cancer, and the idea of a treatment with few or no side effects sounds great. Sometimes medical treatments like chemotherapy can be hard to take, or they may no longer be working. But the truth is that most of these alternative methods have not been tested and proven to work in treating cancer.

As you consider your options, here are 3 important steps you can take:

Look for "red flags" that suggest fraud. Does the method promise to cure all or most cancers? Are you told not to have regular medical treatments? Is the treatment a "secret" that requires you to visit certain providers or travel to another country?

Talk to your doctor or nurse about any method you are thinking about using.

Contact us at 1-800-227-2345 to learn more about complementary and alternative methods in general and to find out about the specific methods you are looking at. You can also learn more on the [Complementary and Alternative Medicine](#) page of our website.

## **The choice is yours**

Decisions about how to treat or manage your cancer are always yours to make. If you want to use a non-standard treatment, learn all you can about the method and talk to your doctor about it. With good information and the support of your health care team, you may be able to safely use the methods that can help you while avoiding those that could be harmful.

## **Treatment of non-invasive (stage 0) breast cancer**

Stage 0 includes lobular carcinoma in situ (LCIS) and ductal carcinoma in situ (DCIS), which are treated very differently.

### **LCIS**

Since this is not a true cancer or pre-cancer, no immediate or active treatment is recommended for most women with LCIS. But because having LCIS increases your risk of developing invasive cancer later on, close follow-up is very important. This usually includes a yearly mammogram and a clinical breast exam. Close follow-up of both breasts is important because women with LCIS in one breast have the same increased risk of developing cancer in either breast. Although there is not enough evidence to recommend routine use of magnetic resonance imaging (MRI) in addition to mammograms for all women with LCIS, it is reasonable for these women to talk with their doctors about their other risk factors and the benefits and limits of being screened yearly with MRI.

Women with LCIS may also want to consider taking tamoxifen or raloxifene (Evista) to reduce their risk of breast cancer or taking part in a clinical trial for breast cancer prevention. For more information on drugs to reduce

breast cancer risk see our document, [Medicines to Reduce Breast Cancer Risk](#). They might also wish to discuss other possible prevention strategies (such as reaching an optimal body weight or starting an exercise program) with their doctor.

Some women with LCIS choose to have a bilateral simple mastectomy (removal of both breasts but not axillary lymph nodes) to reduce their risk of breast cancer, especially if they have other risk factors, such as a strong family history. A woman also may consider immediate or delayed breast reconstruction.

## **DCIS**

In most cases, a woman with DCIS can choose between breast-conserving surgery (BCS) and simple mastectomy. BCS is usually followed by radiation therapy. Lymph node removal (most often a sentinel lymph node biopsy) is not always needed. It may be done if the doctor thinks that a woman with DCIS may also have an area of invasive cancer. The risk of an area of DCIS containing invasive cancer goes up with tumor size and nuclear grade. Many doctors will do a sentinel lymph node biopsy if a mastectomy is done for DCIS. This is because if an area of invasive cancer is found in the tissue removed during a mastectomy, the doctor won't be able to go back and do a sentinel lymph node procedure later, and so may have to do a full axillary lymph node dissection.

Radiation therapy given after BCS lowers the chance of the cancer coming back in the same breast (as more DCIS or as an invasive cancer). BCS without radiation therapy is not a standard treatment, but might be an option for certain women who had small areas of low-grade DCIS that were removed with large enough cancer-free surgical margins. But most women who have BCS for DCIS will require radiation therapy.

Mastectomy may be necessary if the area of DCIS is very large, if the breast has several areas of DCIS, or if BCS cannot completely remove the DCIS (that is, the BCS specimen and re-excision specimens have cancer cells in or near the surgical margins). Women having a mastectomy for DCIS may choose to have reconstruction immediately or later.

If the DCIS is estrogen receptor-positive, treatment with tamoxifen for 5 years after surgery can lower the risk of another DCIS or invasive cancer developing in either breast. Women may want to discuss the pros and cons of this option with their doctors.

# Treatment of invasive breast cancer, by stage

Breast-conserving surgery (BCS) is often appropriate for earlier-stage invasive breast cancers if the cancer is small enough, although mastectomy is also an option. If the cancer is too large, a mastectomy will be needed, unless pre-operative (neoadjuvant) chemotherapy (chemo) can shrink the tumor enough to allow BCS. In either case, one or more underarm lymph nodes will need to be checked for cancer. Radiation will be needed for almost all patients who have BCS and some who have mastectomy. Adjuvant systemic therapy after surgery is typically recommended for all cancers larger than 1 cm (about 1/2 inch) across, and also sometimes for smaller tumors.

If you'd like more information on a drug used in your treatment or a specific drug mentioned in this section, see our [Guide to Cancer Drugs](#) , or call us with the names of the medicines you're taking.

## Stage I

These cancers are still relatively small and either have not spread to the lymph nodes (N0) or have a tiny area of cancer spread in the sentinel lymph node (N1mi).

**Local therapy:** Stage I cancers can be treated with either BCS (lumpectomy, partial mastectomy) or mastectomy. The lymph nodes will also need to be evaluated, with a sentinel lymph node biopsy or an axillary lymph node dissection. Breast reconstruction can be done either at the same time as surgery or later.

Radiation therapy is usually given after BCS. Women may consider BCS *without* radiation therapy if they are at least 70 years old and ALL of the following are true:

The tumor was 2 cm or less across and it has been completely removed.

The tumor contains hormone receptors and hormone therapy is given.

None of the lymph nodes removed contained cancer.

Some women who do not meet these criteria may be tempted to avoid radiation, but studies have shown that not getting radiation increases the chances of the cancer coming back.

**Adjuvant systemic therapy:** Most doctors will discuss the pros and cons of adjuvant hormone therapy (either tamoxifen, an aromatase inhibitor, or one following the other) with all women who have a hormone receptor–positive (estrogen or progesterone) breast cancer, no matter how small the tumor. Women with tumors larger than 0.5 cm (about ¼ inch) across may be more likely to benefit from it.

If the tumor is smaller than 1 cm (about ½ inch) across, adjuvant chemo is not usually offered. Some doctors may suggest chemo if a cancer smaller than 1 cm has any unfavorable features (such as being high-grade, hormone receptor–negative, HER2-positive, or having a high score on a gene panel like Oncotype Dx). Adjuvant chemo is usually recommended for larger tumors.

For HER2-positive cancers, adjuvant trastuzumab (Herceptin) is usually recommended as well.

See below for more information on adjuvant therapy.

## Stage II

These cancers are larger and/or have spread to a few nearby lymph nodes.

**Local therapy:** Surgery and radiation therapy options for stage II tumors are similar to those for stage I tumors, except that for stage II, radiation therapy to the chest wall may be considered even after mastectomy if the tumor is large (more than 5 cm across) or cancer cells are found in several lymph nodes.

**Adjuvant systemic therapy:** Adjuvant systemic therapy is recommended for women with stage II breast cancer. It may be hormone therapy, chemo, trastuzumab, or some combination of these, depending on the patient's age, estrogen-receptor status, and HER2/neu status. See the following section for more information on adjuvant therapy.

**Neoadjuvant therapy:** An option for some women who would like to have

BCS, but the surgeon thinks the tumor is too large to have a good result, is to have systemic treatment before surgery to shrink the tumor. This is called neoadjuvant therapy and it can include chemo or hormone therapy. For HER2-positive tumors, the targeted drug trastuzumab is also used, sometimes along with pertuzumab (Perjeta).

If the neoadjuvant treatment shrinks the tumor enough, women may then be able to have BCS (such as lumpectomy) followed by radiation therapy. More adjuvant therapy may also be given after surgery.

If the tumor does not shrink enough for BCS, then mastectomy may be required. Adjuvant therapy may also be given after surgery, but would likely be with different drugs, since the tumor did not shrink with the first set given. Radiation therapy may be given after surgery, as well.

A woman's chance for survival from breast cancer does not seem to be affected by whether she gets chemo before or after her breast surgery.

## **Stage III**

For a cancer to be stage III, the tumor must be large (greater than 5 cm or about 2 inches across) or growing into nearby tissues (the skin over the breast or the muscle underneath), or the cancer has spread to many nearby lymph nodes. Local treatment for some stage III breast cancers is largely the same as that for stage II breast cancers. Tumors that are small enough (and have not grown into nearby tissues) may be removed by BCS (such as lumpectomy) which is followed by radiation therapy. Otherwise, the treatment is mastectomy (with or without breast reconstruction). Sentinel lymph node biopsy may be an option for some patients, but most require an axillary lymph node dissection. Surgery is usually followed by adjuvant systemic chemotherapy, and/or hormone therapy, and/or trastuzumab. Radiation after mastectomy is often recommended.

Often, stage III cancers are treated with chemo before surgery (neoadjuvant chemo). For HER2-positive tumors, the targeted drug trastuzumab is given as well, sometimes along with pertuzumab. This may shrink the tumor enough to allow BCS. Otherwise, a mastectomy is done. Usually an axillary lymph node dissection is done as well. Immediate reconstruction may be an option for some, but reconstruction is often delayed until after radiation therapy, which is often given even if a mastectomy is done. Adjuvant chemo may also be given, with trastuzumab added to chemo for HER2-positive cancers. Adjuvant hormone therapy is offered to all women with hormone receptor–positive breast cancers.

Some inflammatory breast cancers are stage III. They are treated with neoadjuvant chemo (with trastuzumab and sometimes pertuzumab if the cancer is HER2-positive). If the cancer doesn't shrink with chemo, radiation may be given. This is followed by a mastectomy and axillary lymph node dissection. Then adjuvant treatment with chemo (and trastuzumab if the cancer is HER2-positive), radiation therapy (if it wasn't given before surgery), and hormone therapy (if the cancer is hormone receptor-positive) is given. Inflammatory breast cancer is discussed in more detail in our document, [Inflammatory Breast Cancer](#).

## Adjuvant drug therapy for stages I to III breast cancer

Adjuvant drug therapy may be recommended, based on the tumor's size, spread to lymph nodes, and other prognostic features. If it is, you may get chemo, trastuzumab (Herceptin), hormone therapy, or some combination of these.

**Hormone therapy:** Hormone therapy is not likely to be effective for women with hormone receptor-negative tumors. Hormone therapy is frequently offered to all women with hormone receptor-positive invasive breast cancer regardless of the size of the tumor or the number of lymph nodes with cancer cells.

Women who haven't gone through menopause and have hormone receptor-positive tumors are most often treated with tamoxifen, which block the effects of estrogen being made by the ovaries. Some doctors also give a luteinizing hormone-releasing hormone (LHRH) analog, which temporarily stops the ovaries from functioning. Another (permanent) option is surgical removal of the ovaries (oophorectomy). Still, it is not clear that removing the ovaries or stopping them from working helps tamoxifen work better for cancers that have been removed completely. If the woman becomes post-menopausal within 5 years of starting tamoxifen (either naturally or because her ovaries are removed), she may be switched from tamoxifen to an aromatase inhibitor.

Sometimes a woman will stop having periods after chemotherapy or while on tamoxifen. But this does not necessarily mean she is truly post-menopausal. The woman's doctor can check the levels of certain hormones to determine her menopausal status. This is important because the aromatase inhibitors will not help if her ovaries are still working (and she is pre-menopausal).

Women have gone through menopause and who have hormone receptor–

positive tumors will generally get adjuvant hormone therapy either with an aromatase inhibitor (typically for 5 years), or with tamoxifen for 2 to 5 years followed by an aromatase inhibitor for 3 to 5 more years. For women who can't take aromatase inhibitors, an alternative is tamoxifen for 5 years. Women who had their uterus removed (a hysterectomy) but still have their ovaries may need to have blood tests to check hormone levels to see if they have gone through menopause.

If chemo is to be given as well, hormone therapy is usually not started until after chemo is completed.

**Chemotherapy:** Chemo is usually recommended for all women with an invasive breast cancer whose tumor is hormone receptor-negative, and for women with hormone receptor-positive tumors who might additionally benefit from having chemo along with their hormone therapy, based on the stage and characteristics of their tumor.

Adjuvant chemo can decrease the risk of the cancer coming back, but it does not remove the risk completely. Before deciding if it's right for you, it is important to understand the chance of your cancer returning and how much adjuvant therapy will decrease that risk.

Your doctor should discuss what specific drug regimens are best for you based on your cancer, its stage, your other health issues, and your preferences. The typical chemo regimens are listed in the chemotherapy section. The length of these regimens usually ranges from 3 to 6 months. In some cases, dose-dense chemo may be used (see the [Chemotherapy](#) section for an explanation of dose-dense chemo).

**Trastuzumab (Herceptin):** Women who have HER2-positive cancers are usually given trastuzumab along with chemo as part of their treatment. After the chemo is finished, the trastuzumab is continued to complete a year of treatment.

Because trastuzumab can lead to heart problems, heart function is watched closely during treatment with tests such as echocardiograms or MUGA scans.

**Online tools to help make decisions:** To decide if adjuvant therapy is right for you, you might want to visit the Mayo Clinic website at [www.mayoclinic.com](http://www.mayoclinic.com) and type "adjuvant therapy for breast cancer" into the search box. You will find a page that will help you to understand the possible benefits and limits of adjuvant therapy.

Other online guides, such as [www.adjuvantonline.com](http://www.adjuvantonline.com), are designed to be used by health care professionals. This website provides information about your risk of the cancer returning within the next 10 years and what benefits you might expect from hormone therapy and/or chemotherapy. You may want to ask your doctor if he or she uses this site.

## Stage IV

Stage IV cancers have spread beyond the breast and lymph nodes to other parts of the body. Breast cancer most commonly spreads to the bones, liver, and lung. As the cancer progresses, it may spread to the brain, but it can affect any organ, even the eye.

Although surgery and/or radiation may be useful in some situations (see below), systemic therapy is the main treatment. Depending on many factors, this may consist of hormone therapy, chemotherapy, targeted therapies, or some combination of these treatments. Treatment can shrink tumors, improve symptoms, and help patients live longer, but it isn't able to cure these cancers (make the cancer go away and stay away).

Trastuzumab may help women with HER2-positive cancers live longer if it is given with the first chemo for stage IV disease. Trastuzumab can also be given with the hormone therapy drug letrozole. Other options include ado-trastuzumab emtansine (Kadcyla) or giving pertuzumab with chemo and trastuzumab. Treatment with ado-trastuzumab emtansine continues until the cancer starts growing again. It is not clear how long treatment with trastuzumab (with or without pertuzumab) should continue.

All of the systemic therapies given for breast cancer—hormone therapy, chemo, and targeted therapies—have possible side effects, which were described in previous sections. Your doctor will explain to you the benefits and risks of these treatments before prescribing them.

Radiation therapy and/or surgery may also be used in certain situations, such as:

- When the breast tumor is causing an open wound in the breast (or chest)

- To treat a small number of metastases in a certain area

- To prevent bone fractures

- When an area of cancer spread is pressing on the spinal cord

To treat a blockage in the liver

To provide relief of pain or other symptoms

When the cancer has spread to the brain

If your doctor recommends such local treatments, it is important that you understand their goal—whether it is to try to cure the cancer or to prevent or treat symptoms.

In some cases, regional chemo (where drugs are delivered directly into a certain area, such as the fluid around the brain or into the liver) may be useful as well.

Treatment to relieve symptoms depends on where the cancer has spread. For example, pain from bone metastases may be treated with external beam radiation therapy and/or bisphosphonates such as pamidronate (Aredia) or zoledronic acid (Zometa). Most doctors recommend bisphosphonates or denosumab (Xgeva), along with calcium and vitamin D, for all patients whose breast cancer has spread to their bones. (For more information about treatment of bone metastases, see our document, [Bone Metastasis](#).)

**Advanced cancer that progresses during treatment:** Treatment for advanced breast cancer can often shrink the cancer or slow its growth (often for many years), but after a time, it stops working. Further treatment at this point depends on several factors, including previous treatments, where the cancer is located, and a woman's age, general health, and desire to continue getting treatment.

For hormone receptor–positive cancers that were being treated with hormone therapy, switching to another type of hormone therapy sometimes helps. If either letrozole (Femara) or anastrozole (Arimidex) were given, using everolimus (Afinitor) with exemestane may be an option. If hormone drugs stop working, chemo is usually the next step.

If the cancer is no longer responding to one chemo regimen, trying another may be helpful. Many different drugs and combinations can be used to treat breast cancer. However, each time a cancer progresses during treatment it becomes less likely that further treatment will have an effect.

HER2-positive cancers that no longer respond to trastuzumab might respond to lapatinib. Lapatinib also attacks the HER2 protein. This drug is

often given along with the chemotherapy drug capecitabine (Xeloda), but it can be used with other chemo drugs, with trastuzumab, or even alone (without chemo). Other options for patients with HER2 positive cancers include giving pertuzumab with chemo and trastuzumab and using the drug ado-trastuzumab emtansine.

Because current treatments are very unlikely to cure advanced breast cancer, patients in otherwise good health are encouraged to think about taking part in clinical trials of other promising treatments.

## Recurrent breast cancer

Cancer is called *recurrent* when it come backs after treatment. Recurrence can be local (in the same breast or in the mastectomy scar) or in a distant area. Rarely, breast cancer comes back in nearby lymph nodes. This is called *regional* recurrence. Cancer that is found in the opposite breast is not a recurrence—it is a new cancer that requires its own treatment.

**Local recurrence:** Treatment of women whose breast cancer has recurred locally depends on their initial treatment. If the woman had breast-conserving surgery, a local recurrence in the breast is usually treated with mastectomy. If the initial treatment was mastectomy, recurrence near the mastectomy site is treated by removing the tumor whenever possible. This is followed by radiation therapy, but only if none had been given after the original surgery. (Radiation can't be given to the same area twice.) In either case, hormone therapy, targeted therapy (like trastuzumab), chemo, or some combination of these may be used after surgery and/or radiation therapy.

**Regional recurrence:** When breast cancer comes back in nearby lymph nodes (such as those under the arm or around the collar bone), it is treated by removing those lymph nodes. This may be followed by radiation treatments aimed at the area. Systemic treatment (like chemo, targeted therapy, or hormone therapy) may be considered after the local treatment as well.

**Distant recurrence:** In general, women whose cancer comes back in organs like the bones, lungs, brain, etc., are treated the same way as those found to have stage IV breast cancer in these organs when they were first diagnosed (see treatment for stage IV). The only difference is that treatment may be affected by previous treatments a woman has had.

Should your cancer come back, our document, [When Your Cancer Comes](#)

*Back: [Cancer Recurrence](#)* can provide you with more general information on how to manage and cope with this phase of your treatment.

## Treatment of breast cancer during pregnancy

Breast cancer is diagnosed in about 1 pregnant woman out of 3,000. In general, treatment recommendations depend upon how long the woman has been pregnant.

Radiation therapy during pregnancy is known to increase the risk of birth defects, so it is not recommended for pregnant women with breast cancer. Since breast-conserving surgery (BCS) needs to be followed with radiation, BCS is only an option if radiation can be delayed until after the baby is delivered. But breast biopsy procedures and even mastectomy and lymph node removal can be done safely in pregnancy.

For a long time it was assumed that chemotherapy (chemo) was dangerous to the fetus. But several studies have found that using certain chemo drugs during the second and third trimesters (the fourth to ninth months) does not increase the risk of birth defects. Because of concern about the potential damage to the fetus, the safety of chemo during the first trimester (the first 3 months) of pregnancy has not been studied.

Both hormone therapy and targeted therapy can affect the fetus and should not be started until after the patient has given birth.

Many chemo and hormone therapy drugs can enter breast milk and could be passed on to the baby, so breastfeeding is not usually recommended during chemo, hormone, or targeted therapy.

If you'd like more information on a drug used in your treatment or a specific drug mentioned in this section, see our [Guide to Cancer Drugs](#) , or call us with the names of the medicines you're taking.

For more information, see our document, *[Pregnancy and Breast Cancer](#)*.

## More treatment information for breast cancer

For more details on treatment options—including some that may not be

addressed in this document—the National Cancer Institute (NCI) and the National Comprehensive Cancer Network (NCCN) are good sources of information.

The NCI provides treatment guidelines via its telephone information center (1-800-4-CANCER) and its website ([www.cancer.gov](http://www.cancer.gov)). Detailed guidelines intended for use by cancer care professionals are also available on [www.cancer.gov](http://www.cancer.gov).

The NCCN, made up of experts from many of the nation's leading cancer centers, develops cancer treatment guidelines for doctors to use when treating patients. Those are available on the NCCN website ([www.nccn.org](http://www.nccn.org)).

## What happens after treatment for breast cancer?

For many women with breast cancer, treatment may remove or destroy the cancer. Completing treatment can be both stressful and exciting. You may be relieved to finish treatment, but find it hard not to worry about cancer coming back. (When cancer comes back after treatment, it is called *recurrence*.) This is a very common concern in people who have had cancer.

It may take a while before your fears lessen. But it may help to know that many cancer survivors have learned to live with this uncertainty and are leading full lives. Our document, [\*Living with Uncertainty: The Fear of Cancer Recurrence\*](#), gives more detailed information on this.

For other people, the cancer may never go away completely. These people may get regular treatments with chemotherapy, radiation therapy, or other treatments to try to help keep the cancer in check. Learning to live with cancer that does not go away can be difficult and very stressful. It has its own type of uncertainty. Our document, [\*When Cancer Doesn't Go Away\*](#), talks more about this.

## Follow-up care

When treatment ends, your doctors will still want to watch you closely. It is very important to go to all of your follow-up appointments. During these

visits, your doctors will ask questions about any problems you may have and may do exams and lab tests or x-rays and scans to look for signs of cancer or treatment side effects.

Almost any cancer treatment can have side effects. Some may last for a few weeks to months, but others can last the rest of your life. This is the time for you to talk to your cancer care team about any changes or problems you notice and any questions or concerns you have.

At first, your follow-up appointments will probably be scheduled for every 3 to 6 months. The longer you have been free of cancer, the less often the appointments are needed. After 5 years, they are typically done about once a year. If you had breast-conserving surgery, you will get a mammogram about 6 months after surgery and radiation are completed, and then at least every year. Women who had a mastectomy should continue to have yearly mammograms on the remaining breast.

If you are taking tamoxifen or toremifene, you should have pelvic exams every year because these drugs can increase your risk of uterine cancer. This risk is highest in women who have gone through menopause. Be sure to tell your doctor right away about any abnormal vaginal bleeding, such as vaginal bleeding or spotting after menopause, bleeding or spotting between periods, or a change in your periods. Although this is usually caused by a non-cancerous condition, it can also be the first sign of uterine cancer.

If you are taking an aromatase inhibitor or are pre-menopausal taking tamoxifen or toremifene, your doctor will want to monitor your bone health and may consider testing your bone density.

Other tests such as blood tumor marker studies, blood tests of liver function, CTs, bone scans, and chest x-rays are not a standard part of follow-up. Getting these tests won't help a woman treated with breast cancer live longer. They will be done (as indicated) if you have symptoms or physical exam findings that suggest that the cancer has recurred. These and other tests may be done as part of evaluating new treatments by clinical trials.

If symptoms, exams, or tests suggest a recurrence, [imaging tests](#) such as an x-ray, CT scan, PET scan, MRI scan, bone scan, and/or a biopsy may be done. Your doctor may also measure levels of blood tumor markers such as CA-15-3, CA 27-29, or CEA. The blood levels of these substances go up in some women if their cancer has spread to bones or other organs

such as the liver. They are not elevated in all women with recurrence, so they aren't always helpful. If they are elevated, your doctor might use them to monitor the results of therapy.

If cancer does recur, your treatment will depend on the location of the cancer and what treatments you've had before. It may mean [surgery](#), [radiation therapy](#), [hormone therapy](#), [chemotherapy](#), [targeted therapy](#), or some combination of these. For more information on how recurrent cancer is treated, see the section, "[Treatment of invasive breast cancer, by stage.](#)" For more general information on dealing with a recurrence, you may also want to see our document, [When Your Cancer Comes Back: Cancer Recurrence](#).

It is also important to keep health insurance. Tests and doctor visits cost a lot, and even though no one wants to think of their cancer coming back, this could happen.

## Lymphedema after breast cancer treatment

Lymphedema, or swelling of the arm from buildup of fluid, may occur any time after treatment for breast cancer. Any treatment that removes the axillary lymph nodes or gives radiation to the axillary lymph nodes carries the risk of lymphedema because normal drainage of lymph fluid from the arm is changed.

One of the first symptoms of lymphedema may be a feeling of tightness in the arm or hand on the same side that was treated for breast cancer. Any swelling, tightness, or injury to the arm or hand should be reported promptly to your doctor or nurse.

There is no good way to predict who will and will not develop lymphedema. It can occur right after surgery, or months, or even years later. The possibility of developing lymphedema remains throughout a woman's lifetime.

With care, lymphedema can often be avoided or, if it develops, kept under control. Injury or infection involving the affected arm or hand can contribute to the development of lymphedema or make existing lymphedema worse, so preventive measures should focus on protecting the arm and hand.

Most doctors recommend that women avoid having blood drawn from or blood pressures taken on the arm on the side of the lymph node surgery or radiation.

To learn more, see our document, [\*Lymphedema: What Every Woman with Breast Cancer Should Know\*](#).

## **Quality of life after breast cancer treatment**

Women who have had treatment for breast cancer should be reassured that while they may be left with reminders of their treatment (such as surgical scars), their overall quality of life, once treatment has been completed, can be normal. Extensive studies have shown this. Women who have had chemotherapy may, however, notice a slight decrease in certain areas of function.

Some studies suggest that younger women, who represent about 1 out of 4 breast cancer survivors, tend to have more problems adjusting to the stresses of breast cancer and its treatment. They may have more trouble with emotional and social functioning. Some can feel isolated. For some women, chemotherapy may have caused early menopause, which can be very distressing on its own. There may also be sexual difficulties. These issues may be helped with counseling and support groups directed at younger breast cancer survivors.

Last Medical Review: 09/11/2013

## **What is lymphedema?**

During surgery for breast cancer, the doctor might remove one or more lymph (limf) nodes from the underarm area to see if the cancer has spread. When lymph nodes are removed, lymph vessels that carry fluid from the arm to the rest of the body are also removed because they route through and are wrapped around the nodes.

Removing lymph nodes and vessels changes the flow of lymph fluid in that side of the upper body. This makes it harder for fluid in the chest, breast, and arm to flow out of these areas. If the remaining lymph vessels cannot drain enough fluid from these areas, the excess fluid builds up and causes swelling, or lymphedema (limf-uh-**dee**-muh). Radiation treatment to the lymph nodes in the underarm can affect lymph fluid flow in the arm, chest,

and breast area by causing scarring and damage, further increasing the risk of lymphedema.

Lymphedema is a build-up of lymph fluid in the fatty tissues just under your skin. It usually develops slowly over time. The swelling can range from mild to severe. It can start soon after surgery or radiation treatment. But it can also begin months or even many years later. Women who have many lymph nodes removed and women who have had radiation therapy for breast cancer have a higher risk of getting lymphedema.

Doctors still do not fully understand why some patients are more likely to have problems with fluid build-up than others. It's expected that in the future fewer women will develop lymphedema because:

Breast surgery and treatment keep getting more conservative (that is, more women are treated with breast-conserving surgery, which removes the cancer and a small amount of healthy tissue around it, rather than mastectomy, which removes the entire breast and more lymph nodes).

Research advances have led to methods like the sentinel lymph node biopsy (a procedure that allows the surgeon to remove fewer lymph nodes).

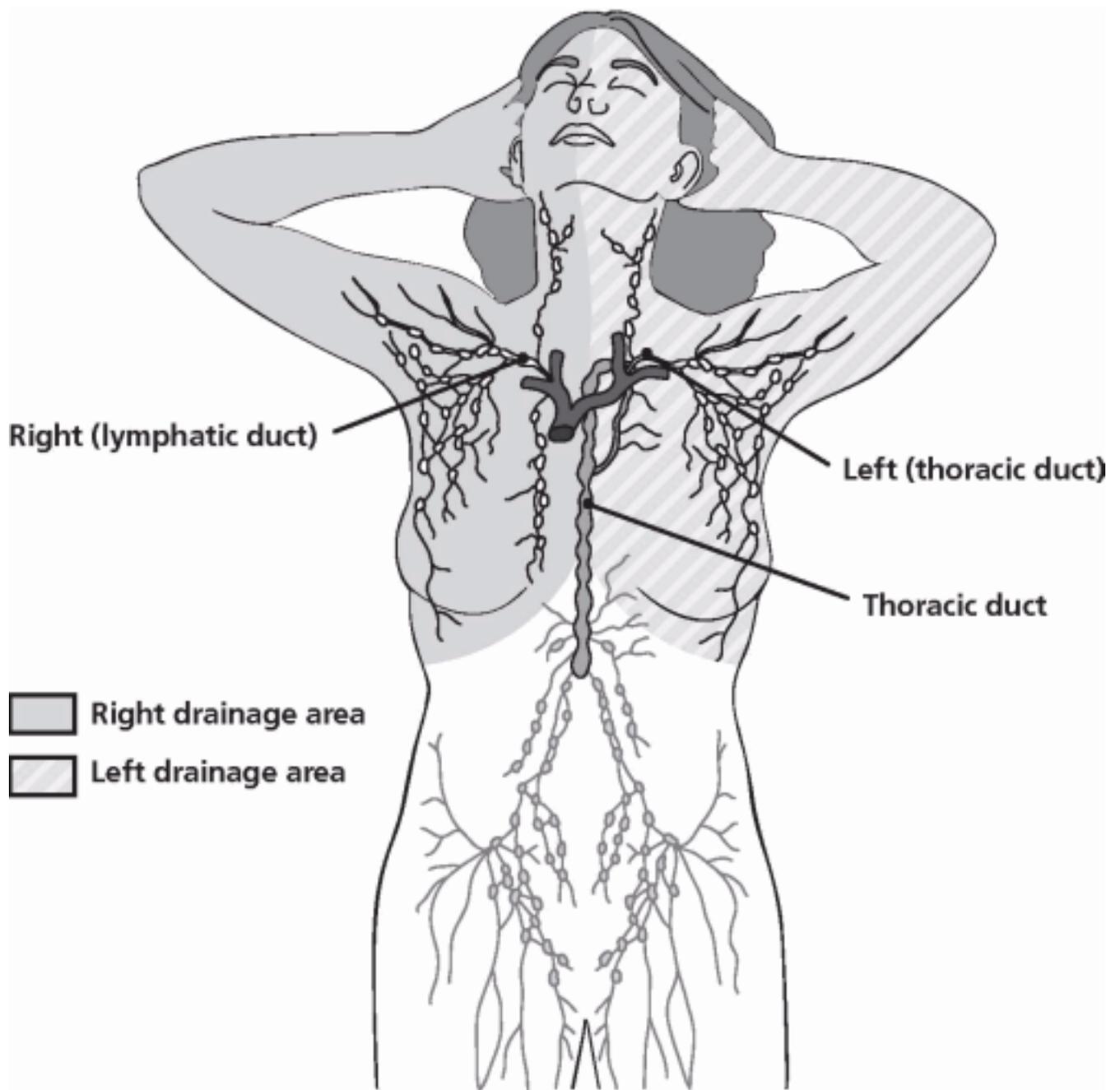
Newer studies are looking at finding which lymph nodes drain the arm before surgery so they can be saved when possible. This procedure is called axillary reverse mapping.

One type of lymphedema that does not seem to be decreasing, and may even be on the rise, is breast edema. It's possible that this is because more women are being treated with breast-conserving surgery and chest wall radiation than in the past.

There's still a lot to be learned about lymphedema, but there are ways that you can care for your arm and breast area to reduce your chances of having future problems. Once lymphedema has started, it cannot be cured. But early and careful management can reduce symptoms and help keep it from getting worse. In fact, some women manage their lymphedema so well they become convinced they no longer have it. All women who have had episodes of lymphedema should follow these guidelines and their doctor's instructions to avoid the return or worsening of lymphedema swelling.

## **What is the lymph system?**

Our bodies have a network of lymph nodes and lymph vessels that collect and carry watery, clear lymph fluid, much like veins collect blood from distant parts of the body (like the hands and arms) and carry it back to the heart. Lymph fluid has proteins, salts, and water, as well as white blood cells, which help fight infections. In the lymph vessels, one-way valves work with body muscles to help move the fluid through the body. Lymph nodes are small collections of tissue that work as filters for harmful substances and help us fight infection.



The lymph system in the upper body

**Why do I need to know about**

# lymphedema?

Some women who have been treated for breast cancer develop swelling or lymphedema of the arm, breast, and chest. Most women who have had breast cancer will not develop this side effect. The risk of lymphedema is higher for women whose breast cancer was treated with both surgery and radiation therapy. We also know that the risk of lymphedema goes up with the number of lymph nodes removed and is higher in women who are obese. Still, there's no way to predict who will develop this condition.

Here is what we know about lymphedema, the signs you can look for, steps you can take to lower your risk of getting it, and things you can do to try to keep it from getting worse. Talk to someone on your health care team about your lymphedema risk and what you can do to lower it. There are things you can do to try to prevent lymphedema. And recognizing it early and starting treatment right away can help manage it.

## Signs of lymphedema

Some signs of lymphedema:

- Swelling in the breast, chest, shoulder, arm, or hand
- Part of your body feels full or heavy
- Skin changes texture, feels tight or hard, or looks red
- New aching, tingling, or other discomfort in the area
- Less movement or flexibility in nearby joints, such as your shoulder, hand, or wrist
- Trouble fitting your arm into jacket or shirt sleeves
- Your bra doesn't fit the same
- Your ring, watch, and/or bracelet feels tight, but you haven't gained weight

Early on, the skin usually stays soft and raising your affected arm might

relieve the swelling. But over time, the swollen area may become hot and red and the skin hard and stiff.

If you've had any type of breast surgery, lymph nodes removed, or radiation treatment, look at your upper body in front of a mirror. Compare both sides of your body and look for changes in size, shape, or skin color. Get to know your body and what's normal for you. This way you can spot changes and get treatment right away.

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## For women who have lymphedema

If you develop lymphedema, there are treatments to reduce the swelling, keep it from getting worse, and decrease the risk of infection. The treatment is prescribed by your doctor and should be given by an experienced therapist. Be sure to check your health insurance to make sure the treatment is covered.

Mild lymphedema should be treated by a physical therapist or other health care professional who has had special training.

Moderate or severe lymphedema is most often treated by a therapist with special training and expertise who will help you with skin care, massage, special bandaging, exercises, and fitting for a compression sleeve. This is sometimes known as *complex decongestive therapy*, or CDT. *Manual lymphatic drainage*, or MLD, is the type of massage used as part of CDT to manage lymphedema. The therapist will also teach you things like how to care for the lymphedema at home and how and when to wear the compression sleeve.

Although most insurance companies will pay for lymphedema treatment, some do not cover the cost of compression garments and dressings. Check with your insurance company about coverage for these therapies.

Seeking and getting treatment early should lead to a shorter course of treatment to control your lymphedema. Again, it's important to notice changes right away and get help as soon as possible.

Lymphedema can and should be treated right away to keep it from getting worse.

## Take care of yourself.

It's important to take good care of your skin – especially in the affected area. Keep your skin clean and dry. Use moisturizers regularly to keep your skin from cracking.

## How to care for cuts, scratches, or burns

Wash the area with soap and water.

Put an over-the-counter antibiotic cream or ointment on the area. Check with your doctor, nurse, or pharmacist if you're not sure what to use.

Cover with a clean, dry gauze or bandage. Keep the area clean and covered until it heals. Change the dressing each day and if it gets wet.

For burns, apply a cold pack or cold water for at least 15 minutes, then wash with soap and water and put on a clean, dry dressing.

Check every day for early signs of infection: pus, rash, red blotches, swelling, increased heat, tenderness, chills, or fever.

Call your doctor right away if you think you have an infection.

## Caring for your whole body

Taking care of your whole body is also important. Here are some good ways to stay as healthy as possible:

Get to and stay at a healthy weight.

Eat more servings of vegetables and fruits each day (try for at least 2½ cups total).

Choose whole-grain foods instead of white flour and sugars.

Cut back on red meat and processed meats like hot dogs, bologna, and bacon.

If you drink alcohol, limit yourself to 1 drink a day.

Don't forget to get some type of regular exercise. This is a key part of lymphedema management. Talk to your health care team about the types of exercise that are best for you. The challenge with exercise recommendations for women with and at risk for lymphedema is that there are risks to both exercising and NOT

exercising. This situation is much like exercising after a heart attack: Not exercising allows for further deconditioning (which is bad), but over-exercising may cause harm. Trained health professionals such as fitness trainers and physical and occupational therapists can help you learn how to exercise safely.

Try to reduce the stress in your life and get enough sleep.

You also need people you can turn to for strength and comfort. Support can come in many forms: family, friends, cancer support groups, places of worship or spiritual groups, online support communities, or one-on-one counselors. You may want to get support from others with lymphedema. It helps to talk to people who understand what you're going through. Call us or contact the National Lymphedema Network (see the "[To learn more](#)" section) to find support groups in your area.

You can't change the fact that you are at risk for lymphedema. What you can change is how you live your life – taking good care of yourself, making healthy choices, and doing what you can to make your body and your mind feel as good as possible.

## **Emotional aspects of breast cancer**

It is important that your focus on tests and treatments does not prevent you from considering your emotional, psychological, and spiritual health as well. Once your treatment ends, you may find yourself overwhelmed by emotions. This happens to a lot of people. You may have been going through so much during treatment that you could only focus on getting through your treatment.

Now you might find that you think about the possibility of your own death, or the effect of your cancer on your family, friends, and career. You may also begin to re-evaluate your relationship with your spouse or partner. Unexpected issues may also cause concern—for instance, as you become healthier and have fewer doctor visits, you will see your health care team less often. That can be a source of anxiety for some.

This is an ideal time to seek out emotional and social support. You need people you can turn to for strength and comfort. Support can come in many forms: family, friends, cancer support groups, church or spiritual

groups, online support communities, or individual counselors.

Almost everyone who has been through cancer can benefit from getting some type of support. What's best for you depends on your situation and personality. Some people feel safe in peer-support groups or education groups. Others would rather talk in an informal setting, such as church. Others may feel more at ease talking one-on-one with a trusted friend or counselor. Whatever your source of strength or comfort, make sure you have a place to go with your concerns.

The cancer journey can feel very lonely. It is not necessary or realistic to go it all by yourself. And your friends and family may feel shut out if you decide not to include them. Let them in—and let in anyone else who you feel might help. If you aren't sure who can help, call your American Cancer Society at 1-800-227-2345 and we can put you in touch with an appropriate group or resource. You may also want to read our booklet [Distress in People with Cancer](#) online, or you can call us to request a free copy by mail.

## Body image after breast cancer treatment

Along with having to cope with the emotional stress that cancer and its treatment can cause, many women with breast cancer also find themselves dealing with changes in their appearance as a result of their treatment.

Some changes may be short term, such as hair loss. But even short-term changes can have a profound effect on how a woman feels about herself. A number of options are available to help women cope with hair loss, including wigs, hats, scarves, and other accessories. For a list of some companies that sell wigs and other hair accessories, see our document, [Breast Protheses and Hair Loss Accessories List](#). Alternatively, some women may choose to use their baldness as a way to identify themselves as breast cancer survivors.

Other changes that result from breast cancer treatment may be more permanent, like the loss of part or all of a breast (or breasts) after surgery. Some women may choose reconstructive surgery to address this, while others may opt for a breast form.

Regardless of the changes you may experience, it's important to know that there is advice and support out there to help you cope with these changes. Speaking with your doctor or other members of your health care team is often a good starting point. There are also many support groups available, such as the American Cancer Society's Reach To Recovery program. Call 1-800-227-2345 or visit our [website](#) to learn more about programs in your area.

## **Breast forms and bras vs. breast reconstruction**

Following a mastectomy (or breast-conserving surgery in some cases), a woman may consider having the breast mound rebuilt, or reconstructed. This is usually something that is discussed before surgery to treat the cancer. Decisions about the type of reconstruction and when it will be done depend on each woman's medical situation and personal preferences. There are several types of reconstructive surgery available. Some use saline (salt water) or silicone implants, while others use tissues from other parts of your body.

For a discussion of the different breast reconstruction options, see our document, [Breast Reconstruction After Mastectomy](#).

A *breast form* is a prosthesis (artificial body part) worn either inside a bra or attached to the body to simulate the appearance and feel of a natural breast. For women who have had a mastectomy, breast forms can be an important alternative to breast reconstruction. Some women might not want further surgery, knowing that breast reconstruction can sometimes require several procedures to complete.

If you are planning on using a breast form, your doctor will tell you when you have healed enough to be fitted for a permanent breast form or prosthesis. Most of these forms are made from materials that mimic the movement, feel, and weight of natural tissue. A properly weighted form provides the balance your body needs for correct posture and anchors your bra, keeping it from riding up.

At first, these forms may feel too heavy, but in time they will feel natural. Prices vary considerably. High price doesn't necessarily mean that the product is the best for you. Take time to shop for a good fit, comfort, and an attractive, natural appearance in the bra and under clothing. Your clothes should fit the way they did before surgery.

The right bra for you may very well be the one you have always worn. It

may or may not need adjustments. If there is tenderness during healing, a bra extender can help by increasing the circumference of the bra so that it does not bind the chest too tightly. Heavy-breasted women can relieve pressure on shoulder straps by slipping a bra shoulder pad under one or both straps.

If you decide to wear your breast form in a pocket in your bra, you can have your regular bra adapted. There are also special mastectomy bras with the pockets already sewn in. If the breast form causes any kind of skin irritation, use a bra with a pocket. If your bra has underwires, you may be able to wear it, but be sure to clear this with your doctor.

You might want to wear your prosthesis under nightgowns but would like something more comfortable than a regular bra. Most department stores carry a soft bra, sometimes called a *leisure* or *night* bra.

For a list of companies that sell breast prostheses and other accessories, see our document, [Breast Prostheses and Hair Loss Accessories List](#).

Insurance coverage of breast prostheses can vary. Be sure to read your insurance policy to see what is covered and how you must submit claims. Also, ask your doctor to write prescriptions for your prosthesis and for any special mastectomy bras. When purchasing bras or breast forms, mark the bills and any checks you write "surgical." Medicare and Medicaid can be used to pay for some of these expenses if you are eligible. The cost of breast forms and bras with pockets may be tax deductible, as may the cost if you have a bra altered. Keep careful records of all related expenses.

Some insurance companies will not cover both a breast prosthesis and reconstructive surgery. That can mean that if you submit a claim for a prosthesis or bra to your insurance company, in some cases the company **will not** cover reconstruction, should you choose this procedure in the future. Make sure you get all the facts before submitting any insurance claims.

If you have questions, call your local ACS Reach To Recovery volunteer. She will give you suggestions, additional reading material, and advice. Remember that she's been there and will probably understand.

# Sexuality after breast cancer

Concerns about sexuality are often very worrisome to a woman with breast cancer. Several factors may place a woman at higher risk for sexual problems after breast cancer. Physical changes (such as those after surgery) may make a woman less comfortable with her body. Some treatments for breast cancer, such as chemotherapy, can change a woman's hormone levels and may negatively affect sexual interest and/or response. A diagnosis of breast cancer when a woman is in her 20s or 30s can be especially difficult because choosing a partner and childbearing are often very important during this period.

Suggestions that may help a woman adjust to changes in her body image include looking at and touching herself; seeking the support of others, preferably before surgery; involving her partner as soon as possible after surgery; and openly communicating feelings, needs, and wants created by her changed image.

## Sexual impact of surgery and radiation

The most common sexual side effects stem from damage to a woman's feelings of attractiveness. In our culture, we are taught to view breasts as a basic part of beauty and femininity. If her breast has been removed, a woman may be insecure about whether her partner will accept her and find her sexually pleasing.

The breasts and nipples are also sources of sexual pleasure for many women. Touching the breasts is a common part of foreplay in our culture. For many women, breast stimulation adds to sexual excitement.

Treatment for breast cancer can interfere with pleasure from breast caressing. After a mastectomy, the whole breast is gone. Some women still enjoy being stroked around the area of the healed scar. Others dislike being touched there and may no longer even enjoy being touched on the remaining breast and nipple. Some women who have had a mastectomy may feel self-conscious in sex positions where the area of the missing breast is more visible.

Breast surgery or radiation to the breasts does not physically decrease a woman's sexual desire. Nor does it decrease her ability to have vaginal lubrication or normal genital feelings, or to reach orgasm. Some good

news from recent research is that within a year after their surgery, most women with early-stage breast cancer have good emotional adjustment and sexual satisfaction. They report a quality of life similar to women who never had cancer.

A few women have chronic pain in their chests and shoulders after radical mastectomy. During intercourse, supporting these areas with pillows and avoiding positions where your weight rests on your chest or arms may help.

If you had breast-conserving surgery followed by radiation therapy, the breast may be scarred. It also may be a different shape or size. During radiation therapy, the skin may become red and swollen. The breast also may be a little tender. Feeling in the breast and nipple, however, should return to normal.

## **Sexual impact of breast reconstruction**

Breast reconstruction restores the shape of the breast, but it cannot restore normal breast sensation. The nerve that supplies feeling to the nipple runs through the deep breast tissue, and it gets disconnected during surgery. In a reconstructed breast, the feeling of pleasure from touching the nipple is lost. A rebuilt nipple has much less feeling.

In time, the skin on the reconstructed breast will regain some sensitivity but probably will not give the same kind of pleasure as before mastectomy. Breast reconstruction often makes women more comfortable with their bodies, however, and helps them feel more attractive.

## **Effect on your partner**

Relationship issues are also important because the cancer diagnosis can be very distressing for the partner, as well as the patient. Partners are usually concerned about how to express their love physically and emotionally after treatment, especially surgery. Breast cancer can be a growth experience for couples under certain circumstances. The relationship may be enhanced if the partner takes part in decision-making and goes with the woman to surgery and other treatments.

More information about this can be found in our document, [\*Sexuality for the Woman with Cancer\*](#).

# Cancer, sex, and sexuality

When you first learned you had cancer, you probably thought mostly of survival. But after a while other questions may have started coming up. You might be wondering “How ‘normal’ can my life be, even if the cancer is under control?” Or even “How will cancer affect my sex life?” It’s important to know that you can get help if you are having sexual problems after cancer treatment. There are many good treatments available.

Sex and sexuality are important parts of everyday life. The difference between sex and sexuality is that sex is thought of as an activity – something you do with a partner. Sexuality is more about the way you feel about yourself as a woman, and is linked to intimacy or your need for caring, closeness, and touch.

Feelings about sexuality affect our zest for living, our self-image, and our relationships with others. Yet patients and doctors often do not talk about the effects of cancer treatment on a woman’s sex life or how she can address problems she’s having. Why? A person may feel uneasy talking about sex with a professional like a doctor or even with a close sex partner. Many people feel awkward and exposed when talking about sex.

This information is for all women who have or have had cancer – regardless of their sexual orientation. We cannot answer every question, but we’ll try to give you enough information to help you and your partner have open, honest talks about intimacy and sex. We will also share some ideas about talking with your doctor and your cancer care team. Lastly, we’ll give you a list of other places to get help in the [“To learn more”](#) section. These are other good sources of more information.

Keep in mind that sensual/sexual touching between you and your partner is always possible, no matter what kinds of cancer treatment you’ve had. This might surprise you, especially if you are feeling down or have not had any sexual touching or activity for a while. But it’s true. The ability to feel pleasure from touch almost always remains.

The first step is to bring up the topic of your sex life with your doctor or another member of your health care team. You need to know how your treatment will affect nutrition, pain, and your ability to return to work. You also have the right to know how your treatment could affect your sexual

function.

## What is a normal sex life?

People vary a great deal in their sexual attitudes and practices. This makes it hard to define “normal.” Some couples like to have sex every day. For others, once a month is enough. Many people see oral sex (using the mouth or tongue) as a normal part of sex, but some believe it’s not OK. “Normal” for you and your partner is whatever gives you pleasure together. Both partners should agree on what makes their sex life enjoyable.

It’s common for people coping with cancer to lose interest in or desire for sexual activity at times. Doubts and fears, along with cancer and cancer treatment effects, can make you feel less than your best. Sometimes concerns about your health may be much greater than your interest in sexual activity. But as you get back to your usual routines, your desire for intimacy may return, too.

It’s OK to be interested in sex throughout your life. There are some who think sex is only for the young, and that older people lose both their desire for sex and/or their ability to “perform.” Those beliefs are largely myths. Many men and women can and do stay sexually active until the end of life. (See the “[To learn more](#)” section for more on sex and aging.) Still, it is true that sexual response and function may change over time with age. For example, more than half of men over age 40 have at least a little trouble with erections. For some of these men the problem is severe. Many women also notice changes as they get older, sometimes even before menopause begins. A decrease in sexual desire and problems with vaginal dryness may increase during and after menopause.

Sometimes, sexual problems center around anxiety, tension, or other problems in a relationship. Other times, they may be the result of a physical condition, a medical condition, or medicines that cause or worsen sexual difficulties. But most symptoms can be treated. We now have medicines, therapy, surgery, and other treatments that can help people deal with most kinds of problems they may have. If you want to keep your sex life active, you can likely do so.

If you’re in a relationship and one of you has a sexual difficulty, it affects both of you. If you are working on sexual problems, it works best when your partner can be part of the solution.

# What is a healthy sexual response?

The sexual response has 4 phases:

Desire

Excitement

Orgasm

Resolution

A person usually goes through the phases in the same order. But the sexual response can be stopped at any phase. For instance, you don't have to reach orgasm each time you feel the desire for sex.

**Desire** is having an interest in sexual activity. You may just think about sex, feel attracted to someone, or be frustrated because of a lack of sex. Sexual desire is a natural part of life from the teenage years onward.

**Excitement** is the phase when you feel aroused or "turned on." Touching and stroking feel much more pleasurable and intense when a person is excited. Excitement also results from sexual fantasies and sensual sights, sounds, scents, and tastes. Physically, excitement means that:

The heart beats faster.

Blood pressure goes up.

Breathing gets heavy.

More blood is sent into the genital (or "private") area, and the whole area, including the clitoris, swells. (In a man, the surge of blood creates an erection, or a stiff penis. In a woman, blood flow to the female genitals is called *engorgement*.)

The vagina becomes moist and gets longer and wider, opening up like a balloon.

The skin of the genitals ("private parts") turns a deeper color of red.

The body may sweat or get warmer.

**Orgasm** is the sexual climax. In both women and men, the nervous system creates intense pleasure in the genitals. The muscles around the genitals contract in rhythm, sending waves of feeling through the body. Men ejaculate (or release) semen when these muscles contract. The person feels pleasure and satisfaction.

**Resolution** occurs within a few minutes after an orgasm. The body returns to its unexcited state. Heartbeat and breathing slow down. The extra blood drains out of the genital area. Mental excitement subsides.

If a person becomes excited but does not reach orgasm, resolution still takes place but more slowly. It's not harmful to become excited without reaching orgasm, though it may feel frustrating. Some women and men may feel a mild ache until the extra blood leaves the genital area.

**Refractory period.** Men have a certain amount of time after orgasm when they are physically unable to have another orgasm. This time, called the refractory period, tends to get longer as a man ages. A man in his 70s may need to wait several days between orgasms. Women do not have a refractory period. Many can have multiple orgasms, one after another, with little time in between.

## How the female body works sexually

### The natural cycles of the mature female body

In order to talk about sex, it helps to know about the structures and hormones that are also involved with having children. Doctors call this the reproductive system.

During the years when a woman can have children, her ovaries take turns each month producing a ripe egg. When the egg is released, it travels through a tube (the fallopian tube) into the uterus. A woman can get pregnant (naturally) if a sperm cell travels through the opening in the bottom of her uterus (which is called the cervix) and joins the egg. The cervix is the gateway for sperm to get into the body and for a baby passing out of the body at birth.

An egg remains fertile only for about 2 days. If a woman does not become pregnant at that time, the rich lining of the uterus that has built up over the past weeks passes through her cervix and into the vagina as menstrual

flow. If she does become pregnant, the lining stays in place to feed the growing baby.

These regular cycles the mature female body goes through each month are controlled by hormones.

## Hormones

The ovaries usually stop producing eggs and greatly reduce their hormone output around age 50, though the age varies from one woman to the next. This is called menopause or “the change of life.” Some women fear that their sexual desire will go away with menopause. But for many women the drop in ovarian hormones does not lessen sexual desire at all.

The hormones that may help a woman feel desire are called *estrogens* and *androgens*. Androgens are thought of as “male” hormones, but women’s bodies also make small amounts of them. About half of the androgens in women are made in the adrenal glands that sit on top of the kidneys. The ovaries make the rest of a woman’s androgen.

After a woman goes through natural menopause, the adrenal glands keep making hormones. There’s usually enough androgen even after the ovaries stop making it to feel sexual desire.

Most women still desire sexual activity even while their bodies are going through changes in hormone levels, such as during the menstrual cycle, pregnancy, menopause, or when taking birth control pills.

## The role of estrogen

Estrogen helps keep your vagina moist and flexible, and helps it change when you are sexually aroused. When a woman is not excited, her vagina is not an open tunnel, as some think. Instead, it stays relaxed and folded together so that its walls touch each other. As a woman starts to feel aroused, the vagina gets longer and wider. The cells lining the vagina secrete droplets of fluid (or lubricant) that make the vagina slippery. These changes depend on the hormone estrogen. If a woman’s estrogen levels are low, as they might be after menopause, these changes in the vagina may take place more slowly.

Without estrogen:

Your vaginal lining thins.

Your vaginal walls lose some of their ability to stretch.

Your vagina may stay somewhat tight and dry, even if you are very excited. This is called *vaginal atrophy*.

## **Female orgasm**

As a woman becomes sexually excited, her nervous system sends signals of pleasure to her brain. If she is stimulated, for instance, by touching, the signals get stronger and may trigger the orgasm reflex. During orgasm, the muscles around the genitals contract in rhythm. The sudden release of muscle tension sends waves of pleasure through the genital area and sometimes over the entire body. Afterward, a woman feels relaxed and satisfied.

A woman's orgasms may change from time to time. Sometimes she may have no orgasm, or she may have one with each sexual encounter. Sometimes, she may have multiple orgasms, one after the other. As part of the natural aging process, orgasms may take longer to reach. It may also take more stimulation to achieve them.

## **How orgasms happen**

An orgasm is a natural reflex, but most women need some experience in learning to trigger it. It's often harder to reach orgasm during intercourse than it is through the stroking of the outside genital area, usually on or near the clitoris. About 1 in 3 American women do not reach orgasm without some extra touching in addition to intercourse.

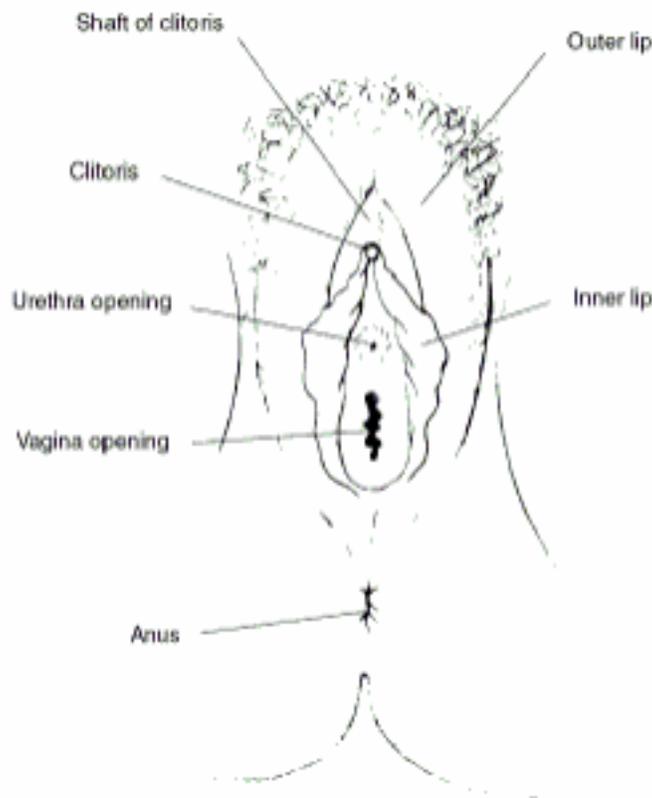
Orgasms during intercourse are not proven to be better than other orgasms. Also, orgasms where you and your partner climax at the same time may not be a realistic goal for many couples.

There are many sources of excitement that lead to orgasm. They differ for each woman. A few women can reach orgasm just by having a vivid fantasy about sex or by having their breasts stroked. Others have had an orgasm during a dream while asleep. But most women need some caressing of their genitals to reach orgasm.

The areas of a woman's genitals (see illustration) that are most sensitive to touch are the clitoris and the inner lips. The outside part of the genital area (called the vulva) includes the outer lips, inner lips, the clitoris, and the entrance to the vagina. The outer lips are filled with spongy tissue. They

protect the delicate inner lips and clitoris. The opening of the urethra (the tube that carries urine from the bladder) is between the inner lips and behind the clitoris. The anus (opening of the bowels) is behind the vagina.

When a woman becomes sexually excited, the entire genital area swells. It also turns a darker pink as blood rushes in under the skin.



A woman's genital area

Many women reach orgasm most easily when the clitoris is stroked. Like a penis, the clitoris has a head and a shaft. Its function is to send messages of pleasure to the brain when it's stroked.

The head of the clitoris is so sensitive that it can become sore from direct rubbing that's either too fast or too hard. Soreness can be prevented by using a lubricant and by stroking or touching close to, but not on, the head of the clitoris.

Other areas, including the outer lips and anus, can also give a woman pleasure when stroked. Each woman's sensitive zones are a little different. The opening of the vagina contains many nerve endings. It's more sensitive to light touch than the deep end of the vagina. For some women, the front wall of the vagina (bladder side) is more sensitive to pressure during sex than the back wall. Some sex therapists suggest that stroking an area about 1 to 4 inches deep on the front wall of the vagina helps some women reach orgasm during intercourse.

## **Keeping your sex life going despite cancer treatment**

Here are some points to keep in mind as you continue your sex life during or after cancer treatment.

**Learn as much as you can about the possible effects your cancer treatment may have on your sexuality.** Talk with your doctor, nurse, or any other member of your health care team. When you know what to expect, you can plan how you might handle those issues.

**Keep in mind that, no matter what kind of cancer treatment you have, you'll still be able to feel pleasure when you are touched.** Few cancer treatments (other than those affecting some areas of the brain or spinal cord) damage the nerves and muscles involved in feeling pleasure from touch and reaching orgasm. For example, women whose vaginas are painfully tight or dry can often reach orgasm through stroking of their breasts and outer genitals. For people with cancer, sexual touching is often satisfying. Pleasure and satisfaction are possible even if some aspects of sexuality have changed.

**Try to keep an open mind about ways to feel sexual pleasure.** Some couples have a narrow view of what sexual activity means to them. If both partners cannot reach orgasm through or during penetration, some may feel disappointed. But for people being treated for cancer, there may be times when intercourse is not possible. Those times can be a chance to learn new ways to give and receive sexual pleasure. You and your partner can help each other reach orgasm through touching and stroking. At times, just cuddling can be pleasurable. You could also continue to enjoy touching yourself. Do not stop sexual pleasure just because your usual routine has been changed.

**Try to have clear, 2-way talks about sex with your partner and with your doctor.** If you are too embarrassed to ask your doctor whether sexual activity is OK, you may never find out. Talk to your doctor about sex, and tell your partner what you learn. Otherwise, your partner might be afraid that sex might hurt you. Good communication is the key to adjusting your sexual routine when cancer changes your body. If you feel weak or tired and want your partner to take a more active role in touching you, say so. If some part of your body is tender or sore, you can guide your partner's touches to create the most pleasure and avoid discomfort.

**Boost your self-esteem.** Remind yourself about your good qualities. If you lose your hair, you may choose to wear a wig, hat, or scarf if it makes you feel more comfortable. Some women prefer to wear nothing on their head. You may wear a breast form (prosthesis) if you have had a breast removed. Do whatever makes you feel good about yourself. Eating right and exercising can also help keep your body strong and your spirits up. Practice relaxation techniques, and get professional help if you think you are depressed or struggling.

## **How cancer treatment affects sexual desire and response**

### **Lack of desire**

Both men and women often lose interest in sexual activity during cancer treatment, at least for a time. At first, concern for survival is so great that sex may not be a priority. This is OK. Few people are interested in sex when they feel their lives are being threatened. When people are in treatment, loss of desire may be caused by worry, depression, nausea, pain, or fatigue. Cancer treatments that disturb the normal hormone balance can also lessen sexual desire.

If there's a conflict in the relationship, one partner or both might lose interest in sex. Any emotion or thought that keeps a woman from feeling excited can interfere with desire for sex. Distracting thoughts can keep her from getting aroused. Her vagina then stays tight and dry, which can make vaginal penetration uncomfortable or painful.

Many people who have cancer worry that a partner will be turned off by changes in their bodies or by the very word "cancer." These worries can affect desire, too.

## Pain

Pain is a common problem for women during vaginal penetration (and/or intercourse). It's often related to changes in the vagina's tissues or size and vaginal dryness. These changes can happen after pelvic surgery, radiation therapy, menopause, or treatment that has affected a woman's hormones.

Sometimes the pain sets off a problem called *vaginismus*. If a woman has vaginismus, the muscles around the opening of the vagina become tense without the woman being aware of it. This makes vaginal penetration difficult. Pushing harder increases the woman's pain because her vaginal muscles are clenched in a spasm. Vaginismus can be treated with counseling and some special relaxation training. These treatments are described in the section called "[Dealing with sexual problems](#)."

## Premature menopause

Another common way that cancer treatment can affect a woman's sex life is by causing menopause earlier than expected. This is called *premature menopause*. Symptoms are often more abrupt and intense than the slow changes that happen during a natural menopause. When a woman's ovaries are removed as part of a cancer surgery, or when the ovaries stop working because of chemotherapy or radiation to the pelvis, the loss of estrogen can cause hot flashes and vaginal atrophy (the vagina becomes tight and dry). Some women can take replacement hormones to help these problems. Women with cancers of the breast or uterus usually cannot take estrogen, but they may benefit from some of the suggestions discussed in the section called "[Dealing with sexual problems](#)."

Women who have premature menopause sometimes have low androgen levels. This may be linked to lower sexual desire, but this link is not clear. Androgen (testosterone) hormone therapy has been shown to improve sexual function, but there are safety concerns that have kept the FDA from approving testosterone supplements for this purpose. Testosterone has not been studied in women with cancer.

If you are thinking of using hormones, it's important to talk with your oncologist or nurse to learn about the benefits and possible risks of hormone therapy.

## Orgasm

Women are usually able to have orgasms after cancer unless cancer or its treatment has damaged the spinal cord and caused the genital area to be numb. But even with spinal cord damage, there's evidence that orgasm is possible, at least in some women.

Sometimes problems like pain during intercourse may distract a woman from reaching orgasm. In some cases, a woman might need to try different positions or types of genital touching. She might also need to practice having orgasms alone before going back to sex with a partner.

## **Pregnancy after breast cancer**

Because many breast cancers are sensitive to estrogen, there has been concern that if a woman has been treated for breast cancer, high hormone levels during pregnancy might increase the chance of recurrence. Studies have shown, however, that pregnancy doesn't increase the risk of recurrence after successful treatment of breast cancer. Still, many doctors advise breast cancer survivors not to become pregnant for at least 2 years after treatment. This would allow any early return of the cancer to be diagnosed, which in turn could affect a woman's decision to become pregnant. But this 2-year wait period is not based on strong scientific evidence, and earlier pregnancy may not be harmful. Still, chemotherapy and hormone therapy drugs can affect the fetus, so it isn't safe to get pregnant until all treatment is complete.

Women are advised to discuss their risk of recurrence with their doctors. In some cases, counseling can help women with the complex issues and uncertainties about motherhood and breast cancer survivorship.

## **Post-menopausal hormone therapy after breast cancer**

The known link between estrogen levels and breast cancer growth has discouraged many women and their doctors from choosing or recommending post-menopausal hormone therapy (PHT), also called

hormone replacement therapy (HRT), to help relieve menopausal symptoms. Unfortunately, many women experience menopausal symptoms after treatment for breast cancer. This can occur naturally, as a result of post-menopausal women stopping PHT, or in pre-menopausal women as a result of chemotherapy or ovarian ablation. Tamoxifen and aromatase inhibitors can also cause menopausal symptoms such as hot flashes.

In the past, doctors have offered PHT after breast cancer treatment to women suffering from severe symptoms because early studies had shown no harm. But a well-designed clinical trial (the HABITS study) found that breast cancer survivors taking PHT were much more likely to develop a new or recurrent breast cancer than women who were not taking the drugs. This is why most doctors now feel that if a woman was previously treated for breast cancer, taking PHT would be unwise.

Women might want to discuss with their doctors alternatives to PHT to help with specific menopausal symptoms. Some doctors have suggested that phytoestrogens (estrogen-like substances from certain plant sources, such as soy products) may be safer than the estrogens used in PHT. However, although eating soy foods seems to be safe for breast cancer survivors, there is not enough information available on phytoestrogen supplements to fully evaluate their safety.

Drugs without hormonal properties that may be somewhat effective in treating hot flashes include the antidepressant venlafaxine (Effexor®), the blood pressure drug clonidine, and the nerve drug gabapentin (Neurontin®). [Acupuncture](#) also seems to be helpful in treating hot flashes. For women taking tamoxifen, it's important to note that some antidepressants, known as *SSRIs*, may interact with tamoxifen and could make it less effective. Ask your doctor about any possible interactions between tamoxifen and any drugs you may be taking.

## Lifestyle changes after breast cancer treatment

You can't change the fact that you have had cancer. What you can change is how you live the rest of your life – making choices to help you stay healthy and feel as well as you can. This can be a time to look at your life in new ways. Maybe you are thinking about how to improve your health

over the long term. Some people even start during cancer treatment.

## **Making healthier choices**

For many people, a diagnosis of cancer helps them focus on their health in ways they may not have thought much about in the past. Are there things you could do that might make you healthier? Maybe you could try to eat better or get more exercise. Maybe you could cut down on the alcohol, or give up tobacco. Even things like keeping your stress level under control may help. Now is a good time to think about making changes that can have positive effects for the rest of your life. You will feel better and you will also be healthier.

You can start by working on those things that worry you most. Get help with those that are harder for you. For instance, if you are thinking about [quitting smoking](#) and need help, call the American Cancer Society for information and support. This tobacco cessation and coaching service can help increase your chances of quitting for good.

## **Eating better**

Eating right can be hard for anyone, but it can get even tougher during and after cancer treatment. Treatment may change your sense of taste. Nausea can be a problem. You may not feel like eating and lose weight when you don't want to. Or you may have gained weight that you can't seem to lose. All of these things can be very frustrating.

If treatment caused weight changes or eating or taste problems, do the best you can and keep in mind that these problems usually get better over time. You may find it helps to eat small portions every 2 to 3 hours until you feel better. You may also want to ask your cancer team about seeing a dietitian, an expert in nutrition who can give you ideas on how to deal with these treatment side effects.

One of the best things you can do after cancer treatment is put healthy eating habits into place. You may be surprised at the long-term benefits of some simple changes, like increasing the variety of healthy foods you eat. Getting to and staying at a healthy weight, eating a healthy diet, and limiting your alcohol intake may lower your risk for a number of types of cancer, as well as having many other health benefits.

## **Rest, fatigue, and exercise**

Extreme tiredness, called [fatigue](#), is very common in people treated for cancer. This is not a normal tiredness, but a "bone-weary" exhaustion that doesn't get better with rest. For some people, fatigue lasts a long time after treatment, and can make it hard for them to exercise and do other things they want to do. But exercise can help reduce fatigue. Studies have shown that patients who follow an exercise program tailored to their personal needs feel better physically and emotionally and can cope better, too.

If you were sick and not very active during treatment, it is normal for your fitness, endurance, and muscle strength to decline. Any plan for physical activity should fit your own situation. A person who never exercises will not be able to take on the same amount of exercise as someone who plays tennis twice a week. If you haven't exercised in a few years, you will have to start slowly – maybe just by taking short walks. You can read more in our document [Nutrition and Physical Activity During and After Cancer Treatment: Answers to Common Questions](#).

Talk with your health care team before starting anything. Get their opinion about your exercise plans. Then, try to find an exercise buddy so you're not doing it alone. Having family or friends involved when starting a new exercise program can give you that extra boost of support to keep you going when the push just isn't there.

If you are very tired, you will need to balance activity with rest. It is OK to rest when you need to. Sometimes it's really hard for people to allow themselves to rest when they are used to working all day or taking care of a household, but this is not the time to push yourself too hard. Listen to your body and rest when you need to. (For more information on dealing with fatigue, please see [Fatigue in People With Cancer](#) and [Anemia in People With Cancer](#).)

Keep in mind exercise can improve your physical and emotional health.

- It improves your cardiovascular (heart and circulation) fitness.

- Along with a good diet, it will help you get to and stay at a healthy weight.

- It makes your muscles stronger.

- It reduces fatigue and helps you have more energy.

- It can help lower anxiety and depression.

It can make you feel happier.

It helps you feel better about yourself.

And long term, we know that getting regular physical activity plays a role in helping to lower the risk of some cancers, as well as having other health benefits.

## **If treatment for breast cancer stops working**

If cancer keeps growing or comes back after one kind of treatment, it is possible that another treatment plan might still cure the cancer, or at least shrink it enough to help you live longer and feel better. But when a person has tried many different treatments and the cancer has not gotten any better, the cancer tends to become resistant to all treatment. If this happens, it's important to weigh the possible limited benefits of a new treatment against the possible downsides. Everyone has their own way of looking at this.

This is likely to be the hardest part of your battle with cancer—when you have been through many medical treatments and nothing's working anymore. Your doctor may offer you new options, but at some point you may need to consider that treatment is not likely to improve your health or change your outcome or survival.

If you want to continue to get treatment for as long as you can, you need to think about the odds of treatment having any benefit and how this compares to the possible risks and side effects. In many cases, your doctor can estimate how likely it is the cancer will respond to treatment you are considering. For instance, the doctor may say that more chemo or radiation might have about a 1% chance of working. Some people are still tempted to try this. But it is important to think about and understand your reasons for choosing this plan.

No matter what you decide to do, you need to feel as good as you can. Make sure you are asking for and getting treatment for any symptoms you might have, such as nausea or pain. This type of treatment is called *palliative care*.

[Palliative care](#) helps relieve symptoms, but is not expected to cure the disease. It can be given along with cancer treatment, or can even be cancer treatment. The difference is its purpose—the main purpose of palliative care is to improve the quality of your life, or help you feel as good as you can for as long as you can. Sometimes this means using drugs to help with symptoms like pain or nausea. Sometimes, though, the treatments used to control your symptoms are the same as those used to treat cancer. For instance, radiation might be used to help relieve bone pain caused by cancer that has spread to the bones. Or chemo might be used to help shrink a tumor and keep it from blocking the bowels. But this is not the same as treatment to try to cure the cancer. You can learn more about the changes that occur when curative treatment stops working, and about planning ahead for yourself and your family, in our documents called [Nearing the End of Life](#) and [Advance Directives](#). You can read them online or call us to have free copies mailed to you.

At some point, you may benefit from hospice care. This is special care that treats the person rather than the disease; it focuses on quality rather than length of life. Most of the time, it is given at home. Your cancer may be causing problems that need to be managed, and hospice focuses on your comfort. You should know that while getting hospice care often means the end of treatments such as chemo and radiation, it doesn't mean you can't have treatment for the problems caused by your cancer or other health conditions. In hospice the focus of your care is on living life as fully as possible and feeling as well as you can at this difficult time. You can learn more about hospice in our document called [Hospice Care](#).

Staying hopeful is important, too. Your hope for a cure may not be as bright, but there is still hope for good times with family and friends—times that are filled with happiness and meaning. Pausing at this time in your cancer treatment gives you a chance to refocus on the most important things in your life. Now is the time to do some things you've always wanted to do and to stop doing the things you no longer want to do. Though the cancer may be beyond your control, there are still choices you can make.

