Understanding Your Diagnosis

Not all breast cancers are the same. There are different types of breast cancer, as well as different stages. Understanding how cancer works and how your particular cancer affects your body will help you make decisions about your care and what is best for you.

The information in this section will help you plan and prepare for your treatment. ***However, it is not meant to replace the individual attention, advice, and treatment plan of your oncologist and medical team.***

What is a Cell? How Does a Cell Become a Cancer?

Cells are the building blocks of all tissue and organs in the human body. Each cell contains genetic material (DNA) and other elements. DNA controls the growth rate of cells.

Normal cells grow and multiply at a specific rate. Cells that grow and multiply without stopping are called cancerous or malignant. Cancerous cells are not detectable when they first start growing. At a certain point, the cancerous cells continue to multiply and form a mass which can be detected. Abnormal cell growth could go on for years before it is large enough to be detected.

Breast anatomy

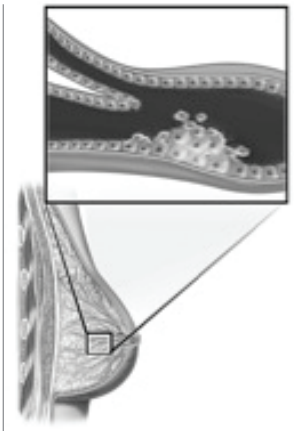
There are two separate ideas used when describing cancer: grade and stage. A cancer's grade, along with stage, are important in determining your recommended treatment. Grade refers to how much your cells look like normal tissue. Stage for invasive cancer is determined by how big the tumor is and if it has spread beyond the breast to the lymph nodes and other areas of the body. Ductal Carcinoma In Situ (DCIS) is not invasive, so it is always stage 0 regardless of size. More information about staging will be discussed later in this chapter.

Ductal Carcinoma In Situ (DCIS)

Ductal Carcinoma In Situ (DCIS) is a change in the cells that line the milk ducts, which are the "tubes" that bring milk from the milk lobules to the nipple.

Normally, a thin layer of breast epithelial cells lines the inside of the milk duct. DCIS happens when the cells of this thin layer grow and multiply without stopping and have abnormal features that can be detected only under the microscope.

In DCIS, the abnormal breast cells are confined to the milk duct. They do not spread outside the milk duct into the surrounding breast tissue, lymph nodes or other parts of the body. We call this a non-invasive type of cancer because it has not invaded other tissue. DCIS is "Stage 0" breast cancer. That means it has been detected at the earliest stage possible.



Normal breast with DCIS shown as cross-section of the duct.

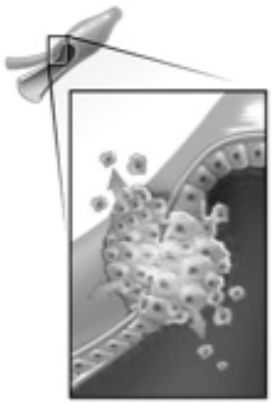
If left untreated, sometimes DCIS will spread outside the milk duct and turn into an invasive or infiltrating cancer. At this point in time, we cannot predict which patients with DCIS will develop invasive or infiltrating cancers. Therefore, it is recommended that DCIS be surgically removed before it can become an invasive cancer. Radiation treatment of the breast is often recommended following removal of the affected tissue. Radiation is not recommended following a mastectomy (removal of the entire breast) to treat DCIS. In addition, a medication such as Tamoxifen may be recommended to reduce the risk of breast cancer in the future.

DCIS is often found on a mammogram. The mammogram may show microcalcifications that are worrisome. These are small calcium deposits that form within or near the DCIS. Not all micro-calcifications seen on a mammogram indicate DCIS. Those that form a line, are new or have increased in number may be suspicious. Less commonly, DCIS may show up as a nodule or thickening of tissue on a mammogram. In rare cases, DCIS may be felt as a thickening or nodule in the breast on self-exam or during a physical exam by a health care provider.

Invasive or Infiltrating Ductal Carcinoma (IDC)

Invasive or infiltrating ductal carcinoma (IDC) is the most common type of breast cancer. This may also be diagnosed as "invasive mammary carcinoma of no special type (ductal, not otherwise specified)" in your report. IDC occurs when the cells that line the milk duct become abnormal. The ductal cancer cells look different from normal milk duct cells, and the body produces too many of them. They spread outside the milk duct into the surrounding breast tissue. IDC does not mean that the cancer has traveled to other parts of the body beyond the breast, but it has the ability to do so. It is not uncommon to have DCIS along with IDC.

Infiltrating ductal carcinoma



IDC shown on a cross section of duct.

When the pathologist examines the cells under the microscope, a grade is assigned. The cancer will be graded from 1 to 3. Grade 1 means that the cancer cells are very similar to the normal cells. Grade 3 indicates that the cancer cells are very different from the normal cells in breast tissue. Higher grade tumors are generally more aggressive than lower-grade tumors.

Surgery, radiation, hormonal therapy and chemotherapy can all be used to treat IDC. Most women will receive a combination of treatments, although not necessarily all four types of treatment. The types of treatment recommended will depend upon the size of the cancer, whether the cancer is in the lymph nodes, features of the cancer cells themselves and your general health.

Inflammatory Breast Cancer

Inflammatory breast cancer is a type of invasive ductal breast cancer.

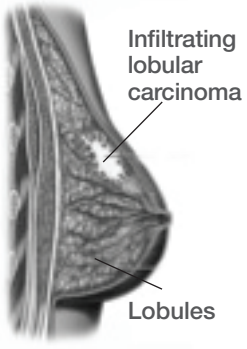
The cancer cells spread outside the milk duct into the surrounding breast tissue and into the small lymphatic vessels in the breast, particularly those in the skin of the breast. The invasion of the cancer cells into the lymphatic vessels of the breast skin causes the breast to look inflamed, i.e., red, warm and even swollen. It often looks like there is an infection in the breast. A biopsy of the breast and the skin is necessary to diagnose inflammatory breast cancer.

Inflammatory breast cancer behaves differently than other invasive ductal breast cancers and must be treated differently. It is important to control the growth of the inflammatory breast cancer cells, and chemotherapy is often recommended first. Once chemotherapy is completed, the need for surgery and radiation will be determined.

Invasive or Infiltrating Lobular Carcinoma (ILC)

Invasive or infiltrating lobular breast cancer (ILC) occurs when the cells in the milk lobule become abnormal. The lobular cancer cells look different from normal lobular cells and multiply without stopping. They spread outside the lobule into the surrounding breast tissue. ILC does not mean that the cancer has traveled to other parts of the body beyond the breast, but it has the ability to do so.

When the pathologist examines the cells under the microscope, a grade is assigned. The cancer will be graded from 1 to 3. Grade 1 means that the cancer cells are very similar to the normal cells (classic). Grade 3 indicates that the cancer cells are very different from the normal cells in breast tissue (pleomorphic). Higher grade tumors are generally more aggressive than lowergrade tumors.



Breast carcinoma (ILC)

Surgery, radiation, hormonal therapy and chemotherapy can all be used to treat ILC. Most women will receive a combination of treatments, although not necessarily all four types of treatments. The types of treatment recommended will depend upon the size of the cancer, whether the cancer is in the lymph nodes, features of the cancer cells themselves and your general health.

Interpreting Your Pathology Report

Tissue removed from the breast, lymph nodes or other parts of the body are sent to a laboratory to be viewed by a pathologist, (a doctor who identifies diseases by studying cells and tissues under a microscope). The pathologist's written report of his or her findings is called a pathology report, which usually includes:

- A detailed record of the specimens received and examined
- A complete description of the appearance of the tissue cells, such as size, grade, color and the presence of any visible abnormality
- A report of all of the diagnostic findings after microscopic examination
- A complete documentation of all of the studies performed on the tissue

A copy of the pathology report is sent to your doctor and becomes part of your medical record.

The next two pages describe some common terms routinely used in breast cancer pathology reports.

Final microscopic diagnosis

This section summarizes the pathologist's findings.

Infiltrating/invasive ductal breast carcinoma (IDC): cancer that started in the milk duct of the breast and has spread into surrounding breast tissue. In the final pathology report, the diagnosis may be more specific.

Infiltrating/invasive lobular breast carcinoma (ILC): cancer that started in the milk lobule of the breast and has spread into surrounding breast tissue

Ductal carcinoma in situ (DCIS): early cancer cells growing in the lining of the milk duct in the breast.

Grade: describes how much the cancer cells look like their normal cell counterparts. The Scarff-Bloom-Richardson (SBR) scale is one method used to determine the grade.

- Well-differentiated (grade 1) SBR (3, 4, 5) – the cells still have many of the features of normal cells.
- Moderately differentiated (grade 2) SBR (6, 7) – the cells have some of the features of normal cells.
- Poorly differentiated (grade 3) SBR (8, 9) – the cells have few of the features of normal cells.

Tumor size: size of the tumor, measured as a whole and under the microscope.

In situ component: If invasive cancer was found, there may be surrounding DCIS as well (see definition above), which will be noted in this section. If an extensive intraductal component (EIC) is noted, it means that the area of invasive cancer contains at least 25% DCIS.

Necrosis: cells that have died. Necrosis is usually associated with a more aggressive DCIS.

Architectural pattern: the pattern of growth of the DCIS cells. Descriptions used include cribiform, comedo, solid, micropapillary and papillary.

Angiolymphatic invasion: cancer cells have entered the small blood vessels or lymphatic vessels in the breast.

Margins: the area of normal tissue around the tumor that is removed during surgery. Ideally there are no cancer cells at the margin (clear or negative margin), only a rim of normal tissue. The pathologist will measure the distance between the cancer and the edge of normal tissue. If cancer cells are detected at the edge of the tissue removed, it is called a positive margin, and more surgery may be required.

Negative and positive margins are the distance between the tumor and the edge of the tissue. The bottom example shows where there is still some tumor at the margins.

Calcification: notes whether calcium deposits were found in the tumor.

Biopsy site: if a prior needle biopsy has been done, it will be noted whether the biopsy site is seen in the sample.

Nipple: if the nipple was removed, it will be noted if cancer is present in the nipple.

Sentinel node biopsy: if a sentinel lymph node biopsy was done, the report will note the number of lymph nodes containing cancer cells (positive lymph nodes), the size of the lymph nodes, and the total number of lymph nodes removed with the sentinel lymph node biopsy.

Axillary lymph node dissection: the report will note the total number of lymph nodes removed, the number that had cancer and the size of the lymph nodes. If a sentinel lymph node biopsy was done before, the report will note the number of additional lymph nodes removed, the number containing cancer cells (positive lymph nodes), and the size of the lymph nodes.

Extracapsular extension: means the cancer cells have spread outside the wall of the lymph node. Your report will state if it is present.

Pathologic tumor stage (AJCC): a scale used by pathologists to summarize features of the tumor (T), number of lymph nodes with cancer (N), and metastatic sites (M).

Comments: includes specific pathologic findings and clarifications of what was seen in the pathologic specimen.

Clinical History

This section contains information on why surgery is needed.

Gross description

This section gives specific details on what was given to the pathologist at the surgery and what it looks like without a microscope.

Tumor characteristics and other tests

Other reports will be made for your breast cancer. These reports will contain the following information:

Estrogen and progesterone receptors: The tissue will be tested in a laboratory for estrogen and progesterone hormone receptors in the cancer cells. These receptors are found on the surface of the cancer cell. The receptors bind the specific hormones (like a key in a lock) and this binding activates the cell internal processes resulting in the cell growth. Both hormones stimulate the growth of normal breast cells (as they contain these receptors) and some breast cancer cells (those that are hormone receptor positive). If hormone receptors are present (ER+, PR+) then these hormones circulating in the body may affect the cancer's growth. The report will list how strongly the cancer cells pick up a special stain for hormone receptors. Any staining is considered hormone receptor positive.

HER2 Assessment: The tissue will be tested to see if the cancer cells contain an increased amount of a protein on the surface of the cells called HER2. Some cells have too many copies of the HER2 gene and they make too much HER2 protein. If a person has HER2 positive breast cancer, that means that the HER2 protein sends messages to the inside of the cancer cells causing them to grow and divide.

About 20% of women with breast cancer have HER2 positive tumors. Tumors that are HER2 positive can grow very fast, and this type of tumor is considered to be aggressive. The presence of too much HER2 in the breast cancer specimen identifies people who might benefit from treatments directed against the HER2 protein. If you are HER2 positive, there are newer drugs called biologic agents that may be prescribed by your medical oncologist to treat HER2 positive breast cancer.

There are several methods for testing HER2 status: Some HER2 tests (IHC) look for the HER2 protein on the surface of the cancer cells, and other tests look for the amount of HER2 inside the cancer cells. An inconclusive IHC result should be followed by additional testing.

Here are the different methods of testing:

IHC = Immunohistochemistry

CISH = Chromogenic in situ hybridization

FISH = Fluorescence in situ hybridization

SISH = Silver enhanced in situ hybridization

DISH = Dual in-situ hybridization

Tumor Profiling

For some patients who have ER+ breast cancer, your physician may send a piece of the tumor to an outside lab company to look at the genetic profile of the tumor. The results of this test can help your medical oncologist determine whether chemotherapy would be of benefit for you. Another possible use for this kind of testing, is to determine whether radiation would be beneficial for DCIS after lumpectomy.

Other kinds of genetic tumor profiling tests may be ordered by your physician to help guide your treatment and tell your physician if targeted therapy may be beneficial. This type of genetic tumor profiling is not a standard test.

Discuss with your medical oncologist if you have questions about any genetic tumor profile tests and whether they would be beneficial in your situation.

Staging in Breast Cancer

Once your cancer is diagnosed, your doctors will want to know exactly how big the cancer is, whether it has spread to the lymph nodes or other parts of your body, as well as some specific features of the cancer. This is called staging a cancer. Knowing the stage of your cancer will help your doctors develop the best treatment plan for you.

Breast cancer used to be staged looking only at the tumor size, lymph node involvement and if the cancer spread beyond the original tumor site. Due to advances in cancer research, breast cancer staging now includes estrogen and progesterone receptor status, HER2 status, and in some cases, cancer genomics (the DNA of the cancer cells).

Staging may be done before and/or after surgery. If you are getting neoadjuvant treatment (treatment before surgery), your cancer can be clinically staged based on your biopsy, other test results and physical exam. When you have surgery, your cancer will be pathologically staged after the cancer cells are examined under the microscope. Your doctor may order specific tests to help determine the stage of your cancer.

Sometimes during the course of your treatment and follow-up your cancer may be re-staged. This allows your doctor to get an updated estimate of the size and location of your cancer. It will allow your doctor to adjust your treatment plan.

Stage 1 through 4 breast cancers are all referred to as invasive or infiltrating cancers. This means that the cancer cells have spread, invaded or infiltrated into the tissue surrounding the milk duct or lobule in the breast.

Five Stages of Breast Cancer

Stage 0

The lining of the milk duct contains abnormal cells, but the cells have not spread to the surrounding breast tissue or to the lymph nodes. This stage is also called noninvasive carcinoma, ductal carcinoma in situ (DCIS), or intraductal carcinoma.

Stages 1-3

As mentioned above, there are many variables that are considered when staging breast cancer. Prognostic factors (characteristics that help determine the aggressiveness of the cancer) play a large role in staging. Prognostic factors include anatomic factors (tumor, node, metastasis), biologic factors (ER, PR, HER2, grade), and genomic factors (the DNA of the cancer cell). Prior to 2018, the size of the tumor and number of lymph nodes determined the stage. As of 2018, that is no longer the case. It is possible to have a larger tumor with favorable biologic and genomic factors and have early stage breast cancer. Conversely, it is possible to have a smaller tumor with less favorable biologic and genomic factors and have a later stage cancer. Your physician will discuss staging in detail with you.

Stage 4

Tumor is any size and has spread beyond the breast and lymph nodes to other parts of the body (usually bone, liver, lung or brain). This is often called metastatic cancer.

Hereditary Breast Cancer and Genetic Testing

Family history can play a role in the development of breast cancer. Approximately 20-30% of women who develop breast cancer report a family history of breast cancer. A genetic predisposition, where there is a strong family history of breast cancer is responsible for 5-10% of all breast cancer.

A number of genes associated with a high risk of breast cancer have been identified, including BRCA1 and BRCA2. Women who harbor a BRCA1 or BRCA2 gene mutation have an elevated lifetime risk of developing both breast and ovarian cancer. There are other genes that may also increase the risk of breast and other cancers. If you carry a harmful mutation, there may be additional recommendations for your treatment and follow-up care. There also may be important implications for family members.

Genetic testing may help you learn if you are at increased risk for another cancer or a second breast cancer. Having the gene for a specific cancer does not mean that you will develop that cancer. It only means that you may have a tendency toward developing the cancer and that the gene may be passed down to your children.

DISCRIMINATION

Federal legislation went into effect in 2008, entitled the Genetic Information Nondiscrimination Act or GINA, to prevent discrimination in health coverage and employment based on genetic information.

Women should ask their doctor whether genetic counseling and testing may be helpful if:

- They were 45 or younger when they developed breast cancer
- They have a close relative who developed breast cancer at a young age (50 years old or younger)
- They have a close relative with ovarian cancer
- They have a male relative with breast cancer
- They are of Ashkenazi Jewish descent
- They have "triple negative" breast cancer (estrogen and progesterone receptor negative and HER2 negative) and are 60 years old or younger
- They have multiple close family members on the same side of the family with breast, ovarian, prostate or pancreatic cancer.
- They were 50 years old or younger with one close blood relative with breast cancer, aggressive prostate cancer, or pancreatic cancer or went on to develop a second breast cancer.

It is important to discuss genetic testing and its possible implications with your doctor and a genetic counselor. If you decide to get testing, a small sample of your blood or a saliva sample will be sent to a genetic laboratory. Your DNA will be studied to detect mutations or changes in the genes. A report of the findings will be sent to the genetic counselor and doctor that ordered the test, and they will share the results with you.

The information in this section is not meant to replace the individual attention, advice, and treatment plan of your oncologist and medical team.