



NCCN
GUIDELINES
FOR PATIENTS®

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Breast Cancer

Locally Advanced

STAGE III

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NATIONAL COMPREHENSIVE CANCER NETWORK
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Guiding Treatment, Changing Lives.

Rockin for the Cure®



Available online at NCCN.org/patients



LEARNING that you have cancer can be overwhelming.

The goal of this book is to help you get the best care. It presents which cancer tests and treatments for stage III breast cancer are recommended by experts.

The National Comprehensive Cancer Network® (NCCN®) is a not-for-profit alliance of 27 of the world's leading cancer centers. Experts from NCCN have written treatment guidelines for doctors who treat breast cancer. These treatment guidelines suggest what the best practice is for cancer care. The information in this patient book is based on the guidelines written for doctors.

This book focuses on the treatment of stage III breast cancer. Key points of the book are summarized in the [NCCN Quick Guide™](#). NCCN also offers patient resources on carcinoma in situ (stage 0), early-stage (stages I and II), and metastatic (stage IV) breast cancer, ovarian cancer, sarcoma, lymphomas, and other cancer types. Visit NCCN.org/patients for the full library of patient books, summaries, and other resources.

About



These patient guidelines for cancer care are produced by the National Comprehensive Cancer Network® (NCCN®).

The mission of NCCN is to improve cancer care so people can live better lives. At the core of NCCN are the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®). NCCN Guidelines® contain information to help health care workers plan the best cancer care. They list options for cancer care that are most likely to have the best results. The NCCN Guidelines for Patients® present the information from the NCCN Guidelines in an easy-to-learn format.

Panels of experts create the NCCN Guidelines. Most of the experts are from NCCN Member Institutions. Their areas of expertise are diverse. Many panels also include a patient advocate. Recommendations in the NCCN Guidelines are based on clinical trials and the experience of the panelists. The NCCN Guidelines are updated at least once a year. When funded, the patient books are updated to reflect the most recent version of the NCCN Guidelines for doctors.

For more information about the NCCN Guidelines, visit NCCN.org/clinical.asp.

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NCCN Foundation was founded by NCCN to raise funds for patient education based on the NCCN Guidelines. NCCN Foundation offers guidance to people with cancer and their caregivers at every step of their cancer journey. This is done by sharing key information from the world's leading cancer experts. This information can be found in a library of NCCN Guidelines for Patients® and other patient education resources. NCCN Foundation is also committed to advancing cancer treatment by funding the nation's promising doctors at the center of cancer research, education, and progress of cancer therapies.

For more information about NCCN Foundation, visit NCCNFoundation.org.

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Endorsed by

BREAST CANCER ALLIANCE

Receiving a cancer diagnosis can be overwhelming, both for the patient and their family. We support the NCCN guidelines for breast cancer with the knowledge that these tools will help to equip patients with many of the educational resources, and answers to questions, they may seek. breastcanceralliance.org

FORCE: FACING OUR RISK OF CANCER EMPOWERED

As the nation's leading organization serving the hereditary breast and ovarian cancer community, FORCE is pleased to endorse the NCCN Guidelines for Patients with breast cancer. This guide provides valuable, evidence-based, expert-reviewed information on the standard of care, empowering patients to make informed decisions about their treatment. facingourrisk.org

LIVING BEYOND BREAST CANCER

Receiving a diagnosis of breast cancer is overwhelming. Having trusted information is essential to help understand one's particular diagnosis and treatment options. The information found in the NCCN Guidelines for Patients: Breast Cancer is accessible, accurate, and will help every step of the way—from the moment of diagnosis through treatment. People can use the NCCN Guidelines for Patients: Breast Cancer to become an informed partner in their own care. lbbc.org

SHARSHERET

Sharsheret is proud to endorse this important resource, the NCCN Guidelines for Patients: Breast Cancer. With this critical tool in hand, women nationwide have the knowledge they need to partner with their healthcare team to navigate the often complicated world of breast cancer care and make informed treatment decisions. sharsheret.org

SISTERS NETWORK, INC.

Sisters Network Inc., a non-profit African-American breast cancer survivors' organization, strongly supports the NCCN Guidelines for breast cancer. This important patient resource provides clear, explanatory language that patients, their families and the general public can understand. sistersnetwork.org

YOUNG SURVIVAL COALITION (YSC)

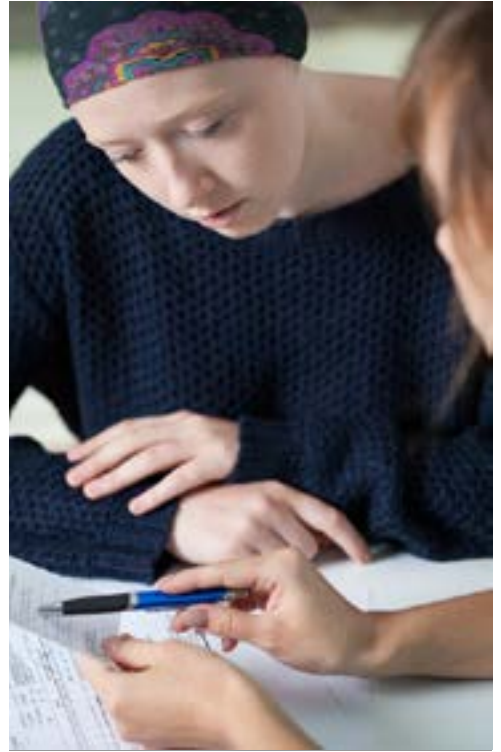
Young Survival Coalition (YSC) is pleased to endorse the NCCN Guidelines for Patients: Breast Cancer as an invaluable resource for young women diagnosed with breast cancer and their co-survivors. This in-depth, illustrated series clearly explains what breast cancer is, how it is treated and what patients can expect on the journey ahead. youngsurvival.org

Special thank you to



ROCKIN' FOR THE CURE®

NCCN Foundation would like to thank Rockin' for the Cure for providing much needed support for the NCCN Guidelines for Patients! Rockin' For The Cure 2017 was a giant success and we are incredibly grateful to the Rockin' For The Cure team for their hard work and passion to promote cancer awareness. rockinforthecure.net



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Who should read this book?

This book is about treatment for stage III breast cancer. These cancers are carcinomas of the breast. Inflammatory breast cancer is not included.

Almost all breast cancers occur in women. As such, most of this book is written with women in mind. However, men are treated like women except where noted.

Patients and those who support them—caregivers, family, and friends—may find the book helpful. It is a good starting point to learn what your options may be.

Are the book chapters in a certain order?

The book chapters follow a common treatment pathway. Starting with **Part 1** may be helpful. It explains what stage III breast cancer is. Also, common treatment pathways are discussed.

Part 2 lists what health care is needed before treatment. Some types of health care help your doctors plan treatment. Other health care can address health issues beyond cancer treatment.

Parts 3 through 8 describes the common treatment types. Options for treatment are also included. Tips for talking and deciding your options with your doctor are presented in **Part 9**.

Does this book include all options?

This book includes information for many people. Your treatment team can point out what applies to you. They can also give you more information. While reading, make a list of questions to ask your doctors.

The treatment options are based on science and the experience of NCCN experts. However, their recommendations may not be right for you. Your doctors may suggest other options based on your health and other factors. If other options are given, ask your treatment team questions.

Help! What do the words mean?

In this book, many medical words are included. These are words that your treatment team may say to you. Most of these words may be new to you. It may be a lot to learn.

Don't be discouraged as you read. Keep reading and review the information. Ask your treatment team to explain a word or phrase that you do not understand.

Words that you may not know are defined in the text or in the *Dictionary*. Acronyms are also defined when first used and in the *Glossary*. Acronyms are short words formed from the first letters of several words. One example is DNA for **d**eoxyribonucleic **a**cid.

1

Breast cancer basics

8 Women's breasts

10 A disease of cells

10 Cancer's threat

12 Cancer stage

13 Treatment pathways

14 Clinical trials

15 Review



You've learned that you have breast cancer. It's common to feel shocked and confused. Part 1 reviews some basics that may help you learn about breast cancer.

Women's breasts

Before learning about breast cancer, it is helpful to know about breasts. The ring of darker skin in the center of the breast is called the areola. The raised tip in the middle of the areola is called the nipple. In young girls, there are small ducts under the nipple that branch into fatty tissue called stroma.

Increases in female hormones during puberty among girls cause their breasts to change. The stroma increases, the ducts grow and branch out like tree limbs, and lobules form at the end of the ducts. Lobules are small sacs that make breast milk after a baby is born. Breast milk drains from the millions of lobules into the ducts that connect to the nipple. See **Figure 1** for a look inside women's breasts.

Lymph is a clear fluid that gives cells water and food. It also helps to fight germs. Lymph drains from breast tissue into lymph vessels within the stroma. **See Figure 2.** Then, it travels to the breast's lymph nodes, most of which are in your armpit. Lymph nodes are small structures that filter and remove germs from lymph. Nodes near the armpit are called axillary lymph nodes.

Figure 1
Inside of breasts

Inside of women's breasts are millions of lobules that form breast milk after a baby is born. Breast milk drains from the lobules into ducts that carry the milk to the nipple. Around the lobules and ducts is soft tissue called stroma.

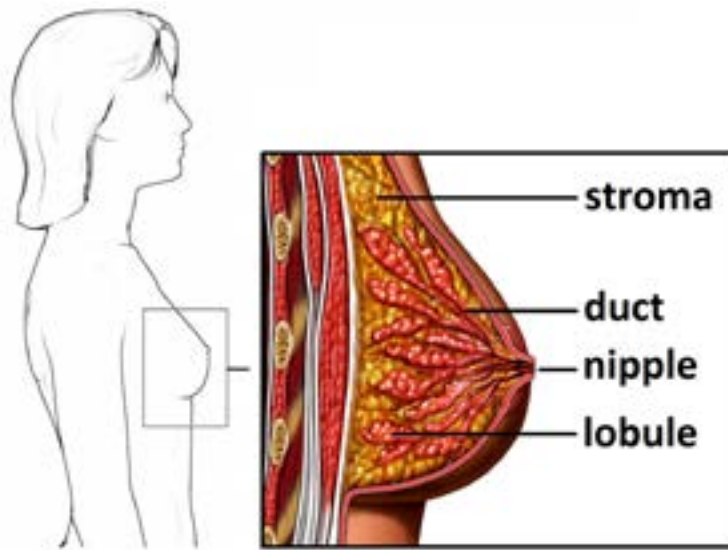


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Figure 2
Breast lymph vessels and nodes

Lymph is a clear fluid that gives cells water and food and helps to fight germs. It drains from breast tissue into lymph vessels within the stroma. It then travels to the breast's lymph nodes, most of which are in the armpit. Nodes near the armpit are called axillary lymph nodes.



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A disease of cells

Your body is made of trillions of cells. Cancer is a disease of cells. Each type of cancer is named after the cell from which it derived. Breast cancer is a cancer of breast cells.

Almost all breast cancers are carcinomas. Carcinomas are cancers of cells that make up the skin and the tissue that lines or covers certain organs. In the breast, carcinomas are cancers of cells that line either the ducts or lobules. Most breast cancers start in ductal cells.

Cells have a control center called the nucleus. The nucleus contains chromosomes, which are long strands of DNA (deoxyribonucleic acid) tightly wrapped around proteins. **See Figure 3.** Within DNA are coded instructions for building new cells and controlling how cells behave. These instructions are called genes.

There can be abnormal changes in genes called mutations. Some types of mutations that are linked to cancer are present in all cells. Other mutations are present only in cancer cells. Mutations cause cancer cells to not behave like normal cells and sometimes to look very different from normal cells.

Cancer's threat

Cancer cells don't behave like normal cells in three key ways. First, cancer cells grow more quickly and live longer than normal cells. Normal cells grow and then divide to form new cells when needed. They also die when old or damaged as shown in **Figure 4.** In contrast, cancer cells make new cells that aren't needed and don't die quickly when old or damaged. Over time, cancer cells form a mass called the primary tumor.

The second way cancer cells differ from normal cells is that they can grow into surrounding tissues. If not treated, the primary tumor can grow from a duct or lobule into the stroma. Breast cancers that have grown into the stroma are called "invasive."

Third, unlike normal cells, cancer cells can leave the breast. This process is called metastasis. In this process, cancer cells break away from the tumor and merge with blood or lymph. Then, the cancer cells travel in blood or lymph through vessels to other sites. Once at other sites, cancer cells may form secondary tumors and cause major health problems.

Figure 3
Genetic material in cells

Most human cells contain the “blueprint of life”—the plan by which our bodies are made and work. The plan is found inside of chromosomes, which are long strands of DNA that are tightly wrapped around proteins. Genes are small pieces of DNA that contain instructions for building new cells and controlling how cells behave. Humans have an estimated 20,000 to 25,000 genes.

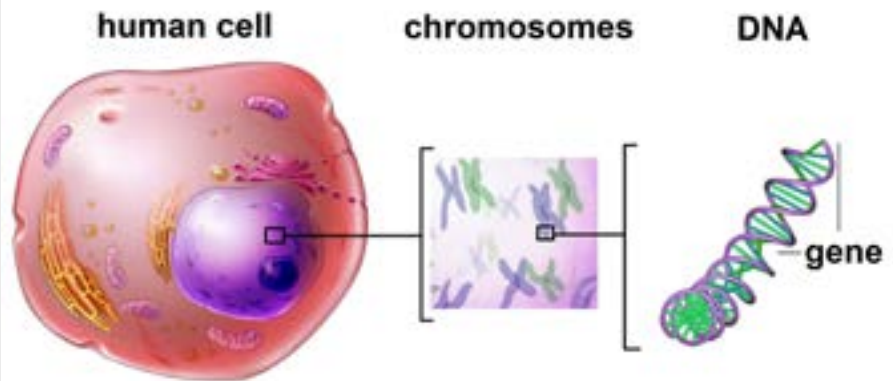


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Figure 4
Normal cell growth vs. cancer cell growth

Normal cells increase in number when they are needed and die when old or damaged. In contrast, cancer cells quickly make new cells and live longer because of abnormal changes in genes.

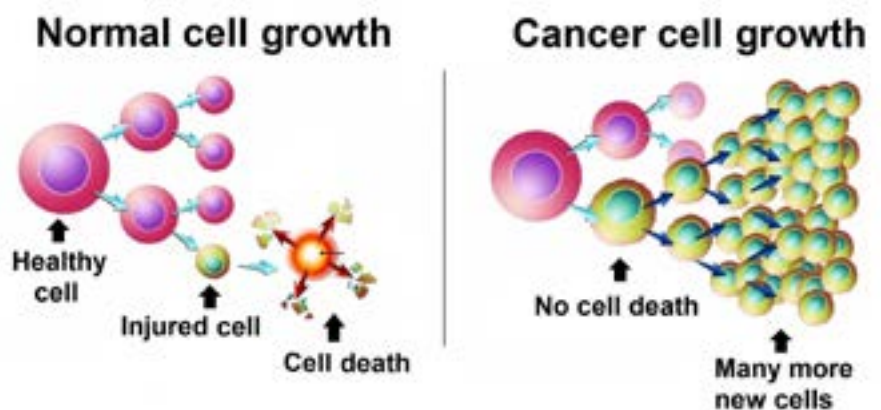


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Cancer stage

A cancer stage is your doctors' rating of the extent of the cancer. It is used to plan which tests may be needed and which treatments are best for you. The AJCC (American Joint Committee on Cancer) staging system is used to stage breast cancer.

In this system, the letters T, N, and M describe a different area of cancer growth. The T score describes the growth of the primary tumor. The N score describes cancer growth within nearby lymph nodes. Nearby nodes are on the same side of the chest as the breast tumor. The M score tells if the cancer has spread to distant sites. The T, N, and M scores are combined to assign the cancer a stage.

Rating of the cancer stage is often done twice. The first rating is called the clinical stage. It is based on tests received before surgery. Exactly how far the cancer has spread and how many lymph nodes have

cancer can't be known until after surgery. Thus, your doctors will rate the cancer again after surgery. This rating is called the pathologic stage.

Breast cancer is described as stage 0, 1 (I), 2 (II), 3 (III), or 4 (IV). The focus of this book is on stage III. Stage III cancers have grown into the stroma but haven't spread to distant sites. Most have spread to nearby lymph nodes. Clinical stage III cancers are defined as:

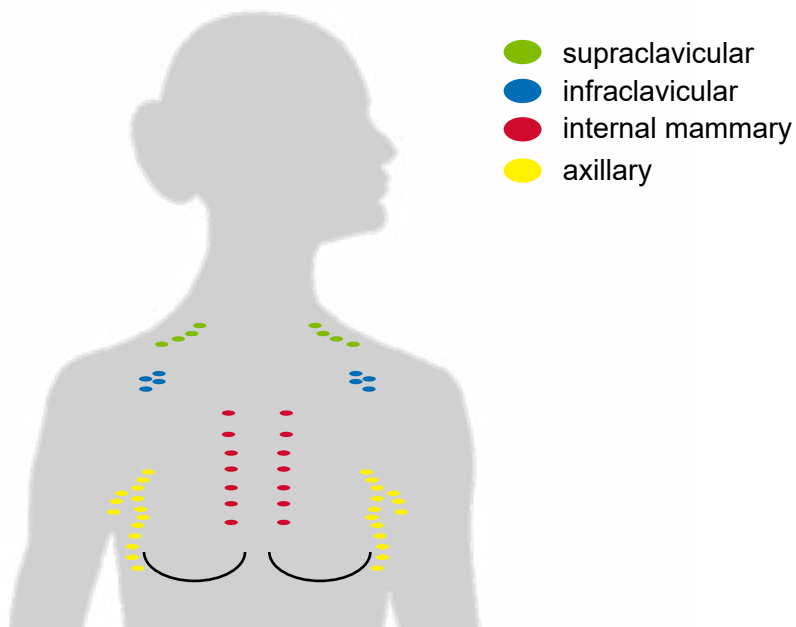
Stage IIIA

These cancers do not involve the breast skin or chest wall. The size of the in-breast tumor varies across ratings. The cancer has spread to nearby lymph nodes.

- Cancers rated T3, N1, M0 consist of breast tumors that are larger than 5 cm. There are signs of cancer in axillary nodes. These nodes aren't stuck together or to the chest wall.

Figure 5
Nearby lymph nodes

Nearby lymph nodes includes 4 groups. The axillary lymph nodes are near your armpit. Internal mammary lymph nodes are next to your breastbone. Infraclavicular lymph nodes are below your collarbone, and above are the supraclavicular nodes.



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- Cancers rated T0–T3, N2, M0 consist of breast tumors of any size. Sometimes, no breast tumor is found. The cancer appears to be in axillary nodes or in internal mammary nodes. The axillary nodes are stuck together or to the chest wall.

Stage IIIB

These cancers involve the breast skin, chest wall, or both. If in the skin, the skin has open sore(s), small secondary tumor(s), or is swollen. Some stage IIIB cancers have spread to nearby nodes.

- Cancers rated T4, N0, M0 do not appear to have spread to lymph nodes.
- Cancers rated T4, N1, M0 appear to be in axillary nodes. These nodes aren't stuck together or to the chest wall.
- Cancers rated T4, N2, M0 appear to be in fixed axillary or internal mammary nodes.

Stage IIIC

Tests suggest that the cancer has spread to a great extent within nearby lymph nodes.

- Cancers rated T0–T4, N3, M0 appear to have spread to 1) many axillary nodes, 2) axillary nodes plus internal mammary nodes, 3) infraclavicular nodes, or 4) supraclavicular nodes.

Treatment pathways

Treatment for stage III breast cancer has many parts. More than one type of treatment is used. You will likely have chemotherapy, surgery, radiation therapy, and, as for many women, endocrine therapy.

Despite common treatment types, treatment differs among women. For example, not everyone receives the same chemotherapy or surgery. The order of some treatments may differ, too. The order of treatments may depend on the type of breast surgery that is planned. However, your options may change during the course of treatment.

Your doctor will plan your treatment based on many factors. One such factor is the cancer stage. Common treatment pathways by cancer stage are briefly described next. More information is provided throughout the book.

Stage IIIA (T3, N1, M0)

These cancers are confined to the breast and the lymph nodes near the armpit. As such, they are treated like large stage II cancers. In general, there are two treatment pathways.

At the core of one pathway is a lumpectomy. This surgery spares healthy breast tissue. Chemotherapy is often the first treatment received in this pathway. Before chemotherapy, your lymph nodes will be assessed for cancer. At least some lymph nodes in your armpit will be removed. After breast surgery, radiation therapy will follow. Endocrine therapy may be received.

The other pathway includes a mastectomy. Your whole breast will be removed during this surgery. Chemotherapy may be started before or after surgery. If before, your lymph nodes will first be assessed for cancer. At breast surgery, at least some lymph nodes will be removed. After surgery

and chemotherapy, many women receive radiation therapy and endocrine therapy.

Stages IIIA (T0-T3, N2, M0), IIIB, and IIIC

Due to the extent of these cancers, it is standard to first receive chemotherapy. A mastectomy often follows, but at times a lumpectomy can be done. Lymph nodes near your armpit will be removed. Radiation therapy will follow surgery. Endocrine therapy may be received.

Clinical trials

One of your treatment choices may be to join a clinical trial. Joining a clinical trial is strongly supported. NCCN believes that you will receive the best management in a clinical trial.

New tests and treatments aren't offered to the public as soon as they're made. They first need to be studied. A clinical trial is a type of research that studies a test or treatment in people.

Clinical trials study how safe and helpful tests and treatments are for people. When found to be safe and helpful, they may become tomorrow's standard of care. Because of clinical trials, the tests and treatments in this book are now widely used to help people with breast cancer. Future tests and treatments that may have better results than today's treatments will depend on clinical trials.

New tests and treatments go through a series of clinical trials. These trials aim to ensure they're safe and work. Without clinical trials, there is no way to know if a test or treatment is safe or helpful. Clinical trials have four phases.

Examples of the four phases for treatment are:

- **Phase I trials** aim to find the safest and best dose of a new drug. Another aim is to find the best way to give the drug with the fewest side effects. These trials often involve about 20 people.
- **Phase II trials** assess if a drug works for a specific type of cancer.
- **Phase III trials** compare a new drug to a standard treatment. These trials often involve hundreds or thousands of people.
- **Phase IV trials** test drugs approved by the U.S. FDA (Food and Drug Administration) to learn more about side effects with long-term use.

Joining a clinical trial has benefits. First, you'll have access to the most current cancer care. However, please note that it is unknown how well new treatments work if at all. Second, you will receive the best management in a clinical trial. Third, the results of your treatment—both good and bad—will be carefully tracked. Fourth, you may help other people who will have cancer in the future.

Clinical trials have risks, too. Like any test or treatment, there may be side effects. Also, new tests or treatments may or may not improve your health. In fact, your health may worsen during a trial. That is why every cancer center follows guidelines to assess the safety of people in research. Other downsides may include more hospital trips, paperwork, and extra costs for you.

To join a clinical trial, you must meet the conditions of the study. Patients in a clinical trial are often alike in terms of their cancer and general health. Thus, if patients improve, it's because of the treatment and not because of differences between them.

To join, you'll need to review and sign an informed consent form. This form describes the study in detail. The study's risks and benefits should be described and may include others than those described above.

Ask your treatment team if there is an open clinical trial that you can join. There may be clinical trials where you're getting treatment or at other treatment centers nearby. You can also find clinical trials through the websites listed in Part 9.

Review

- Inside of women's breasts are lobules, ducts, and stroma. Lobules are structures that make breast milk. Ducts carry breast milk from the lobules to the nipple. Stroma is a soft tissue that surrounds the lobules and ducts.
- Breast cancer often starts in the milk ducts or lobules and then spreads into the stroma.
- Breast cancer can spread outside the breast through lymph or blood.
- Stage III breast cancers are divided into three groups. Stage IIIA cancers do not involve the breast skin or chest wall but have spread into nearby lymph nodes. Stage IIIB cancers do involve the breast skin, chest wall, or both. Stage IIIC cancers have spread to a great extent within nearby lymph nodes.
- Treatment for stage III breast cancer has many parts. Common treatments are chemotherapy, surgery, radiation therapy, and endocrine therapy. Not everyone receives the same chemotherapy or surgery. The order of some treatments may differ, too.
- Clinical trials give people access to new tests and treatments that they otherwise can't receive. If proven to work well, they may be approved in time by the FDA.

2

Treatment planning

17 Medical history

18 Physical exam

18 Imaging tests

20 Biopsy

21 Cancer lab tests

23 Blood tests

24 Genetic counseling

24 Fertility counseling

25 Distress screening

25 Review



Not all breast cancers are the same. Your cancer doctor will want to learn all about the cancer you have. Part 2 describes the tests used to learn about breast cancer. Based on the test results, your treatment can be tailored to you. This is called **personalized medicine**.

Medical history

Your medical history includes any health events and medicines you've taken in your life. Your cancer doctor will want to know about illnesses, breast biopsies, prior treatment with radiation, and if you are pregnant. It may help to make a list of old and new medications while at home to bring to your doctor's office.

Breast cancer and other health conditions can run in families. Thus, your cancer doctor will ask about the medical history of your blood relatives. Hereditary breast cancers are due to abnormal genes that were passed down from a parent to a child. They are not common. About 1 out of 10 breast cancers are hereditary. Read the section called *Genetic counseling* to learn more.

A medical history is needed for treatment planning. See [Guide 1](#) for a complete list of care that is advised prior to treatment. Some women do not need every test or service listed.

Guide 1. Health care before cancer treatment

Main tests and services
Medical history
Physical exam
Diagnostic bilateral mammogram
Breast ultrasound if needed
Breast MRI sometimes
Biopsy
Hormone receptor test on cancer cells
HER2 test on cancer cells
Genetic counseling if you may have hereditary breast cancer
Fertility counseling if you can have babies
Distress screening

Other care that may be useful
Chest diagnostic CT scan with contrast
Abdomen ± pelvis diagnostic scans (CT or MRI with contrast)
Bone scan or sodium fluoride PET/CT
FDG PET/CT sometimes
Complete blood count
Comprehensive metabolic panel

Physical exam

Doctors often perform a physical exam along with taking a medical history. A physical exam is a study of your body for signs of disease. To start, your basic body functions will be measured. These functions include your temperature, blood pressure, and pulse and breathing (respiration) rate. Your weight will also be checked.

During the exam, your doctor will listen to your lungs, heart, and gut. He or she will also look at and feel parts of your body. This is done to see if organs are of normal size, are soft or hard, or cause pain when touched.

Your doctor will touch your breasts and nearby lymph nodes. This is called a clinical breast exam. Your breasts may be felt while you sit or stand up as well as when you lie back. Some women feel uneasy having their breasts touched by their doctor. Keep in mind that this exam provides important information and is quick.

Imaging tests

Imaging tests make pictures (images) of the insides of your body. They can show which sites have cancer. This information helps your doctors stage the cancer. Certain imaging tests also reveal some features of a tumor and its cells.

Lobular breast cancer is a less common subtype. It may be hard to see well on some types of imaging. Confirm with your doctor what imaging tests you should receive.

A radiologist is a doctor who's an expert in reading images. Your radiologist will convey the imaging results to your cancer doctor. This information helps your doctor decide what the next steps of care should be.

Your treatment team will tell you how to prepare for these tests. You may need to stop taking some medicines and stop eating and drinking for a few hours before some scans. Tell your team if you get nervous when in small spaces. You may be given a sedative to help you relax.

Some imaging tests use contrast. Contrast is a dye that will be injected into your bloodstream. It makes the pictures clearer. Some people have an allergic reaction to the dye. Tell your doctor if you've had problems with contrast in the past.

Diagnostic bilateral mammogram

A mammogram is a picture of the insides of your breast. The pictures are made using x-rays. A computer combines the x-rays to make detailed pictures.

You may have already had a diagnostic bilateral mammogram. If you haven't, it is advised. A bilateral mammogram is a picture of each breast. Diagnostic mammograms are made with more x-rays than

screening mammograms. They are better at showing the size and number of tumors.

Breast ultrasound

Ultrasound uses sound waves to make pictures. A probe will be held on your bare breast while the pictures are viewed on a screen. The probe may also be placed below your armpit to view your lymph nodes.

Ultrasound is sometimes used to assess the size of a breast tumor. Ultrasound is also sometimes used to guide a needle into a tumor during a biopsy. Biopsies are described more on the next page.

Breast MRI

Sometimes, the mammogram and ultrasound pictures are unclear. In this case, your doctor may want you to get breast MRI (**m**agnetic **r**esonance **i**maging). This test uses a magnetic field and radio waves to make pictures of the insides of your breasts.

For breast MRI, you must remove your top and bra. You will lie face down on a table that has padded openings for your breasts. In the openings, there are coils that help to make pictures. The table will move slowly through the machine during the scan.

Chest diagnostic CT scan

CT (**c**omputed **t**omography) takes many pictures of a body part using x-rays. **See Figure 6.** A computer combines the x-ray images to make a detailed picture. Your doctor may want you to receive CT of your chest. Contrast should be used.

Abdomen ± pelvis diagnostic scans

Tests may suggest a health problem within your abdomen or pelvis. You may report related symptoms. A scan can help show if cancer is present. Either a CT or MRI scan with contrast can be used.

Before MRI, you may be fitted with coil devices that emit radio waves. Straps may be used to help you stay in place. During the scan, you will be inside the machine. An open MRI scanner may be an option at some health centers. The machine makes loud noises but you can wear earplugs. The part of your body that was scanned may feel a bit warm afterward.

Figure 6. CT machine

Pictures of the insides of your body can be made with an imaging test. During the scan, you will lie on a table that will move into the tunnel of the imaging machine. The pictures will be viewed by a doctor who will look for signs of cancer.



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Bone scan

A bone scan may be used to see if the cancer has spread to your bones. For this scan, a radiotracer will be injected into your bloodstream. The most common radiotracer used for bone scans is technetium. You will need to wait about 3 hours for the radiotracer to enter your bones.

A special camera will be used to take pictures while you lie still on a table. It takes 45 to 60 minutes to complete the pictures. Areas of bone damage use more radiotracer than healthy bone and thus appear as bright spots in the pictures. Bone damage can be caused by cancer as well as by other health problems.

PET/CT

Sometimes CT is combined with PET (positron emission tomography). When used together, they are called a PET/CT scan. Some cancer centers have one machine that does both scans. At other centers, the scans are done with two machines.

For PET, a radiotracer will first be injected into your body. The radiotracer is detected with a special camera during the scan. Cancer cells appear brighter than normal cells because they use the radiotracer more quickly. PET can show even small amounts of cancer.

Sodium fluoride PET/CT

Instead of a bone scan, images of bones can be made with PET/CT. The radiotracer used to image bones is sodium fluoride. This scan is costly. However, it shows sites of bone damage and repair better than a bone scan. It also has a shorter waiting time of 40 to 60 minutes for the radiotracer to be seen and a shorter scanning time of 15 to 20 minutes.

FDG PET/CT

This scan also detects cancer. FDG (fluorodeoxyglucose) is a radiotracer that is made of

fluoride and a simple form of sugar called glucose. You must fast for 4 hours or more before the scan. FDG PET/CT can be done at the same time as diagnostic CT.

FDG PET/CT is most helpful when other imaging tests are unclear. It may also be helpful with finding breast cancer that has spread to lymph nodes or distant sites. If the scan detects cancer spread to the bone, a bone scan or sodium fluoride PET/CT may not be needed.

Biopsy

Treatment given before surgery can cause tumors to shrink a lot. Thus, biopsies may be done while the cancer can still be found. A biopsy is a procedure that removes tissue or fluid samples for testing. Numbing medicine may be injected into the site before the biopsy.

Breast biopsy

If not done before, a core needle biopsy of the breast tumor is needed. Mammography may be used to guide the needle into the tumor. This procedure is called a stereotactic needle biopsy. Needles can also be guided with ultrasound images. You may also have small metal clips placed in your breast near the tumor. The clips will help your surgeon find the area with cancer.

Lymph node biopsy

If not done before, you may receive an ultrasound of axillary lymph nodes. If cancer may be present, a needle biopsy is often done with ultrasound guidance. An FNA (fine-needle aspiration) removes a small group of cells. **See Figure 7.** A core needle biopsy removes a solid tissue sample. Like breast tumors, lymph nodes with possible cancer may be marked with a tattoo or clip.

Sentinel lymph nodes are the first nodes to which lymph travels after leaving the breast. An SLNB (sentinel lymph node biopsy) is advised in two cases. It is advised if the axillary ultrasound looks okay. It is advised if there's no cancer in the biopsy samples. SLNB can be done before or after preoperative treatment. Read Part 4 for more information.

Cancer lab tests

The samples are sent to a pathologist to confirm if cancer is present. A pathologist is a doctor who's an expert in testing cells to find disease. You may have had biopsies of a tumor in your breast, lymph node, or both sites.

Pathology report

All biopsy results are recorded in a pathology report. A report will be written each time tissue is removed from your body and tested for cancer. These reports are vital to planning treatment.

It's a good idea to get a copy of your pathology report(s). Review your report(s) with your doctor. Take notes. Ask questions if you don't understand. This information can be complex.

Histologic typing

The pathologist will examine the samples using a microscope. If cancer is present, he or she will study the parts of the cancer cells to classify the disease. This is called histologic typing. The pathology report will state if the cancer started in the breast or elsewhere.

If breast cancer is found, the subtype will be noted in the report. The most common subtype is ductal breast cancer. Out of every 100 breast cancers, about 85 to 90 are ductal cancers. These cancers started in the breast ducts. Breast cancer can also start in the lobules. These cancers are called lobular breast cancer. There are other less common types of breast cancer as well.

Figure 7 Lymph node biopsies

Breast cancer can spread to the lymph nodes by your armpit. Signs of cancer in lymph nodes can be found with a physical exam, imaging test, or both. If a test suggests there's cancer, a biopsy is needed. An FNA removes a small group of cells and a core needle biopsy removes a solid tissue sample.

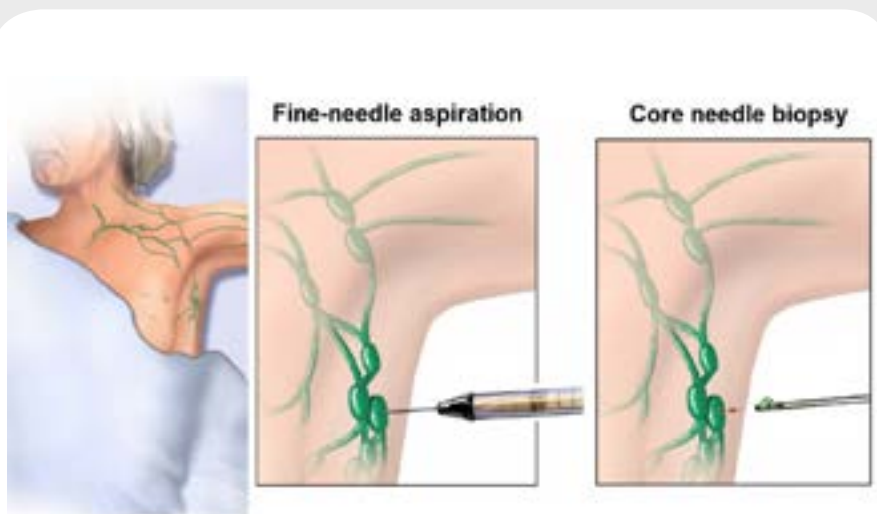


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Receptor testing

Not all breast cancer cells are alike. They can differ by the type of receptors they have. A receptor is a protein found inside or on the surface of cells. Substances bind to the receptors and cause changes within the cell. The two types of receptor tests important for treatment planning are described next.

Hormone receptor test

Estrogen and progesterone are hormones that are present in all women. Among some women with breast cancer, the cancer cells have receptors to which these hormones attach. As shown in **Figure 8**, hormone receptors are inside of cells. After hormones attach, the receptors enter the

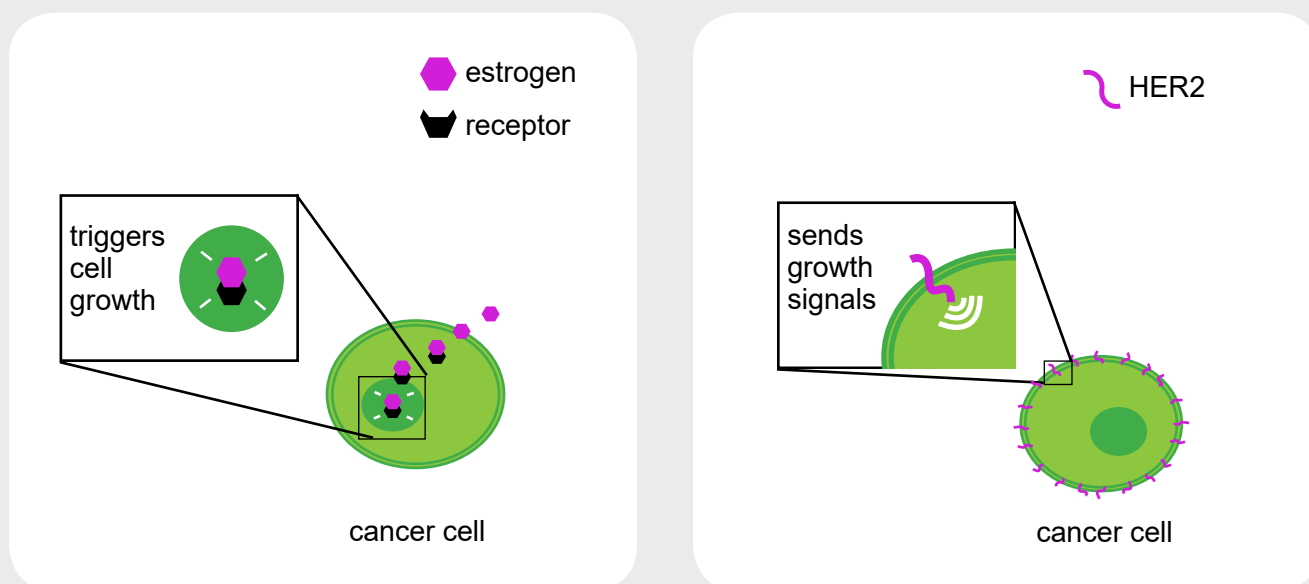
nucleus and cause cells to grow in number. However, the growth of cancer cells with hormone receptors is usually slower than cancer cells without these receptors.

Testing for hormone receptors is important. There are drugs that can be used to stop hormones from causing cancer growth. IHC (immunohistochemistry) is the lab test used by pathologists for hormone receptors.

IHC involves applying a stain to cells then looking at them with a microscope. The stain shows how many cells have hormone receptors and the amount of hormone receptors in the cells. If at least 1 out of

Figure 8
Key receptors in breast cancer

Hormone and HER2 receptors help breast cancer grow. Some women have a high amount of one or both types of receptors. It is important to test for these cell receptors so that the best cancer treatment is received.



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every 100 cancer cells stain positive, the cancer is called hormone receptor–positive. If fewer cancer cells stain positive for hormone receptors, the cancer is called hormone receptor–negative.

HER2 test

HER2 (**h**uman **e**pidermal growth factor **r**eceptor **2**) is a receptor within the membrane of breast cells. As shown in **Figure 8**, it extends from within the cell through the membrane to outside of the cell. When activated, it causes breast cancer cells to grow and divide.

Normal breast cells have two copies of the gene that makes HER2. In contrast, some breast cancers have cells with more than two copies. This causes too many HER2 receptors to be made. Other breast cancers have cells with only two *HER2* gene copies but still too many HER2 receptors are made.

With too many HER2 receptors, breast cancer cells grow and divide fast. However, there are drugs to stop these cancer cells from growing. Due to high costs and the side effects of these drugs, it is very important to have tests that correctly show HER2 status.

IHC is used to learn the amount of HER2 receptors. An IHC score of 3+ means that the cancer cells have many HER2 receptors. Another test of HER2 is ISH (in situ hybridization). ISH counts the number of copies of the *HER2* gene. If the cancer cells have too many *HER2* genes or receptors, the cancer is called HER2 positive.

Blood tests

Blood tests may be done to check for health problems before starting treatment. For a blood test, a needle will be inserted into your vein to remove a sample of blood. The needle may bruise your skin and you may feel dizzy from the blood draw. Your blood sample will then be sent to a lab where a pathologist will test it.

Complete blood count

A CBC (**c**omplete **b**lood **c**ount) measures the number of blood cells in a blood sample. It includes numbers of white blood cells, red blood cells, and platelets. Cancer and other health problems can cause low or high counts.

Comprehensive metabolic panel

Chemicals in your blood come from your liver, bone, and other organs. A comprehensive metabolic panel often includes tests for up to 14 chemicals. The tests show if the level of chemicals is too low or high. Abnormal levels can be caused by cancer or other health problems. Your doctor may use this test to check how well your organs are working before treatment.

Genetic counseling

Hereditary breast cancer is caused by abnormal genes that were passed down from a parent to a child. Your disease or family history may suggest you have hereditary breast cancer. In this case, your doctor will refer you for genetic counseling. A genetic counselor is an expert in gene mutations that are related to disease. Your counselor can tell you more about your chances of having hereditary breast cancer.

Your genetics counselor may suggest that you undergo genetic testing. *BRCA1* and *BRCA2* gene mutations that are related to breast cancer are well-known. Other genes may be tested as well. These genes may cause cancers other than just breast cancer. Your counselor will explain what your test results mean and what action is needed.

Findings of gene mutations may impact your cancer care. Your test results may be used to guide treatment planning. Read Part 4 to learn how hereditary breast cancer may affect your options for breast surgery. Also, you may need to be watched more closely if your chances for another cancer type is high. Your family may also need to undergo testing, too.

Some genetic test results are called VUS (variants of unknown significance). They are not fully understood by doctors. Also, they do not impact your treatment. Your doctors may know of research that aims to learn more. If interested, ask your doctors about taking part in such research.

Fertility counseling

If you still have menstrual periods, your doctors will have important information to share with you. First, it is important that you do not get pregnant during most cancer treatments. Cancer treatments may harm your baby. Your doctors can tell you which birth control methods are best to use while going through treatment.

Second, some cancer treatments may affect your ability to have babies in the future. After treatment has ended, some women decide they want to have another baby. If you want to have babies after treatment or are unsure, tell your doctors.

It may help to talk with a fertility specialist before you begin cancer treatment. A fertility specialist is an expert in helping women get pregnant. The fertility specialist can discuss with you ways to help you have a baby after treatment.

Distress screening

Distress is an unpleasant experience of a mental, physical, social, or spiritual nature. It can affect how you feel, think, and act. It can include feelings of sadness, fear, helplessness, worry, anger, guilt, and so forth. Everyone with cancer has some distress at some point in time. It is to be expected.

Feeling distressed may be a minor problem or it may be more serious. You may be so distressed that you can't do the things you used to do. Serious or not, it is important that your treatment team knows how you feel. They may ask you to complete a list of screening questions to assess how distressed you are. Read the [NCCN Guidelines for Patients®: Distress](#) to learn more.



If needed, your treatment team can get you help. Help can include support groups, talk therapy, or medication. Some people also feel better by exercising, talking with loved ones, or relaxing. There may also be helpful community resources, such as support groups and wellness centers.

Review

- A medical history is a report of all health events in your lifetime. It will include questions about your family's health to help assess if you have hereditary breast cancer.
- Your doctor will examine your body for signs of disease. He or she will touch parts of your body, including your breasts, to see if anything feels abnormal.
- Imaging tests allow your doctor to see how far the cancer has spread without cutting into your body.
- Some breast cancers consist of cells with too many hormone receptors, HER2s, or both. These features are used to plan treatment.
- Blood tests may be done to look for signs of cancer outside of your breast.
- Genetic counseling may help you decide whether to be tested for hereditary breast cancer.
- Fertility counseling may be helpful with planning to have a baby after treatment.
- You should be screened for distress so you can receive help if needed.

3

Chemotherapy and HER2 treatment

27 Overview

30 Treatment guide

31 What to expect

34 Review



The first treatment for many women with stage III breast cancer will be chemotherapy. HER2 treatment may be added. Part 3 explains the role of chemotherapy and lists which drugs are options. It also presents some details on what to expect during chemotherapy.

Overview

Almost all stage III breast cancers are treated with chemotherapy. Read this section to learn when chemotherapy and HER2 treatment are given and to whom. This section also reviews how chemotherapy and HER2 treatment work.

Timing of treatment

Chemotherapy is often given before surgery for stage III cancers. It is given to shrink tumors as much as possible. Shrinking tumors allows more normal tissue to be saved at the time surgery. Cancer drugs given for this purpose are called preoperative (or neoadjuvant) treatment.

Instead of chemotherapy, endocrine therapy is sometimes used for preoperative treatment. It is an anti-hormone treatment. Thus, it is used for hormone receptor–positive cancers. It may be an option before surgery for slow-growing cancers or because of health issues. Read Part 6 to learn more about endocrine therapy.

Sometimes, chemotherapy is received after surgery. More chemotherapy may be advised even if you had it before surgery. If you received endocrine therapy before surgery, you may receive chemotherapy afterward. Some women who have surgery first receive chemotherapy afterwards. Chemotherapy given after surgery is called adjuvant treatment.

Not advised for

Do not receive chemotherapy if you've been pregnant for fewer than 3 months. Chemotherapy may harm your baby. Some types of chemotherapy are safe in the second and third trimesters.

Chemotherapy if older than 70 years

The use of chemotherapy for women older than age 70 has been questioned. You may not be given chemotherapy if you are older than 70 years for the following reasons.

- There is little research on older women to help inform treatment decisions.
- Chemotherapy may not be that helpful because the return of breast cancer can take a long time in older women. Thus, the odds that chemotherapy will stop a life-threatening recurrence are small.
- Some women have reactions to chemotherapy that threaten their health.
- You may have health problems other than cancer that are more serious.

How chemotherapy works

The types of chemotherapy differ in the way they treat cancer. Some kill cancer cells by damaging their DNA or by disrupting the making of DNA. Others interfere with cell parts that are needed for making new cells. Thus, no new cells are made to replace dying cells. The four types of chemotherapy used to treat stage III breast cancer are listed in [Guide 2](#).

Some chemotherapy drugs work when cells are in an active growth phase. **See Figure 9**. During the active growth phase, cells grow and divide to form a new cell. Chemotherapy drugs that disrupt the growth phase work well for cancer cells that are growing and dividing quickly. Other chemotherapy drugs work whether cells are in a growth or resting phase.

How HER2 treatment works

Antibodies are Y-shaped proteins that are made by your body. They help your body's disease-fighting (immune) system work. Monoclonal antibodies are antibodies made in a lab. They are used to treat cancer.

There are monoclonal antibodies that treat HER2-positive breast cancer. They are trastuzumab and pertuzumab. Trastuzumab is sold as Herceptin®, and pertuzumab as Perjeta®. Trastuzumab is used with chemotherapy. Pertuzumab may be added.

HER2 monoclonal antibodies are a type of targeted therapy. They prevent HER2 from sending signals that start the growth of cancer cells. Trastuzumab works by attaching to and disabling HER2 receptors. **See Figure 10**. Pertuzumab works like trastuzumab but attaches to a different part of the receptor. These two drugs also attract immune cells that help to kill the cancer cells.

Guide 2. Chemotherapy types

Type	Generic name	Brand name	How they work
Alkylating agents	Carboplatin	—	Damage DNA by adding a chemical to it
	Cyclophosphamide	—	
Anthracyclines	Doxorubicin	—	Damage and disrupt the making of DNA
	Epirubicin	Ellence®	
Antimetabolites	Fluorouracil	—	Prevent the “building blocks” of DNA from being used
	Methotrexate	—	
Microtubule inhibitors	Docetaxel	Taxotere®	Stop a cell from dividing into two cells
	Paclitaxel	Taxol®, Abraxane®	

Figure 9 Chemotherapy and the cell cycle

A cell goes through many changes to divide into two cells. Science has grouped these changes into 7 main phases. There may be another phase of rest, too. Some chemotherapy drugs work in any phase. Other chemotherapy drugs work in one or two growth phases.

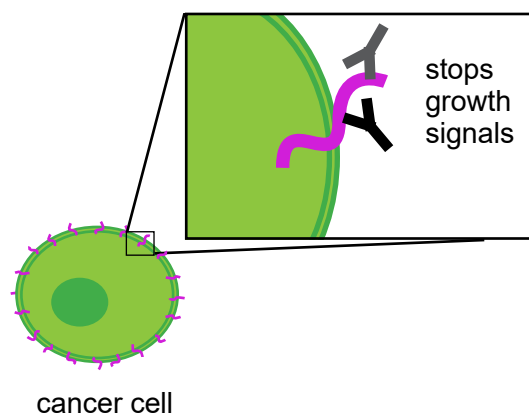


Chemotherapy may work in some or all phases of cell division.

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Figure 10 HER2 antibodies

Antibodies are Y-shaped proteins that are made by your body to help fight illness. HER2 antibodies are made in the lab. They attach to the HER2 on the outside of the cell, which prevents growth signals from starting.



HER2
antibody

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Treatment guide

Chemotherapy options for breast cancer depend on HER2 status. [Guide 3](#) lists the treatment options for HER2-negative cancers. [Guide 4](#) lists the treatment options for HER2-positive cancers. Options are grouped into “preferred” and “other” regimens. These groups are based on how well the drug works, side effects, and treatment schedules.

Chemotherapy drugs differ in the way they work. Thus, more than one drug is often used. A combination regimen is the use of two or more cancer drugs.

Chemotherapy is given in cycles of treatment days followed by days of rest. Likewise, some targeted therapies are also given in cycles. The cycles vary in length depending on which drugs are used. Giving chemotherapy in cycles gives your body a chance to recover after receiving chemotherapy.

Guide 3. Options for HER2-negative cancers

Preferred regimens	Schedule	Total time
Dose-dense AC	Four 14-day cycles	4 months
then paclitaxel	Four 14-day cycles	
Dose-dense AC	Four 14-day cycles	5 months
then weekly paclitaxel	Twelve 7-day cycles	
TC	Four 21-day cycles	3 months

Other regimens	Schedule	Total time
Dose-dense AC	Four 14-day cycles	2 months
AC	Four 21-day cycles	3 months
CMF	Six 28-day cycles	6 months
AC	Four 21-day cycles	6 months
then docetaxel	Four 21-day cycles	
AC	Four 21-day cycles	6 months
then weekly paclitaxel	Twelve 7-day cycles	
EC	Eight 21-day cycles	6 months
TAC	Six 21-day cycles	4 months and 2 weeks

Abbreviations: AC = doxorubicin + cyclophosphamide; CMF = cyclophosphamide + methotrexate + fluorouracil; EC = epirubicin + cyclophosphamide; TAC = docetaxel + doxorubicin + cyclophosphamide; TC = docetaxel + cyclophosphamide

What to expect

Preparing for chemotherapy

Before starting chemotherapy, your doctor may ask you to stop taking some of your medicines, vitamins, or both. Some of these treatments can cause chemotherapy to not work as well or may cause health problems while on chemotherapy. You may also have to change what you drink and eat. If you smoke, it's important that you stop.

Receiving chemotherapy

All chemotherapy drugs for stage III breast cancer are liquids that are injected into a vein. The injection may be one fast shot or may be a slow drip called an infusion. The drugs can be injected directly into a vein or through a catheter surgically placed in your chest or arm. Trastuzumab and pertuzumab are also liquids given by infusion.

You will need to go to a chemotherapy center to receive treatment. How long your visit will be depends on which drugs you will get. It can take a few minutes or a few hours to finish a dose.

If you have HER2-positive breast cancer, you should be treated with chemotherapy and HER2 antibodies for at least 9 weeks before surgery. However, it is ideal that your finish chemotherapy before surgery.

Side effects

Side effects are unplanned physical or emotional reactions to treatment. Side effects differ among women. Some women have many side effects. Other women have few. Some side effects can be very serious. Others can be unpleasant but not serious.

Chemotherapy

Side effects of chemotherapy depend on the drug type, amount taken, length of treatment, and the person. In general, side effects are caused by the death of fast-growing cells. These cells are found in the hair follicles, gut, mouth, and blood. Thus,

common side effects of chemotherapy include low blood cell counts, not feeling hungry, nausea, vomiting, diarrhea, hair loss, and mouth sores.

Other side effects of chemotherapy may include anxiety, fatigue, and peripheral neuropathy. Peripheral neuropathy is numbness or tingling of nerves in the hands and feet. Some types of chemotherapy, such as anthracyclines, can cause damage to the heart. Anthracyclines include doxorubicin and epirubicin.

Premenopause is the time in life during which menstrual periods occur. Menopause is the point in time when periods completely stop. If you are in premenopause, chemotherapy may cause periods to stop short term or completely. However, don't depend on chemotherapy for birth control. You could still become pregnant and your baby could have birth defects. Use birth control but not birth control with hormones (eg, "the pill"). Talk to your doctors for more information.

HER2 antibodies

You may have a mild flu-like response to the first dose of trastuzumab that includes fever, chills, headache, muscle aches, and nausea. This response is less common with the second and third doses. Other side effects may include damage to the heart and rarely to the lungs.

Common side effects of pertuzumab are diarrhea, nausea, and feeling tired and weak. Less common side effects include skin rash, low white blood cell counts, and mouth sores. It is not yet clear if pertuzumab damages the heart, although trastuzumab may do so.

Not all the side effects of chemotherapy and HER2 antibodies are listed here. Please ask your treatment team for a complete list. If a side effect bothers you, tell your treatment team. There may be ways to help you feel better.

Guide 4. Options for HER2-positive cancers

Preferred regimens	Schedule	Total time
AC	Four 21-day cycles	1 year and 3 months
then paclitaxel with pertuzumab and trastuzumab	Four 21-day cycles	
then trastuzumab	Every 21 days to complete 1 year on trastuzumab	
AC	Four 21-day cycles	1 year and 3 months
then paclitaxel with trastuzumab	Twelve 7-day cycles	
then trastuzumab	Every 7 or 21 days to complete 1 year on trastuzumab	
Dose-dense AC	Four 14-day cycles	1 year and 2 months
then paclitaxel with trastuzumab	Four 14-day cycles with weekly trastuzumab	
then trastuzumab	Every 7 or 21 days to complete 1 year on trastuzumab	
TCH	Six 21-day cycles	1 year
then trastuzumab	Every 21 days to complete 1 year on trastuzumab	
TCH + pertuzumab	Six 21-day cycles	1 year
then trastuzumab	Every 21 days to complete 1 year on trastuzumab	

Abbreviations: AC = doxorubicin + cyclophosphamide; TCH = docetaxel + carboplatin + trastuzumab

Guide 4 continued

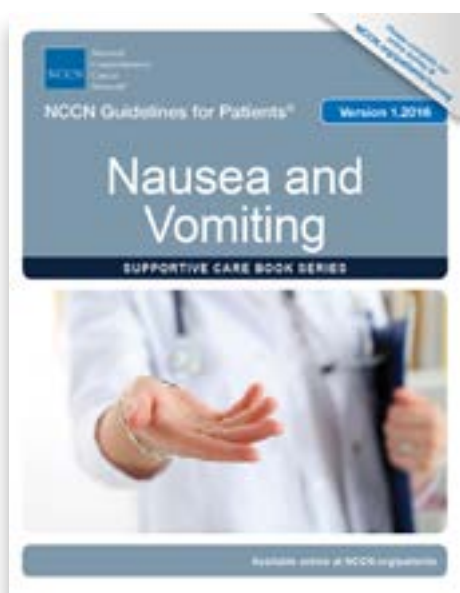
Other regimens	Schedule	Total time
AC	Four 21-day cycles	1 year and 3 months
then docetaxel with trastuzumab	Four 21-day cycles with weekly trastuzumab	
then trastuzumab	Every 21 days to complete 1 year on trastuzumab	
AC	Four 21-day cycles	1 year and 3 months
then docetaxel with pertuzumab and trastuzumab	Four 21-day cycles	
then trastuzumab	Every 21 days to complete 1 year on trastuzumab	
Docetaxel and cyclophosphamide with trastuzumab	Four 21-day cycles with trastuzumab every 7 or 21 days	1 year
then trastuzumab	Every 21 days to complete 1 year on trastuzumab	
Paclitaxel with trastuzumab	Twelve 7-day cycles with weekly trastuzumab	1 year
then trastuzumab	Every 7 or 21 days to complete 1 year on trastuzumab	
FEC	Three 21-day cycles	1 year
then docetaxel with pertuzumab and trastuzumab	Three 21-day cycles	
then trastuzumab	Every 21 days to complete 1 year on trastuzumab	
FEC	Three 21-day cycles	1 year
then paclitaxel with pertuzumab and trastuzumab	Three 21-day cycles	
then trastuzumab	Every 21 days to complete 1 year on trastuzumab	
Docetaxel with pertuzumab and trastuzumab	Four 21-day cycles	1 year
then FEC	Three 21-day cycles	
then trastuzumab	Every 21 days to complete 1 year on trastuzumab	
Paclitaxel with pertuzumab and trastuzumab	Four 21-day cycles	1 year
then FEC	Three 21-day cycles	
then trastuzumab	Every 21 days to complete 1 year on trastuzumab	

Abbreviations: AC = doxorubicin + cyclophosphamide; FEC = fluorouracil + epirubicin + cyclophosphamide
TCH = docetaxel + carboplatin + trastuzumab

Supportive care

This book focuses on cancer treatment. However, supportive care is important, too. Supportive care doesn't aim to treat cancer but aims to improve quality of life. It can address many needs.

Supportive care includes help for side effects. During chemotherapy cycles, you may be given drugs to help you feel better. You may be given drugs to fight nausea and vomiting. To learn more, read the [NCCN Guidelines for Patients®: Nausea and Vomiting](#).



You may also get a shot of (peg-)filgrastim under your skin. This medicine increases the number of white blood cells to normal levels. This will protect your immune system during chemotherapy. Some people give themselves the injection while others return to the clinic for it. Blood, heart, and other tests may be given to check your health.

Checking results

Your doctor will want to know how well treatment is working. The cancer might improve in part (partial response). It may improve so much that tests cannot detect it (complete response). It may stay the same (stable disease). It could also worsen (progression).

Treatment results should be assessed with a physical exam and imaging tests. Imaging tests that best showed the tumor when it was found should be received. Your doctors should meet to select which imaging tests are best to use.

If the cancer doesn't respond, your treatment plan will change. You may receive different chemotherapy or radiation therapy. Radiation therapy is discussed in Part 5.

Review

- Chemotherapy is often the first treatment used for stage III breast cancer. It is given to kill as many cancer cells as possible.
- In some cases, chemotherapy is given after surgery to prevent the cancer from returning.
- You should receive HER2 treatment with chemotherapy if the cancer is HER2-positive. HER2 antibodies stop certain growth signals within cancer cells.
- There are multiple chemotherapy regimens for breast cancer. Talk to your doctor about which ones are best for you.
- Chemotherapy is given in cycles of treatment days followed by days of rest.
- Chemotherapy and HER2 antibodies can cause side effects. Ask your treatment team for a complete list of side effects.

4

Surgery

36 Overview

38 Treatment guide

40 What to expect

41 Breast reconstruction

42 Review



Surgery to remove cancer is often a key part of treatment. Part 4 explains which methods of removing the cancer may be options for you. It also provides some details on ways to rebuild breasts after cancer surgery.

Overview

Surgery to remove the cancer is often a key part of treatment for stage III breast cancer. The goal is to remove all the cancer or as much as possible. This will lower the chance of the cancer coming back.

During surgery, cancer in the breast and some lymph nodes will be removed. There are two types of surgeries that remove cancer in the breast. **See Figure 11.** There are also two types of surgeries to remove lymph nodes. Breast and lymph node surgeries are described next.

Breast surgery

A lumpectomy removes the breast tumor(s) while sparing healthy tissue. The tumor is removed along with normal-looking tissue around its edge. The normal-looking tissue is called a surgical margin.

A mastectomy removes the whole breast. There is more than one type of mastectomy. For stage III breast cancer, a total mastectomy is advised.

Figure 11 Breast surgery

There are two types of surgeries that remove cancer from the breast. The top picture shows the start of a lumpectomy. A cut was made large enough to remove the tumor. The bottom picture shows a total mastectomy. An oval-shaped cut was made into the breast. Next, the breast was detached from the skin and muscle and removed.

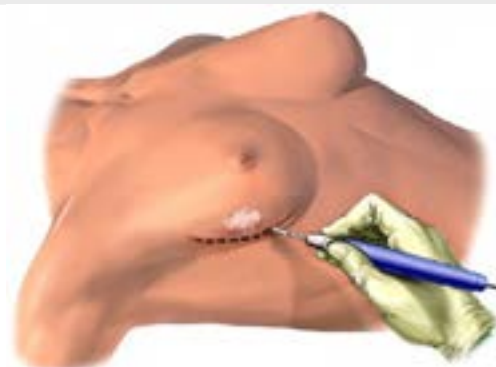


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It is also called a simple mastectomy. This surgery removes the whole breast but no chest muscle. Sometimes the breast skin can be spared. Read the section, *Breast reconstruction*, for more information.

Lymph node surgery

During the breast surgery, nearby lymph nodes will be removed. Lymph nodes with cancer or that may have cancer will be removed. All removed nodes will be tested for cancer. This allows the cancer stage to be revised if needed. You are more likely to receive the best treatment when the cancer stage is correct.

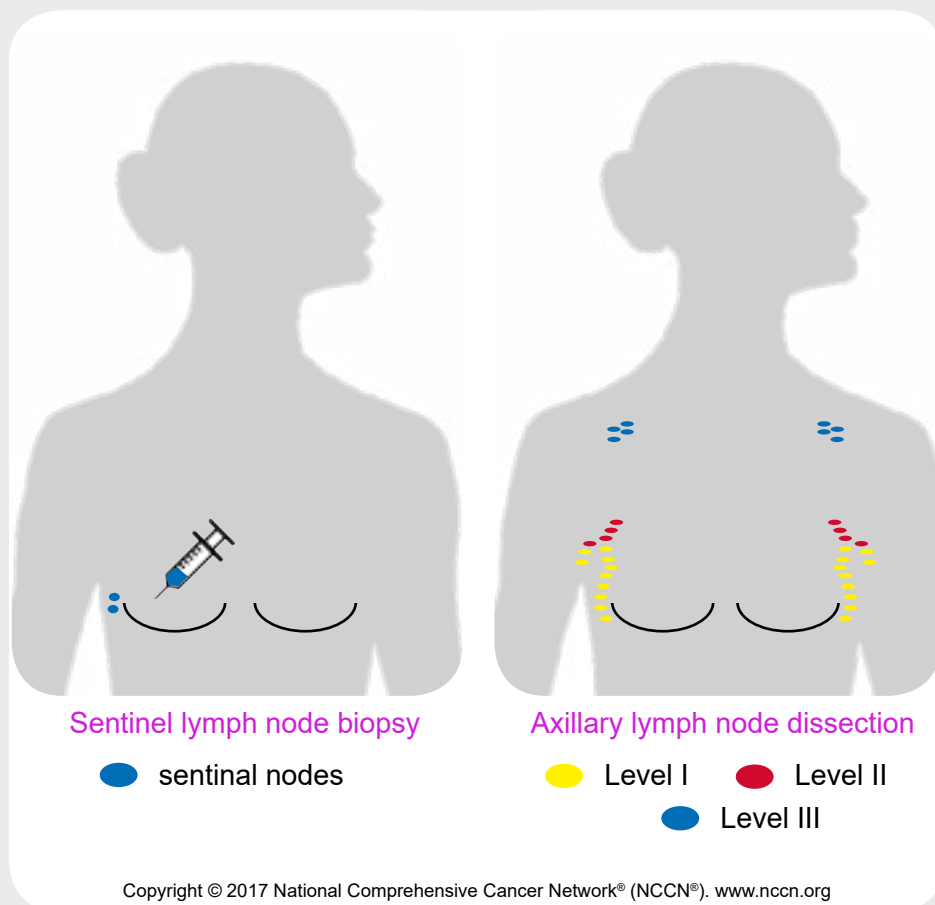
A sentinel lymph node biopsy is a surgery that finds and removes the lymph nodes to which breast cancer first spreads. **See Figure 12.** These nodes

are called sentinel nodes. Often 2 or 3 nodes are removed. This surgery is also called a sentinel lymph node dissection.

An axillary lymph node dissection removes more than a few lymph nodes. At least 10 lymph nodes are removed from Level I and II areas. Level I lymph nodes are in the armpit. Level II nodes are higher and deeper in the armpit. If cancer is found in Level II lymph nodes, nodes from Level III may be removed. Level III nodes are below the collarbone. They are also called infraclavicular lymph nodes.

Figure 12
Lymph node surgery

There are also two types of surgeries to remove lymph nodes. A sentinel lymph node biopsy finds and removes the lymph nodes to which breast cancer first spreads. An axillary lymph node dissection removes at least 10 lymph nodes from Level I and II areas.



Treatment guide

Breast surgery

Guide 5 lists the deciding factors for breast surgeries. If you had preoperative treatment, your surgical options are based on how well treatment worked. Another deciding factor is the amount of breast tissue that needs to be removed.

For any stage III cancer that shrank enough, a lumpectomy may be an option. However, there are other factors to consider. The other option is a mastectomy.

Lumpectomy

A lumpectomy may be an option if only some of your breast needs to be removed. Removing a large part may cause your breast to look deformed. A lumpectomy is not advised when more than one cut is needed to remove all the cancer. Is it also not advised if worrisome spots throughout the breast should be removed with the cancer.

Some deciding factors clearly rule out a lumpectomy. It isn't an option if you should not or cannot have radiation. Do not receive radiation therapy during

pregnancy. Lumpectomy may not be an option if you've had radiation near the tumor site. Some connective tissue diseases may also exclude lumpectomy. Examples include scleroderma and lupus.



Being likely to get new breast tumors due to your genes may exclude lumpectomy. Talk with your doctor about genetic mutations that may affect your options. Some are discussed next.

Lumpectomy is not advised if both *ATM* genes are mutated. Normal *ATM* protects the body from cells with damaged DNA. It fixes, shuts down, or kills the damaged cells. When mutated, *ATM* genes can lead to breast cancer.

ATM mutations also make the side effects of radiation therapy much worse. New tumors may form because of the radiation. Thus, breast-conserving therapy is not advised.

A lumpectomy may not be an option if you have Li-Fraumeni syndrome. It increases the risk for breast cancer. Like having an *ATM* mutation, radiation therapy should also be avoided.

Guide 5. Breast surgery

Surgery options	Deciding factors
Lumpectomy with radiation therapy (AKA breast-conserving therapy) may be an option if <u>all</u> these factors describe you:	 <ul style="list-style-type: none"> • Don't need a large part of your breast removed, • Aren't genetically predisposed to breast cancer, AND • Can have radiation therapy.
Mastectomy may be an option if <u>any</u> of these factors describe you:	 <ul style="list-style-type: none"> • Are not approved for a lumpectomy, • A lumpectomy would not remove all the cancer, OR • Are approved for a lumpectomy but declined.

There are other mutated genes that may cause a higher risk of a second breast cancer. Examples include *BRCA1* and *BRCA2* mutations. However, these mutations do not worsen the side effects of radiation.

Mastectomy

A mastectomy is an option for many women with stage III breast cancer. It is often received after preoperative treatment. It is sometimes received after a lumpectomy that didn't remove all the cancer.

Mastectomy is also an option for women who are approved for but decline a lumpectomy. Some women decline because of how they want their breast to look. Others decline because cancer can't return in a breast that's been removed. However, breast cancer may still return elsewhere. If you have a choice between surgeries, a decision aid may help. Read Part 9 for more information.

Lymph node surgery

[Guide 6](#) lists the deciding factors for lymph node surgeries. Most women with stage III breast cancer will receive an axillary lymph node dissection. The cancer appears to have spread to enough lymph nodes that thorough testing is advised.

An axillary dissection might not be needed for clinical stage T3, N1, M0. Even though lymph nodes look abnormal, needle biopsies may not find cancer. In this case, a sentinel lymph node biopsy may be an option. If sentinel nodes are cancer-free, no other surgery is needed. The cancer will be re-staged to stage II. If cancer is found in sentinel nodes, an axillary dissection is advised.

For T3, N1, M0 cancers, needle biopsies may confirm cancer in lymph nodes before preoperative treatment. Afterward, the nodes may look and feel normal. In this case, a sentinel lymph node biopsy

Guide 6. Lymph node surgery

Surgery options		Deciding factors
Axillary lymph node dissection is an option if you:	→	<ul style="list-style-type: none"> Have stage III breast cancer.
Sentinel lymph node biopsy is an option if you:	→	<ul style="list-style-type: none"> Have stage IIIA (T3, N1, M0) and either of the following: <ul style="list-style-type: none"> Had a needle biopsy that found no cancer in nodes before preoperative treatment, or Had a needle biopsy that confirmed cancer in nodes before preoperative treatment but afterward they look and feel normal.
No lymph node surgery may be an option if you:	→	<ul style="list-style-type: none"> Have stage IIIA (T3, N1, M0) cancer plus one or more of the following: <ul style="list-style-type: none"> Have tubular or mucinous breast cancer, Will not have future treatment based on the results of lymph node surgery, Are older in age, or Have major health problems other than breast cancer.

to recheck the nodes may be an option. If cancer is present, you would receive an axillary lymph node dissection.

Some women with T3, N1, M0 cancers may not need lymph node surgery. Surgery wouldn't likely be helpful. Such women include those with slow-growing cancer, set plans for adjuvant treatment, who are older in age, or those with major health problems other than breast cancer.

What to expect

Your treatment team will tell you how to prepare for surgery. Briefly, you will be asked to stop eating and drinking. You may need to stop taking some medicines for a short period of time. If you smoke, it is important to stop to get the best treatment results. Some details about surgery and side effects are described next. Ask your treatment team for more information.

Lumpectomy

The cancer may be small or hard to feel. In this case, your surgeon may request a localization procedure before surgery. This procedure uses a mammogram or ultrasound to find the cancer. Next, a marker is placed. The marker allows your surgeon to more easily find the cancer.

A lumpectomy may take up to 60 minutes. A cut on the breast is made large enough to remove the cancer area. Pain is prevented with either local or general anesthesia.

A lumpectomy will leave a small scar. It may cause some pain and swelling for about a week. There may be a dent in your breast that can be fixed with breast reconstruction.

Mastectomy

A total mastectomy is finished within 1 to 2 hours. An oval-shaped cut is often first made around the areola. Next, the breast tissue will be detached from the skin and muscle and then removed. For breast reconstruction that is planned, your surgeon will try to save some of the breast skin. Pain is prevented with general anesthesia.

A plastic drain tube is often placed under the skin. It will remain for 2 or 3 weeks while you heal. Then, it will be removed.

A total mastectomy will leave a large scar. It also will cause pain and swelling. You may have stiffness, tiredness despite sleeping (fatigue), and uncomfortable crawling sensations as your nerves heal.

Sentinel lymph node biopsy

A radioactive tracer, blue dye, or both will be injected into your breast. The tracer and dye will drain into lymph vessels within your breast. Then, they will travel to the breast's lymph nodes. These nodes are usually in the armpit.

The dye will mark the sentinel node(s). Often, there is more than one. If you will have a lumpectomy, the nodes will be removed through a second cut near the breast. If you will have a mastectomy, the nodes may be removed through the cut made to remove the breast. Sometimes, some other nearby nodes are removed, too.

Some side effects of sentinel dissection are lymphedema, numbness, and pain. Lymphedema is swelling of the arm due to buildup of lymph. It may not go away. Most women find lymphedema bothersome but not disabling. There is no way to know who will have it or when it will occur. Ask your treatment team for a full list of side effects.

Axillary lymph node dissection

A surgical cut will be made into your armpit. Through this cut, lymph nodes and fat will be removed. Side effects for sentinel and axillary dissections are alike. However, they are more common with axillary dissection. They can also be more complicated. There is a greater chance for lymphedema.

Breast reconstruction

Some women choose to have breast reconstruction. Others use an external fake breast called a prosthesis. Some women do nothing. Breast reconstruction is briefly described next. Talk with your doctor about your options. More information can be found at the websites listed in Part 9.

After lumpectomy

If you will have a lumpectomy, your breast can be re-shaped using volume displacement. Volume displacement is the shifting of the remaining breast tissue so as to fill the hole left by the lumpectomy. It helps keep the natural look of your breast. Shifting of the breast tissue is often done by the cancer surgeon right after the lumpectomy.

You may not like the results of your lumpectomy even after volume displacement. In this case, breast revision surgery may help. Breast revision surgery is done by a plastic surgeon. Revision options include a second volume displacement, breast implants, or flaps. Breast implants and flaps are described next.

After mastectomy

The timing of breast reconstruction differs after mastectomy. Reconstruction at the same time as the cancer surgery is called immediate reconstruction. Delayed reconstruction can occur months or years after the cancer surgery. Breast reconstruction following a mastectomy is done by a plastic surgeon.

To enhance breast reconstruction, you may be able to have a skin-sparing mastectomy. This surgery usually removes only the breast, nipple, and areola. Your breast skin is spared. As a result, the mastectomy scar will be smaller and your breast will have a more natural shape. Skin-sparing mastectomy can be done for some women. Ask your surgeon if this is an option for you.

All breast reconstruction is generally safe. However, with any surgery, there are risks. Ask your treatment team for a complete list of side effects. Women who smoke or are obese are more likely to have problems.

Implants

Breast implants are small bags filled with salt water, silicone gel, or both. They are placed under the breast skin and muscle to reconstruct breasts. Implants have a small risk of breaking and leaking. There is a low but increased risk for a rare type of lymphoma.

A balloon-like device, called an expander, may first be placed under your muscle or skin. It then will be inflated to stretch out your muscle and skin. Every few weeks for two to three months, the expander will be enlarged. When the implant can fit, a second surgery will be done to exchange the expander for the implant.

Radiation can affect implant reconstruction. An expander is not likely an option if you have had radiation therapy to the breast. Your best option may be a flap. If no radiation has been received, a two-step process is advised. Placement of an expander should occur at the end of the cancer surgery. Placement of the implant follows at a later time.

Reconstruction with implants can cause pain. You may feel pain from the expander stretching your skin and muscle. Some women will also have pain from the implant, scar tissue, or tissue death (necrosis).

Flaps

Another type of breast reconstruction uses tissue from your body, known as “flaps.” Tissue from the belly area, butt, or from under the shoulder blade is used. Some flaps are completely removed from your body and then sewn in place. Other flaps stay attached and then are slid over and sewn into place. Some risks of flaps are tissue death, lumps from death of fat cells, and muscle weakness that may cause organs to extend through (hernia).

Radiation therapy can affect flaps. Delayed reconstruction after radiation therapy is advised. Otherwise, an expander can be placed during cancer surgery followed by flap reconstruction after radiation.

Implants and flaps

Some breasts are reconstructed with both implants and flaps. Using both may give the reconstructed breast more volume and help match its shape to your other breast. However, for any reconstruction, you may need surgery on your real breast to match both breasts in size and shape.

Nipple replacement

You can have your nipple remade, use a fake nipple, or do nothing. The plastic surgeon can recreate a nipple mound with the surrounding tissues. Sometimes, tissue can be moved from other parts of your body. These other parts include your thigh, other nipple, or female parts between your legs (vulva). You may lose feeling in your real nipple if tissue is removed. Tissue used from other areas of your body to make a nipple can be darkened in color with a tattoo.

Review

- Surgery is a key part of treatment for stage III breast cancer. A lumpectomy removes the tumor and a rim of healthy tissue around it. A total mastectomy removes the whole breast but no chest muscle.
- Sentinel lymph node biopsy removes the lymph nodes to which breast cancer first spreads. Axillary lymph node dissection removes sentinel and other nodes near the armpit.
- Many women with stage III breast cancer receive a mastectomy and axillary lymph node dissection. If certain conditions are met, a lumpectomy may be an option.
- Volume displacement is the shifting of the remaining breast tissue so as to fill the hole left by the lumpectomy.
- Breast reconstruction after mastectomy is done with breast implants, flaps, or both.

5

Radiation therapy

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Almost all women with stage III breast cancer will receive radiation therapy. Part 5 explains how radiation therapy works and where it is needed. It also provides some details on what to expect during treatment.

Overview

Radiation therapy is a local treatment for breast cancer. It may be given after surgery to the breast or chest wall. **See Figure 13.** Nearby lymph nodes may be treated as well. The purpose of treatment is to decrease the chance of the cancer returning at the treatment site.

For stage III breast cancer, radiation therapy uses high-energy x-rays for treatment. The rays damage

DNA in cancer cells. This either kills the cancer cells or stops new cancer cells from being made.

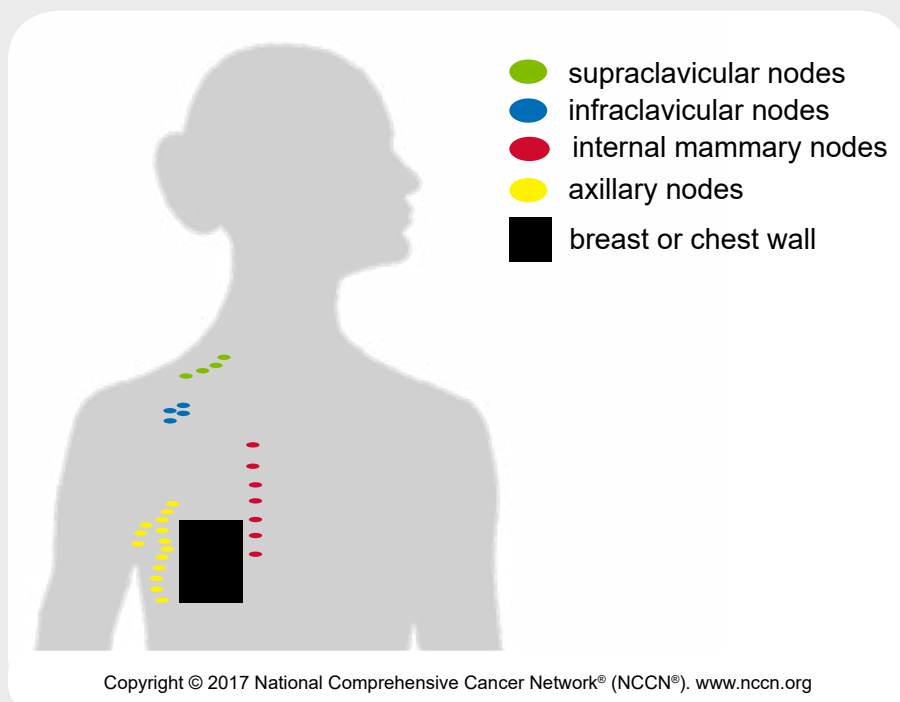
A radiation oncologist will oversee your treatment. A radiation oncologist is a doctor who's an expert in treating cancer with radiation. He or she will tailor treatment to you.

Radiation therapy can be received with some but not all cancer treatments. It is okay to take HER2 antibodies or endocrine therapy during radiation therapy. Radiation therapy is usually given after chemotherapy is finished.

If you are pregnant, don't start radiation therapy. It may harm your baby. Start after your baby is born.

Figure 13
Radiation sites

Areas of your body where the cancer may return will be treated. Radiation may be given to your breast or chest wall. Lymph nodes near the breast with cancer may be treated as well.



Treatment guide

Radiation therapy is advised for most stage III breast cancers. Areas of your body where the cancer may return will be treated. Cancer staging is used to plan radiation options.

Cancer stage

The clinical stage is the TNM rating given before treatment. In your medical records, you may see lowercase letters next to the cancer stage.

A lowercase “c” means the clinical stage. The clinical stage is based on results from the physical exam and some imaging.

Breast cancer is often staged twice. The pathologic stage is based on lab tests on tissue. Thus, it is often assigned after surgery and sometimes after biopsy.

A lowercase “p” next to TNM scores means the pathologic stage.

Preoperative treatment is used for many stage III cancers. In this case, you may see a

lowercase “y” next to TNM scores. The “y” means you have received preoperative treatment.

TNM ratings may differ between the clinical and pathologic stages. With no preoperative treatment, more cancer may be found at surgery. Thus, a cN1 could be changed to pN2 or pN3. After preoperative treatment, less cancer may be found because the treatment worked. For example, cN1 could be rated ypN0 after preoperative treatment.

Radiation planning

Radiation therapy is based on both the clinical and pathologic stages. Both stages are especially important if you received preoperative treatment. The highest stage between the clinical and pathologic stages is used for planning. For example, a cN1 score rather than ypN0 will be used to decide the need for radiation. This also holds true for the T stage.

Clinical stage IIIA (T3, N1, M0)

Guide 7 lists radiation options for cancers rated T3, N1, M0 at diagnosis. Most women with this cancer stage receive radiation therapy. Options are based on the type of breast surgery received, lymph node status, and overall cancer stage.

After lumpectomy, radiation to your whole breast is advised. If N1, radiation to nearby lymph nodes may be strongly considered. If N2 or N3, radiation to nearby nodes is advised. Toward the end of radiation, you may receive extra radiation where the breast tumor was. This extra radiation is called a boost.

After mastectomy, almost all women will receive radiation. If N1, radiation should be strongly considered. If N2 or N3, radiation to the chest wall and nearby lymph nodes is advised. A boost to the surgical scar may be added.

Residual disease

If you had chemotherapy, there are other times when radiation should be received. These conditions include 1) high T or N clinical scores, 2) large residual cancer in the breast, and 3) any residual cancer in lymph nodes. Residual cancer is cancer that remains after treatment.

Clinical stage IIIA (T0–T3, N2, M0), IIIB, IIIC

Guide 8 lists radiation options for all other stage III cancers. There is a higher chance that the cancer will return. Thus, radiation is advised for all these cancers.

After lumpectomy, radiation to your whole breast is advised. Nearby lymph nodes will be treated, too. Toward the end of treatment, you may receive extra radiation where the breast tumor was. This is called a boost.

After mastectomy, radiation to the chest wall and nearby lymph nodes is advised. Toward the end of radiation, you may receive a radiation boost to the surgical scar.

Guide 7. Options for clinical stage IIIA (T3, N1, M0)

Breast surgery	Highest N stage		Where is radiation needed?
Lumpectomy	pN1	→	<ul style="list-style-type: none"> • Whole breast ± boost to surgical site • Strongly consider treating <ul style="list-style-type: none"> ◦ Infraclavicular and supraclavicular areas ◦ Internal mammary lymph nodes ◦ Axillary area at risk for cancer
	pN2 or pN3	→	<ul style="list-style-type: none"> • Whole breast ± boost to surgical site • Infraclavicular and supraclavicular areas • Internal mammary lymph nodes • Axillary area at risk for cancer
Mastectomy	pN1	→	<ul style="list-style-type: none"> • Strongly consider treating <ul style="list-style-type: none"> ◦ Chest wall ± scar boost ◦ Infraclavicular and supraclavicular areas ◦ Internal mammary lymph nodes ◦ Axillary area at risk for cancer
	pN2 or pN3	→	<ul style="list-style-type: none"> • Chest wall ± scar boost • Infraclavicular and supraclavicular areas • Internal mammary lymph nodes • Axillary area at risk for cancer

Guide 8. Options for clinical stage IIIA (T0–T3, N2, M0), IIIB, IIIC

Breast surgery		Where is radiation needed?
Lumpectomy	→	<ul style="list-style-type: none"> • Whole breast ± boost to surgical site • Infraclavicular and supraclavicular areas • Internal mammary lymph nodes • Axillary area at risk for cancer
Mastectomy	→	<ul style="list-style-type: none"> • Chest wall ± scar boost • Infraclavicular and supraclavicular areas • Internal mammary lymph nodes • Axillary area at risk for cancer

What to expect

For breast cancer, the most common radiation method is EBRT (**e**xternal **b**eam **r**adiation **t**herapy). A large machine makes radiation beams used for treatment. This machine is called a LINAC (**l**inear **a**ccelerator).

The beams consists of high-energy x-rays, which are a type of photon radiation. They will move through your body at the speed of light. There is no ongoing radiation inside of you after the treatment session. You will not have to avoid people.

It takes a team of people to perform the radiation therapy. The radiation team consists of doctors, medical physicists, dosimetrists, nurses, and radiation therapists. Your team will work together to design your treatment plan and provide treatment.



Planning session

A planning session is needed to map out your treatment. The planning process is called simulation. It involves obtaining a CT scan. The planning session takes about one hour.

You will not have to do anything to prepare. It may be helpful to wear easy-to-remove clothes since you'll change into a gown. You will need to remove necklaces and long earrings.

In the CT room, there will be a table with a breast board. The breast board is used to keep you in place during treatment. The radiation therapists will let you know whether to lie face down or face up on the table. At least one of your arms will be raised above your head. Red laser lights are used to help position you.

Once on the table, thin strips of sticky markers are often applied to the skin. These markers will be placed on your scars as well as your breast or chest wall. Next, a CT scan will be done. The medical physicist or dosimetrist will take measurements of your breast.

The CT images will be transferred to a treatment planning computer. Any remaining breast tumor, the surgical site, other organs, and the markers can be seen on the scan. This information will show your radiation oncologist where to direct the radiation. This area is called the treatment field.

After the treatment fields are set, your skin will be marked for treatment sessions. Setup marks are made with ink or tiny permanent tattoos. Also, photos of your set up are taken. The marks and photos will be used to position you for daily treatment sessions.

After simulation, your radiation team will further plan your treatment. Plans are made viewing your CT scans on the treatment planning computer. Your radiation oncologist will work closely with a

dosimetrist. They will plan the best dose, number and shape of radiation beams, and number of treatments. Your plan will be designed to treat the cancer while sparing normal tissue. Special efforts will be made to avoid or lessen radiation to the lungs and heart.

Set-up session

Once your treatment plan is made, a set-up session is needed. This session is sometimes called “port film” day or dress rehearsal. The set-up session occurs in the treatment room.

The radiation therapists will help place you in the correct position on the treatment table. Setup marks are used for positioning. X-rays of the treatment fields will be taken and viewed by your doctor. These x-rays (or port films) are not for treatment. Your doctor will approve treatment when your setup is correct.

Treatment sessions

Treatment is given once a day on Monday through Friday for about 5 to 6½ weeks. Each session can take between 15 to 30 minutes. In general, treatment is received at the same time each day.

Before treatment, you will be placed into the correct position. You will lie on top of the breast board that is on the treatment table. You must be in the same position that was approved at the setup session.

Conformal techniques are used for breast cancer. These techniques shape the radiation dose to the cancer site to spare healthy tissue. 3D-CRT (**three-dimensional conformal radiation therapy**) delivers, from different angles, a photon beam that matches the shape of the tumor. IMRT (**intensity-modulated radiation therapy**) is a form of 3D-CRT that further modifies the beam’s intensity during treatment.

Besides radiation setup techniques, other methods may be used to spare normal tissue. One method may include holding your breath during treatment. This is called “breath-hold.” Respiratory gating is also a technique that can be performed to spare normal tissue. The goal is to move your heart away from the radiation.

During treatment, you will be alone in the room. A therapist will operate the machine from a nearby room. He or she will be able to see, hear, and speak with you at all times. As treatment is given, you may hear noises. The machine will move around you to different treatment angles. You will not see, hear, or feel the radiation.

Side effects

Side effects from radiation therapy differ among women. Factors like radiation dose and length of treatment play a role. Side effects are cumulative. This means they build up slowly and are worse at the end of treatment. Your doctor will check on you every week during treatment. He or she will review skin care, medicines, and other options to help you feel better.

Acute effects are those that happen during or shortly after the end of radiation. Acute effects will generally improve after treatment. Fatigue is an acute effect. Soreness at the treatment site and a sore throat are other acute effects. However, radiation is usually not painful. Skin changes are expected acute effects.

Often, women describe skin changes as like a sunburn. Unlike a sunburn, skin changes build up slowly during treatment. Your skin may become red, irritated, and dry. It may also itch, darken, peel, and sometimes crack open. Skin in regions of friction or rubbing is prone to cracking open.

Late effects are those that happen after treatment. They are related to scar tissue and do not go away. Late effects include skin firmness or tightness. The shape or texture of your breast may change. Scarring can occur in the ribs. Likewise, inflammation and scarring can occur in the lungs or heart, most often without symptoms. There can also be swelling within your arm (lymphedema).

Not all the side effects of radiation have been listed here. Please ask your treatment team for a complete list of side effects. If a side effect bothers you, tell your treatment team. There may be ways to help you feel better.

Review

- Nearly all stage III breast cancers will be treated with radiation therapy. It is used to prevent the cancer from returning at the treatment sites.
- Radiation uses high-energy x-rays to damage cancer cells.
- External beam radiation therapy is the most common method used to treat breast cancer.
- Radiation may cause side effects during, right after, or awhile after treatment.

6

Endocrine therapy

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56 Review



Endocrine therapy stops cancer growth caused by hormones. Part 6 explains the types of endocrine therapy and which ones are options for you. It also provides some details on what to expect during endocrine therapy.

Overview

Estrogen and progesterone help some breast cancers to grow. These cancers are described as hormone receptor–positive. Most breast cancers are hormone receptor–positive. Endocrine therapy is a standard treatment. It lowers the chance of the cancer returning.

Some people refer to endocrine therapy as hormone therapy. However, hormone therapy can then be confused with hormone replacement therapy. The former treats breast cancer whereas the latter treats menopausal symptoms.

Endocrine therapy can be received with some but not all cancer treatments. It's okay to take HER2 antibodies during endocrine therapy. Endocrine therapy may be started during or after radiation therapy. Endocrine therapy is usually given after chemotherapy is finished.

If you are pregnant, don't start endocrine therapy. It may harm your baby. Start after your baby is born.

Types of endocrine therapy

Endocrine therapy affects female hormones by one of two methods. Some therapies block hormones from working. Others lower hormone levels in the body. The main types of endocrine therapy are described next. The section, *Treatment guide*, lists which ones may be an option for you.

Aromatase inhibitors lower estrogen levels in the body. These drugs block a protein that changes a hormone (androgen) into estrogen. They do not affect estrogen made in the ovaries. See [Guide 9](#) for a complete list of drugs for hormone-related growth.

Antiestrogens stop the effect of estrogen on cell growth. SERMs (**s**elective **e**strogen receptor **m**odulators) attach to estrogen receptors and block estrogen from attaching. SERDs (**s**elective **e**strogen receptor **d**egraders) block and destroy estrogen receptors. **See Figure 14.**

Ovarian ablation permanently stops the ovaries from making hormones. Most often, both ovaries are removed from the body. This surgery is called a bilateral oophorectomy. Radiation to the ovaries also stops the making of hormones, but isn't commonly used.

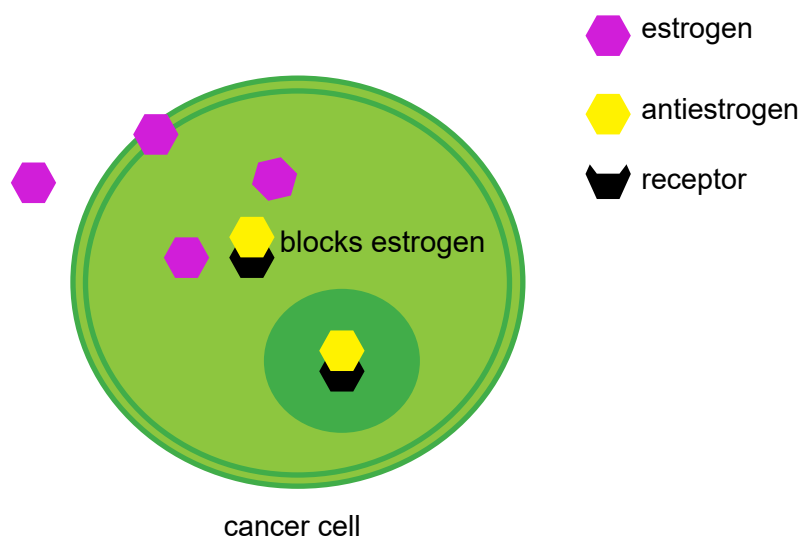
Ovarian suppression temporarily stops the ovaries from making hormones. It is achieved with drugs called LHRH (**l**uteinizing **h**ormone-**r**eleasing **h**ormone) agonists. LHRH is a hormone in the brain that helps control the making of estrogen by the ovaries. LHRH agonists stop LHRH from being made, which stops the ovaries from making more hormones.

Guide 9. Cancer drugs for hormone-related growth

Type	Subtype	Generic name	Brand name	How they work
Antiestrogens	SERD	Fulvestrant	Faslodex®	Prevent key signals for cancer cell growth
	SERM	Tamoxifen citrate	—	
		Toremifene citrate	Fareston®	
Aromatase inhibitors	Non-steroid	Anastrozole	Arimidex®	Lower estrogen levels
		Letrozole	Femara®	
	Steroid	Exemestane	Aromasin®	
Ovarian suppression	LHRH agonist	Goserelin acetate	Zoladex®	Lower estrogen levels
		Leuprolide acetate	Lupron Depot®	

Figure 14
Antiestrogens

Antiestrogens are drugs that stop the effect of estrogen on cancer cell growth. There are two types—SERMs and SERDs. Both block estrogen from attaching to its receptor and starting cell growth. SERDs also help to destroy the receptor.



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Treatment guide

Endocrine therapy is used to treat hormone receptor–positive breast cancer. The breast cancer can have estrogen or progesterone receptors or both. Options are based on menopausal status.

Menopause is the point in time when you won't have another menstrual period again. When a woman hasn't had a period in one or more years, she's often considered in postmenopause. If you get menstrual periods, you are in premenopause.

If you don't get periods, blood tests may be needed to confirm your menopausal status. Your periods may stop during chemotherapy but you may not be in menopause. The amount of estrogen or FSH (follicle-stimulating hormone) in your blood will be measured. Sometimes, these blood tests can't be done until you've been off certain medicines for some time.

All options involve taking an antiestrogen, an aromatase inhibitor, or both back-to-back. These medicines are usually taken for 5 to 10 years. The first regimen received is called the initial treatment. Sometimes a second medicine is taken within the 5-year period. This is called sequential treatment. Endocrine therapy taken beyond the 5-year period is called extended treatment.

Guide 10 lists two options if you are in premenopause. Treatment occurs for at least 5 years and often longer. The first option starts with taking tamoxifen for 5 years. To lower hormone levels, ovarian ablation or suppression may be part of treatment.

After 5 years of tamoxifen, your menstrual status will be assessed. If in premenopause, you may continue tamoxifen for 5 years or stop treatment. If in postmenopause, options include taking tamoxifen or an aromatase inhibitor for 5 years.

The second option for initial treatment includes taking an aromatase inhibitor for 5 years. It also includes ovarian suppression or ablation. These treatments will lower hormone levels.

Guide 11 lists options if you are in postmenopause. In your body, estrogen is made in small amounts by the adrenal glands, liver, and body fat. To reduce estrogen levels, an aromatase inhibitor, tamoxifen, or both may be used. Treatment occurs for at least 5 years and often longer.

Men with breast cancer

One out of every 100 breast cancers occurs in men. Men with breast cancer are treated much like women. One important difference is treatment with endocrine therapy. Your options are the same as for women in postmenopause. However, aromatase inhibitors should be taken with a treatment that stops the making of testosterone by your testes. Aromatase inhibitors alone won't stop hormone-related cancer growth.

Guide 10. Options for premenopause

Initial and sequential treatment		Extended treatment
<ul style="list-style-type: none"> Tamoxifen for 5 years ± ovarian suppression or ablation 	→	If in premenopause: <ul style="list-style-type: none"> Consider taking tamoxifen for another 5 years, or Stop taking endocrine therapy
	→	If in postmenopause: <ul style="list-style-type: none"> Take aromatase inhibitors for 5 years, or Consider taking tamoxifen for another 5 years
<ul style="list-style-type: none"> Aromatase inhibitor for 5 years + ovarian suppression or ablation 		

Guide 11. Options for postmenopause

Initial, sequential, and extended treatment
<ul style="list-style-type: none"> Aromatase inhibitor for 5 years then consider taking for another 5 years
<ul style="list-style-type: none"> Aromatase inhibitor for 2–3 years then tamoxifen to complete 5 years of endocrine therapy
<ul style="list-style-type: none"> Tamoxifen for 2–3 years then an aromatase inhibitor to complete 5 years of endocrine therapy
<ul style="list-style-type: none"> Tamoxifen for 2–3 years then an aromatase inhibitor taken for up to 5 years
<ul style="list-style-type: none"> Tamoxifen for 4.5–6 years then an aromatase inhibitor for 5 years
<ul style="list-style-type: none"> Tamoxifen for 4.5–6 years then consider continuing to complete 10 years of endocrine therapy
<ul style="list-style-type: none"> Tamoxifen for 5 years if aromatase inhibitors aren't an option
<ul style="list-style-type: none"> Consider tamoxifen for up to 10 years if aromatase inhibitors aren't an option

What to expect

Endocrine therapies greatly differ by how they are received and what's required of you. Ovarian ablation consists of either one day of surgery or a few days of radiation therapy. Other endocrine therapies are medicines. Antiestrogens and aromatase inhibitors are pills that are taken every day. LHRH inhibitors are given as monthly injections under the skin. Your treatment team will give you more information to know what to expect. Questions to ask about treatment are listed in Part 9.

Not all women will have the same side effects from endocrine therapy. Your symptoms may differ from other women or those listed next.

For many women, endocrine therapy causes symptoms of menopause. Menopausal symptoms include hot flashes, vaginal discharge or dryness, sleep problems, weight gain, hair thinning, fatigue, bone loss, and changes in mood.

Tamoxifen also has two rare but more serious side effects: 1) cancer of the uterus; and 2) blood clots. For most women, the benefits of taking tamoxifen far outweigh the risks. Aromatase inhibitors don't have the same cancer risk and very rarely cause blood clots.

Not all the side effects of endocrine therapy are listed here. Please ask your treatment team for a list of all common and rare side effects. If a side effect bothers you, tell your treatment team. There may be ways to help you feel better.

Review

- ▶ Endocrine therapy is a standard treatment for hormone receptor–positive breast cancer. It lowers the chances of the cancer returning.
- ▶ There are 4 main types of endocrine therapy for stage III breast cancer. Antiestrogens block the action of estrogen. Aromatase inhibitors, ovarian ablation, and ovarian suppression lower the amount of hormones in the body.
- ▶ Options for endocrine therapy are based on menopausal status. Medicines are often taken for 5 to 10 years.
- ▶ Endocrine therapy may cause symptoms of menopause.

7

Follow-up care

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Follow-up care is important for your long-term health. It is started when there are no signs of cancer. You may still be taking a HER2 antibody or endocrine therapy. Read Part 7 to learn which types of health care are advised.

Cancer tests

Medical history and physical exam

As noted in [Guide 12](#), a medical history and physical exam will occur at follow-up visits. These visits should occur between 1 and 4 times a year as needed for the first 5 years. If results are normal, you should then have these visits every year starting in the 6th year after cancer treatment.

During your visit with your doctor, tell him or her about any new or worse symptoms you have. There may be ways to get relief. Also, tell your team about any new cases of cancer in your family. Your doctor may refer you to a genetic counselor.

Imaging tests

Breasts treated with breast-conserving therapy should be assessed with mammograms. A mammogram every 12 months is advised. The first mammogram should occur at least 6 months after radiation ends. Mammograms will be continued for cancer screening of a breast that hasn't had cancer.

Routine use of other breast imaging isn't advised. Mammograms aren't done after mastectomy since the breast has been removed. Imaging of reconstructed breasts on a regular basis isn't needed. Screening for metastases isn't needed unless cancer signs or symptoms appear.

Side effect care

Medicine check

If on endocrine therapy, don't stop taking your medicine. If you do, the cancer will be more likely to return. Tell your doctor about any side effects that make you think about quitting. There may be ways to get relief.

GYN exam

If on tamoxifen, you need a GYN (**gynecologic**) exam each year. This drug can increase your chance for cancer of the uterus. Tell your doctor if you've had any vaginal bleeding that isn't normal for you. If not on tamoxifen, continue your routine GYN care. For all women, all routine health care should be done.

Bone mineral density

Regular testing of bone mineral density is needed in two cases. Get tested if on an aromatase inhibitor and if cancer treatments caused menopause. Aromatase inhibitors and starting menopause early can cause bone loss. Bone mineral density tests reveal how strong your bones are. These tests use x-rays.

Lymphedema

Lymphedema is swelling due to buildup of lymph fluid. It occurs in the arms after lymph node removal. It may happen just after surgery or months to years later or never. It's important to know about lymphedema so you can watch out for it.

If you have lymphedema, your doctor will assess it at follow-up visits. He or she will also refer you to an expert in lymphedema management. The swelling may be reduced by exercise, massage, compression sleeves, and other means.

Healthy lifestyle

Physical activity

Starting or maintaining an active lifestyle is advised. Physical activity has been linked to better treatment results. Ask your treatment team about ways for you to be more active.

Healthy body weight

Like physical activity, a healthy body weight has been linked to better treatment results. BMI (**b**ody **m**ass **i**ndex) is a measure of body fat based on height and weight. A BMI score of 20 to 25 is advised. This will help you have the best overall health and breast cancer outcomes. Ask your treatment team about ways to achieve a healthy body weight.

Healthy diet

Healthy eating includes a balanced diet and eating the right amount of food. It also includes drinking enough fluids. Healthy eating and limited alcohol use may improve treatment results. You may have special food needs during and after treatment. A nutritionist—an expert in creating a healthy diet—can help.

Guide 12. Long-term health care

Type of care	How often is this care needed?
Medical history and physical exam	<ul style="list-style-type: none"> Between 1–4 times a year as needed for the first 5 years after treatment <ul style="list-style-type: none"> If results are normal, then repeat every year starting in the 6th year after treatment
Mammogram	<ul style="list-style-type: none"> Every 12 months <ul style="list-style-type: none"> If you had radiation therapy, start 6–12 months after radiation ends
Lab and imaging tests for metastases	<ul style="list-style-type: none"> If signs and symptoms appear
Medicine check	<ul style="list-style-type: none"> On a regular basis
GYN exam if: <ul style="list-style-type: none"> Taking tamoxifen and uterus is intact As usual for primary care 	<ul style="list-style-type: none"> Every 12 months
Bone mineral density test if: <ul style="list-style-type: none"> Taking aromatase inhibitor, or Treatment-related menopause 	<ul style="list-style-type: none"> Baseline test then get tested on a regular basis
Lymphedema care	<ul style="list-style-type: none"> As needed
Healthy lifestyle	<ul style="list-style-type: none"> As often as you can

Review

- Updates of your health history and physical exams are advised at least once a year. Tell your doctor if anyone in your family gets cancer.
- Yearly mammograms of breasts treated with breast-conserving lumpectomy are advised. Mammograms should also be used to screen breasts that have not had cancer.
- If you are taking endocrine therapy, it is important that you don't stop without talking to your doctor.
- Getting GYN exams and bone mineral density tests are important if on certain types of endocrine therapy.
- Ask your treatment team about signs of lymphedema.
- Be active, keep a healthy body weight, and eat a healthy diet.

8

Recurrence

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Breast cancer may return after a cancer-free period. Part 8 reviews treatment for cancer that returns in a breast or nearby sites. If distant sites have cancer, read the *NCCN Guidelines for Patients®: Breast Cancer – Metastatic (STAGE IV)*.

Treatment planning

Guide 13 lists the tests that are used to tailor your treatment to you. Many were described in Part 2. Such tests include a medical history, physical exam, and imaging and blood tests. If not received before, genetic counseling is advised if you may have hereditary breast cancer.

In addition to the tests in Part 2, other tests may be needed for a recurrence. A biopsy of the recurrence site is advised to confirm it is cancer. The methods for the biopsy depend on the site. The imaging tests described next may also be needed.

Breast cancer can spread to your spine or brain. Cancer spread to the brain is much less common than to the spine. MRI is advised if your symptoms suggest cancer is present. Contrast will be used.

X-rays of bones that hurt are advised. Long and weight-bearing bones that aren't normal on bone scan or PET/CT and may fracture should also be x-rayed.

Guide 13. Health care before treatment

Main tests and services
Medical history
Physical exam
Complete blood count
Comprehensive metabolic panel
Chest diagnostic CT scan with contrast
Abdomen ± pelvis diagnostic scans (CT or MRI with contrast)
Bone scan or sodium fluoride PET/CT
FDG PET/CT sometimes
Hormone receptor test on cancer cells
HER2 test on cancer cells
Genetic counseling if you may have hereditary breast cancer

Other care that may be useful
Spine MRI with contrast if certain symptoms appear
Brain MRI with contrast if certain symptoms appear
X-rays of bones that hurt
X-rays of long or weight-bearing bones that are abnormal on bone scan

Treatment guide

Some treatment options for recurrences are explained in this section. They are grouped by where the recurrence is in your body. A local recurrence is breast cancer that returned within a breast or the chest wall. A regional recurrence is breast cancer that returned in nearby lymph nodes.

This section includes “systemic” treatment as an option. Doctors use this term when talking about a cancer treatment for the whole body. Systemic treatment includes chemotherapy, chemotherapy with HER2 antibodies, and endocrine therapy.

Local recurrence

[Guide 14](#) lists the treatment options for a local recurrence. Options are based on your prior treatment.

If you had breast-conserving therapy, a total mastectomy is advised. You may also have an axillary lymph node dissection. Systemic treatment may be part of your treatment, too.

If you had only a mastectomy, you may have surgery to remove the cancer. Afterward, radiation therapy is advised. Radiation sites include the chest wall and lymph nodes around your collarbone. Systemic treatment may be added.

You may have had a mastectomy, axillary lymph node dissection, and radiation therapy. In this case, the cancer should be removed by surgery if possible. Systemic treatment may be added.

Guide 14. Options for local recurrence

Prior treatment		What treatment should I have?
Breast-conserving therapy	→	<ul style="list-style-type: none"> • Total mastectomy • Axillary lymph node dissection • Consider systemic treatment
Total mastectomy	→	<ul style="list-style-type: none"> • Surgery if possible • Radiation therapy • Consider systemic treatment
Total mastectomy with axillary lymph node dissection and radiation therapy	→	<ul style="list-style-type: none"> • Surgery if possible • Consider systemic treatment

Lymph node recurrence

Guide 15 lists the treatment options for a recurrence in your lymph nodes. The cancer may have also returned in or near your breast. Treatment options are based on which lymph nodes have cancer.

Axillary lymph nodes with cancer should be removed if possible. Radiation therapy is also advised if possible. Radiation sites include your chest wall, near your armpit (axilla), and the lymph nodes around your collarbone. You may receive systemic treatment, too.

Cancer in supraclavicular or internal mammary nodes may be treated with radiation. Radiation sites include your chest wall and lymph nodes near your collarbone. Internal mammary nodes with cancer should be radiated, too. You may also receive systemic treatment.

Review

- Breast cancer may return after a cancer-free period.
- Tests of your health and the extent of the cancer will be used to tailor treatment to you.
- A local recurrence is the return of cancer in the breast or chest wall. Treatment is based on your prior treatment. Surgery is advised if possible. Treatment should also include radiation therapy if not received before. Systemic treatment may be added.
- Treatment for a regional recurrence depends on which nearby lymph nodes have cancer. Surgery with radiation therapy is advised for cancer in axillary lymph nodes. Cancer in other nearby lymph nodes may be treated with radiation therapy. Systemic treatment may be added for any lymph node recurrence.

Guide 15. Options for lymph node recurrence

Lymph node site		What treatment should I have?
Near your armpit (axillary)	➡	<ul style="list-style-type: none"> • Surgery if possible • Radiation therapy if possible • Consider systemic treatment
Above the collarbone (supraclavicular)	➡	<ul style="list-style-type: none"> • Radiation therapy if possible • Consider systemic treatment
Just inside the ribs near the breast bone (internal mammary)	➡	<ul style="list-style-type: none"> • Radiation therapy if possible • Consider systemic treatment

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Making treatment decisions

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Having cancer is very stressful. While absorbing the fact that you have cancer, you have to learn about tests and treatments. In addition, the time you have to accept a treatment plan feels short. Parts 1 through 8 described the cancer and treatment options. Part 9 aims to help you make decisions that are in line with your beliefs, wishes, and values.

behind your plan but you know your concerns and goals. By working together, you are likely to get a higher quality of care and be more satisfied. You'll likely get the treatment you want, at the place you want, and by the doctors you want.

It's your choice

The role each person wants in choosing his or her treatment differs. You may feel uneasy about making treatment decisions. This may be due to a high level of stress. It may be hard to hear or know what others are saying. Stress, pain, and drugs can limit your ability to make good decisions. You may feel uneasy because you don't know much about cancer. You've never heard the words used to describe cancer, tests, or treatments. Likewise, you may think that your judgment isn't any better than your doctors'.

Letting others decide which option is best may make you feel more at ease. But, whom do you want to make the decisions? You may rely on your doctors alone to make the right decisions. However, your doctors may not tell you which option to choose if you have multiple good options. You can also have loved ones help. They can gather information, speak on your behalf, and share in decision-making with your doctors. Even if others decide which treatment you will receive, you still have to agree by signing a consent form.

On the other hand, you may want to take the lead or share in decision-making. Most patients do. In shared decision-making, you and your doctors share information, weigh the options, and agree on a treatment plan. Your doctors know the science

Questions to ask your doctors

You may meet with experts from different fields of medicine. Strive to have helpful talks with each person. Prepare questions before your visit and ask questions if the person isn't clear. You can also take notes and get copies of your medical records.

It may be helpful to have your spouse, partner, or a friend with you at these visits. A patient advocate or navigator might also be able to come. They can help to ask questions and remember what was said. Suggested questions to ask include:

What's my diagnosis and prognosis?

It's important to know that there are different types of cancer. Cancer can greatly differ even when people have a tumor in the same organ. Based on your test results, your doctors can tell you which type of cancer you have. He or she can also give a prognosis. A prognosis is a prediction of the pattern and outcome of a disease. Knowing the prognosis may affect what you decide about treatment.

1. Where did the cancer start? In what type of cell? Is this cancer common?
2. Is this a fast- or slow-growing cancer?
3. What tests do you recommend for me?
4. Where will the tests take place? How long will the tests take and will any test hurt?
5. What if I am pregnant?
6. How do I prepare for testing?
7. Should I bring a list of my medications?
8. Should I bring someone with me?
9. How often are these tests wrong?
10. Would you give me a copy of the pathology report and other test results?
11. Who will talk with me about the next steps? When?

What are my options?

There is no single treatment practice that is best for all patients. There is often more than one treatment option along with clinical trial options. Your doctor will review your test results and recommend treatment options.

1. What will happen if I do nothing?
2. Can I just carefully monitor the cancer?
3. Do you consult NCCN recommendations when considering options?
4. Are you suggesting options other than what NCCN recommends? If yes, why?
5. Do your suggested options include clinical trials? Please explain why.
6. How do my age, health, and other factors affect my options? What if I am pregnant?
7. Which option is proven to work best?
8. Which options lack scientific proof?
9. What are the benefits of each option? Does any option offer a cure or long-term cancer control? Are my chances any better for one option than another? Less time-consuming? Less expensive?
10. What are the risks of each option? What are possible complications? What are the rare and common side effects? Short-lived and long-lasting side effects? Serious or mild side effects? Other risks?
11. How do you know if treatment is working?
12. What are my options for breast reconstruction?
13. What are my options if my treatment stops working?
14. What can be done to prevent or relieve the side effects of treatment?

Notes

What does each option require of me?

Many patients consider how each option will practically affect their lives. This information may be important because you have family, jobs, and other duties. You also may be concerned about getting the help you need. If you have more than one option, choosing the option that is the least taxing may be important to you:

1. Will I have to go to the hospital or elsewhere? How often? How long is each visit?
2. What do I need to think about if I will travel for treatment?
3. Do I have a choice of when to begin treatment? Can I choose the days and times of treatment?
4. How do I prepare for treatment? Do I have to stop taking any of my medicines? Are there foods I will have to avoid?
5. Should I bring someone with me when I get treated?
6. Will the treatment hurt?
7. How much will the treatment cost me? What does my insurance cover?
8. Will I miss work or school? Will I be able to drive?
9. Is home care after treatment needed? If yes, what type?
10. How soon will I be able to manage my own health?
11. When will I be able to return to my normal activities?

What is your experience?

More and more research is finding that patients treated by more experienced doctors have better results. It is important to learn if a doctor is an expert in the cancer treatment he or she is offering.

1. Are you board certified? If yes, in what area?
2. How many patients like me have you treated?
3. How many procedures like the one you're suggesting have you done?
4. Is this treatment a major part of your practice?
5. How many of your patients have had complications?

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Deciding between options

Deciding which option is best can be hard. Doctors from different fields of medicine may have different opinions on which option is best for you. This can be very confusing. Your spouse or partner may disagree with which option you want. This can be stressful. In some cases, one option hasn't been shown to work better than another. Some ways to decide on treatment are discussed next.

2nd opinion

The time around deciding a treatment is very stressful. People with cancer often want to get treated as soon as possible. They want to make their cancer go away before it spreads farther. While cancer can't be ignored, usually there is time to think about and choose which option is best for you.

You may wish to have another doctor review your test results and suggest a treatment plan. This is called getting a 2nd opinion. You may completely trust your doctor, but a 2nd opinion may help you decide.

Copies of the pathology report, a DVD of the imaging tests, and other test results need to be sent to the doctor giving the 2nd opinion. Some people feel uneasy asking for copies from their doctors. However, a 2nd opinion is a normal part of cancer care.

When doctors have cancer, most will talk with more than one doctor before choosing their treatment. What's more, some health plans require a 2nd opinion. If your health plan doesn't cover the cost of a 2nd opinion, you have the choice of paying for it yourself.

If the two opinions are the same, you may feel more at peace about the treatment you accept to have. If the two opinions differ, think about getting a 3rd opinion. A 3rd opinion may help you decide between your options. Choosing your cancer treatment is a very important decision. It can affect your length and quality of life.

Decision aids

Decision aids are tools that help people make complex choices. For example, you may have to choose between two options that work equally as well. Sometimes making a decision is hard because there is a lack of science supporting a treatment.

Decision aids often focus on one decision point. In contrast, this book presents tests and treatment options at each point of care for women in general. Well-designed decision aids include information that research has identified as what people need. They also aim to help you think about what's important based on your values and preferences.

A listing of decision aids can be found at decisionaid.ohri.ca/AZlist.html. Decision aids for stage III breast cancer are:

Genetic testing

uofmhealth.org/health-library/zx3000

Breast-conserving therapy vs. mastectomy

uofmhealth.org/health-library/tv6530#zx3718

Breast reconstruction after mastectomy

uofmhealth.org/health-library/tb1934#zx3672

Support groups

Besides talking to health experts, it may help to talk to other people who have walked in your shoes. At support groups, you can ask questions and hear about the experiences of other people with breast cancer. Find a support group at the websites listed on page 73.

Compare benefits and downsides

Every option has benefits and downsides. Consider these when deciding which option is best for you. Talking to others can help identify benefits and downsides you haven't thought of. Scoring each factor from 0 to 10 can also help since some factors may be more important to you than others.

Websites

American Cancer Society

cancer.org/cancer/breast-cancer.html

Breast Cancer Alliance

breastcanceralliance.org

Breastcancer.org

breastcancer.org

Cancer Support Community

cancersupportcommunity.org

Facing Our Risk of Cancer Empowered (FORCE)

facingourrisk.org

Living Beyond Breast Cancer (LBBC)

lbbc.org

National Cancer Institute (NCI)

cancer.gov/types/breast

NCCN for Patients®

nccn.org/patients

Rockin for the Cure®

rockinforthe cure.net

Sharsheret

sharsheret.org

Sisters Network, Inc.

sistersnetworkinc.org

Young Survival Coalition (YSC)

youngsurvival.org

Review

- Shared decision-making is a process in which you and your doctors plan treatment together.
- Asking your doctors questions is vital to getting the information you need to make informed decisions.
- Getting a 2nd opinion, using decision aids, attending support groups, and comparing benefits and downsides may help you decide which treatment is best for you.

Glossary

75 Dictionary

79 Acronyms

Dictionary

abdomen

The belly area between the chest and pelvis.

adjuvant treatment

Treatment that is given to lower the chances of the cancer returning.

adrenal gland

A small organ on top of each kidney that makes hormones.

alkaline phosphatase (ALP)

A protein found in most tissues of the body.

antiestrogen

A drug that stops estrogen from attaching to cells.

aromatase inhibitor

A drug that lowers the level of estrogen in the body.

axillary lymph node

A small group of special disease-fighting cells located near the armpit.

axillary lymph node dissection

Surgery to remove axillary lymph nodes.

bilateral diagnostic mammogram

A test that uses multiple x-rays to make pictures of the insides of both breasts.

biopsy

Removal of small amounts of tissue or fluid to be tested for disease.

bone mineral density

A test that measures the strength of bones.

bone scan

A test that uses radioactive material to assess for bone damage.

boost

An extra dose of radiation to a specific area of the body.

breast implant

A small bag filled with salt water, gel, or both that is used to remake breasts.

breast reconstruction

Surgery to rebuild breasts.

breast-conserving therapy

Cancer treatment that includes removing the breast lump and radiation therapy.

cancer stage

Rating of the growth and spread of tumors.

carcinoma

Cancer that starts in cells that form the lining of organs and structures in the body.

catheter

A flexible tube inserted in the body to give treatment or drain fluid from the body.

chemotherapy

Drugs that stop the life cycle of cells so they don't increase in number.

chest wall

The layer of muscle, bone, and tissue on the outer part of the chest.

clinical breast exam

A physical exam of the breasts by a health professional to feel for disease.

clinical stage

The rating of the extent of cancer based on tests before treatment.

clinical trial

Research on a test or treatment to assess its safety or how well it works.

complete blood count (CBC)

A test of the number of blood cells.

computed tomography (CT)

A test that uses x-rays from many angles to make a picture of the inside of the body.

contrast

A dye put into your body to make clearer pictures during imaging tests.

core needle biopsy

Use of a needle to remove a large tissue sample to test for cancer cells.

deoxyribonucleic acid (DNA)

A very thin and long molecule that contains genetic code. Also called the “blueprint of life.”

duct

A tube in the breast that drains breast milk.

ductal carcinoma

A breast cancer that starts in a cell that lines the ducts of the breast.

endocrine therapy

Treatment that stops the making or action of hormones in the body. Also called hormone therapy.

estrogen

A hormone that develops female body traits.

external beam radiation therapy (EBRT)

Treatment with radiation received from a machine outside the body.

fertility specialist

An expert who helps women to have babies.

fine-needle aspiration (FNA)

Removal of a small tissue sample with a very thin needle.

flap

Tissue taken from one area of the body and used in another area.

follicle-stimulating hormone (FSH)

A hormone made by the ovaries.

gene

Coded instructions in cells for making new cells and controlling how cells behave.

general anesthesia

A controlled loss of wakefulness from drugs.

genetic counseling

Discussion with a health expert about the risk for a disease caused by changes in genes.

hereditary breast cancer

Breast cancer caused by faulty, coded information in cells that was passed down from parent to child.

hormone

Chemical in the body that activates cells or organs.

hormone receptor–negative

Cancer cells that don’t use hormones to grow.

hormone receptor–positive

Cancer cells that use hormones to grow.

human epidermal growth factor receptor 2 (HER2)

A protein on the edge of a cell that sends signals for the cell to grow.

human epidermal growth factor receptor 2 (HER2) inhibitor

A cancer drug that stops the effect of a cell protein called HER2.

human epidermal growth factor receptor 2 (HER2)-negative

Cancer cells with normal numbers of HER2 receptors.

human epidermal growth factor receptor 2 (HER2)-positive

Cancer cells with too many HER2 receptors.

imaging test

A test that makes pictures of the insides of the body.

immune system

The body’s natural defense against disease.

immunohistochemistry (IHC)

A lab test of cancer cells to find specific cell traits involved in abnormal cell growth.

in situ hybridization (ISH)

A lab test that counts the number of copies of a gene.

infraclavicular

The area right below the collarbone.

intensity-modulated radiation therapy (IMRT)

Radiation therapy that uses small beams of different strengths based on the thickness of the tissue.

internal mammary

The area along the breastbone.

internal radiation

Treatment with radiation received from an object placed near or in the tumor. Also called brachytherapy.

invasive breast cancer

Cancer cells have grown into the supporting tissue of the breast.

lobular carcinoma

A breast cancer that started in cells that line the breast lobules.

lobule

A gland in the breast that makes breast milk.

local anesthesia

A controlled loss of feeling in a small area of the body from drugs.

lumpectomy

Surgery to remove a breast lump and some normal tissue around it.

luteinizing hormone-releasing hormone (LHRH)

A hormone in the brain that helps control the making of estrogen by the ovaries.

lymph

A clear fluid containing white blood cells.

lymph node

Small groups of special disease-fighting cells located throughout the body.

lymphedema

Swelling of the body due to a buildup of lymph.

magnetic resonance imaging (MRI)

A test that uses a magnetic field and radio waves to make pictures of the insides of the body.

mammogram

A picture of the insides of the breast that is made by an x-ray test.

mastectomy

Surgery to remove the whole breast.

medical history

All health events and medications taken to date.

menopause

The point in time when menstrual periods end.

mutation

An abnormal change in the instructions within cells for making and controlling cells.

neoadjuvant treatment

Treatment given before the main treatment used to cure disease. Also called preoperative treatment.

nipple replacement

The rebuilding of a breast nipple.

ovarian ablation

Methods used to stop the ovaries from making hormones.

ovarian suppression

Methods used to lower the amount of hormones made by the ovaries.

pathologic stage

A rating of the extent of cancer based on tests given after treatment.

pathologist

A doctor who's an expert in testing cells and tissue to find disease.

pelvis

The area between the hip bones.

physical exam

A review of the body by a health expert for signs of disease.

positron emission tomography (PET)

Use of radioactive material to see the shape and function of body parts.

postmenopause

The state of the end of menstrual periods.

premenopause

The state of having regular menstrual periods.

progesterone

A hormone in women that is involved in sexual development, periods, and pregnancy.

puberty

The time when teens sexually develop.

radiation therapy

The use of high-energy rays to destroy cancer cells.

receptor

A protein within cells to which substances can attach.

recurrence

The return of cancer after a cancer-free period.

sentinel lymph node

The first lymph node to which cancer cells spread after leaving the breast tumor.

sentinel lymph node biopsy

Surgery to remove the first lymph node(s) to which cancer cells spread after leaving the breast tumor. Also called sentinel lymph node dissection.

side effect

An unplanned physical or emotional response to treatment.

skin-sparing mastectomy

A surgery that removes all breast tissue but saves as much breast skin as possible.

stroma

Supportive tissue in the breast.

supportive care

Treatment for the symptoms or health conditions caused by cancer or cancer treatment.

supraclavicular

The area right above the collarbone.

surgical margin

The normal tissue around the edge of a tumor that is removed during surgery.

total mastectomy

Surgery that removes the entire breast but no chest muscles. Also called simple mastectomy.

ultrasound

Use of sound waves to make pictures of the insides of the body.

volume displacement

The shifting of breast tissue.

whole breast radiation

Treatment of the entire breast with radiation from a machine outside the body.

Acronyms

3D-CRT

three-dimensional conformal radiation therapy

AJCC

American Joint Committee on Cancer

BMI

body mass index

CBC

complete blood count

cm

centimeters

CT

computed tomography

DNA

deoxyribonucleic acid

FDA

Food and Drug Administration

EBRT

external beam radiation therapy

FDG

fluorodeoxyglucose

FNA

fine-needle aspiration

FSH

follicle-stimulating hormone

GYN

gynecologic

HER2

human epidermal growth factor receptor 2

IHC

immunohistochemistry

IMRT

intensity-modulated radiation therapy

ISH

in situ hybridization

LHRH

luteinizing hormone-releasing hormone

LINAC

linear accelerator

MRI

magnetic resonance imaging

PET

positron emission tomography

PET/CT

positron emission tomography/ computed tomography

SERD

selective estrogen receptor degrader

SERM

selective estrogen receptor modulator

SLNB

sentinel lymph node biopsy

VUS

variants of unknown significance



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Adolescents and Young Adults
(AYAs) with Cancer

Brain Cancer – Gliomas

Breast Cancer
Carcinoma in Situ (Stage 0)
Early-Stage (Stages I and II)
Stage III Breast Cancer
Stage IV Breast Cancer

Chronic Lymphocytic Leukemia

Chronic Myelogenous Leukemia

Colon Cancer

Distress (Supportive Care Series)

Esophageal Cancer

Hodgkin Lymphoma

Kidney Cancer

Lung Cancer (Non-Small Cell
Lung Cancer)

Lung Cancer Screening

Malignant Pleural Mesothelioma

Melanoma

Multiple Myeloma

Myelodysplastic Syndromes

Nausea and Vomiting
(Supportive Care Series)

Non-Hodgkin's Lymphomas
Diffuse Large B-cell Lymphoma
Follicular Lymphoma
Mantle Cell Lymphoma
Mycosis Fungoides
Peripheral T-cell Lymphoma

Ovarian Cancer

Pancreatic Cancer

Prostate Cancer

Soft Tissue Sarcoma

Stomach Cancer

Thyroid Cancer

Waldenström's
Macroglobulinemia/
Lymphoplasmacytic Lymphoma

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(A) A full and fair description of the programs and activities of NCCN Foundation; and (B) A financial statement or summary which shall be consistent with the financial statement required to be filed with the Secretary of State pursuant to Code Section 43-17-5. **KANSAS:** The annual financial report for NCCN

Foundation, 275 Commerce Drive, Suite 300, Fort Washington, PA 19034, 215-690-0300, State Registration # 445-497-1, is

filed with the Secretary of State. **MARYLAND:** A copy of the NCCN Foundation financial report is available by calling NCCN Foundation at 215-690-0300 or writing to 275 Commerce Drive, Suite 300, Fort Washington, PA 19034. For the cost of copying

and postage, documents and information filed under the Maryland charitable organizations law can be obtained from the Secretary of State, Charitable Division, State House, Annapolis, MD 21401, 1-410-974-5534. **MICHIGAN:** Registration Number

MICS 45298. **MISSISSIPPI:** The official registration and financial information of NCCN Foundation may be obtained

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Fox Chase Cancer Center

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Duke Cancer Institute

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Vanderbilt-Ingram Cancer Center

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NCCN Member Institutions

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nebraskamed.com/cancer

Case Comprehensive Cancer Center/
University Hospitals Seidman
Cancer Center and Cleveland Clinic
Taussig Cancer Institute
Cleveland, Ohio
800.641.2422 • UH Seidman Cancer Center
uhhospitals.org/seidman
866.223.8100 • CC Taussig Cancer Institute
my.clevelandclinic.org/services/cancer
216.844.8797 • Case CCC
case.edu/cancer

City of Hope Comprehensive
Cancer Center
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Dana-Farber/Brigham and
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Massachusetts General Hospital
Cancer Center
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massgeneral.org/cancer

Duke Cancer Institute
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foxchase.org

Huntsman Cancer Institute
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Fred Hutchinson Cancer
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Seattle Cancer Care Alliance
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206.667.5000 • fredhutch.org

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hopkinskimmelcancercenter.org

Robert H. Lurie Comprehensive Cancer
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Mayo Clinic Cancer Center
Phoenix/Scottsdale, Arizona
Jacksonville, Florida
Rochester, Minnesota
800.446.2279 • Arizona
904.953.0853 • Florida
507.538.3270 • Minnesota
mayoclinic.org/departments-centers/mayo-clinic-cancer-center

Memorial Sloan Kettering
Cancer Center
New York, New York
800.525.2225
mskcc.org

Moffitt Cancer Center
Tampa, Florida
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moffitt.org

The Ohio State University
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James Cancer Hospital and
Solove Research Institute
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800.293.5066
cancer.osu.edu

Roswell Park Cancer Institute
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Siteman Cancer Center at Barnes-
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siteman.wustl.edu

St. Jude Children's Research Hospital
The University of Tennessee
Health Science Center
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901.683.0055 • westclinic.com

Stanford Cancer Institute
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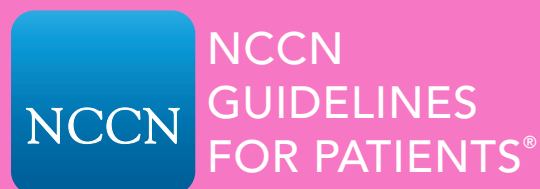
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uwhealth.org/cancer

Yale Cancer Center/
Smilow Cancer Hospital
New Haven, Connecticut
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yalecancercenter.org

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