

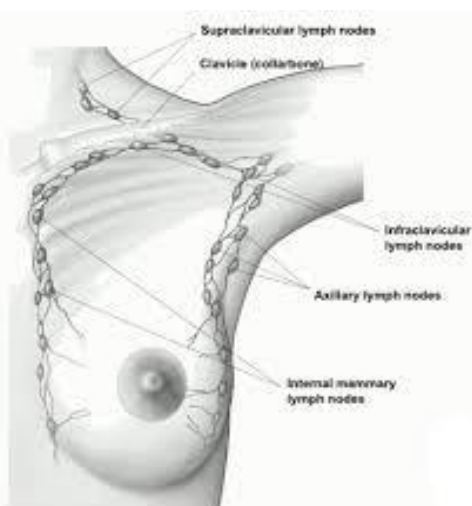
# Radiation Therapy for Breast Cancer

## Definitions

**Mastectomy:** Surgery to remove all breast tissue.

**Lumpectomy:** Surgery to remove only the tumor from the breast. Also known as *breast conservation* or *partial mastectomy*.

**Surgical Margin:** When a tumor is removed, the specimen is sent to a doctor called a pathologist who examines it under a microscope. The pathologist looks to see if any cancer cells are at or near the edges of the specimen.



**Lymph Node:** A small, bean-shaped gland that plays an important role in the body's immune system. It filters the lymphatic fluid and helps fight infection and disease. Lymph nodes usually occur in chains. In breast cancer, the lymph nodes tend to be the first place that cancer travels (or metastasizes) out of the breast. The lymphatic chains that may be involved in breast cancer are the: **axillary** (armpit area), **supraclavicular** (above the collarbone), and **internal mammary** (under the breast bone/sternum). See diagram above.

**Extra-Capsular Extension:** Each lymph node has a thin capsule surrounding it. If cancer is found outside of the lymph node, it means that the tumor has grown through the lymph node and through its capsule. This is also called *extra-nodal extension*.

**Stage:** Your cancer stage is determined by 3 factors:

**T:** tumor size or extent

**N:** if lymph node(s) have cancer cells

**M:** if cancer has spread to distant locations (metastasized)

The combined TNM stage gives an overall stage, ranging from 0 to 4. This number helps doctors plan treatment. It can also give an indication of the outcome (prognosis). It is sometimes confused with the tumor grade, which is not as important when estimating outcome.

**Grade:** A pathologist determines the grade of a tumor. The grade describes how aggressive the tumor looks under a microscope. Grade is reported on a 3 point scale (1-3) or as low, intermediate, or high.

## What is Radiation Therapy?

- Radiation therapy, or *radiotherapy*, uses high-energy x-rays to kill cancer cells. The x-rays are stronger than those used for chest or dental x-ray, and they are given over a longer period of time.
- Radiation can be delivered externally or internally.
  - External beam radiation therapy – the most common type - uses a machine called a linear accelerator that directs radiation beams at the cancer.
  - Internal radiation uses a catheter or seed to place radiation inside your body, near the cancer cells.
- Radiation therapy is a local treatment - only the part of the body being treated gets radiation. This means that it usually has little effect on the rest of the body. In comparison, chemotherapy is systemic, it gets into your blood and travels throughout your body.

## How Does Radiation Therapy Work?

- Radiation damages the DNA molecule of a cell. DNA acts as the instruction manual for a cell. Every time a cell grows or divides (reproduces), it reads its instruction manual for how to do it. By damaging the DNA molecule in a cancer cell, the cell won't be able to grow, divide, or spread. When a cell is damaged beyond repair, the cell dies.
- Radiation therapy may not kill cancer cells immediately. It can take days to months before the cancer cells start to die.
- A course of radiation treatment is divided into a daily dose that is high enough to kill cancer cells but low enough to limit damage to normal cells. Nearby normal/healthy cells may also be affected but they can repair their DNA damage and recover without dying.

## Who is Involved in My Treatment?

It takes a team of medical professionals to plan, create, and deliver your radiation treatment(s). Your doctor works with each member of the team, even some you may not meet!

- **Radiation Oncologist:** A physician specially trained to treat cancer patients with radiotherapy. In charge of your treatment plan.
- **Physician Assistant/PA:** A licensed medical provider who works with your radiation oncologist. They are experienced in caring for patients in radiation therapy. As part of your clinical care team, they can provide nearly all of the clinical services a physician does.
- **Resident Physician:** This doctor has graduated medical school and is in training (residency) to become a radiation oncologist. A radiation oncologist supervises them.
- **Radiation Nurse(s):** Nurses with specialized oncology training and experience with the side effects of treatment. A nurse can recognize when a patient is sick, alert other members of the team, and help care for the patient.
- **Radiation Therapist(s):** Therapists operate the radiation machine. Two or more therapists work together to set you up in the correct position, make you comfortable, and ensure treatment is delivered safely and accurately.

- **Medical Dosimetrist:** This person helps the radiation oncologist design the radiation plan for your treatment.
- **Medical Physicist:** This person makes sure that the radiation equipment is working as it should and that the machine delivers the dose prescribed by your radiation oncologist.

## Why Do I Need Radiation Therapy?

There are many reasons to get radiation therapy, and each person's case is different. Your team will discuss their recommendations with you. Radiation may be needed to:

- lower the risk that the cancer will come back (recur) after a lumpectomy or mastectomy. In some instances, the recurrence benefits translates into an improvement in overall and cancer-specific survival.
- relieve symptoms (palliative care)

### **Post-Lumpectomy Radiation Therapy**

Radiation is often recommended after a lumpectomy to decrease the risk of recurrence. In fact, radiation after lumpectomy may lower the risk of recurrence by up to 75%, which is about the same risk as if you had a mastectomy (removal of the entire breast). There is evidence that adding radiation therapy after a lumpectomy is associated with longer survival in women with breast cancer.

### **Post-Lumpectomy Radiation Therapy for DCIS**

Ductal Carcinoma In-Situ or DCIS is a specific type of non-invasive breast cancer that is found while it is still confined to the breast duct(s). The prognosis of patients with DCIS is excellent. Radiation is often recommended after a lumpectomy to reduce the risk of a recurrence in that breast. However, studies show that there no additional survival benefit in having radiation for this type of cancer.

### **Post-Mastectomy Radiation Therapy**

The recommendation for radiation therapy after a mastectomy is usually based on findings about your individual cancer. These finding may come from your doctor (clinical factors) or the pathologist (pathological factors). Reasons why radiation may be recommended include, but are not limited to:

1. Positive lymph node(s). Cancer cells found in one or more lymph nodes
2. A large breast tumor - over 5 centimeters - or a tumor that has invaded the skin or chest wall
3. Positive surgical margin. Cancer cells in or at the edge of the tissue specimen taken
4. Cancers that have come back (recurred) either locally or regionally

Radiation in these cases has been shown to:

- decrease the risk of recurrence
- decrease the risk of developing metastatic disease
- extend survival

### **Palliative Radiation Therapy**

Radiation therapy may be done to prevent or lessen symptoms caused by a tumor. Palliative radiation is usually reserved for patients with cancer that has spread to distant sites or patients who cannot have – or

cannot tolerate – therapy aimed at curing the disease. A course of palliative radiation is usually shorter. The length of treatment will depend on each patient's circumstances.

## How Much Radiation Do I Need?

Before you start radiation, your radiation oncologist will meet with you in a consultation visit. They will recommend a treatment plan based on the specifics of your cancer and your individual needs.

Historically, a typical course of radiation was 5 to 6 1/2 weeks. Treatments are given 5 days per week, for a total of 25-33 treatments. This course may still be used for patients:

- with advanced breast cancer
- with breast cancer that involves the lymph nodes
- who have had a mastectomy

For other patients with breast cancer, however, many radiation courses now are now much shorter. These shorter courses of radiation treatments to the breast only have been shown to:

- achieve the same excellent outcomes in controlling cancer
- have less impact on quality of life
- cause less fatigue and less time off from work

In some circumstances, there may be more than one accepted way to treat your breast cancer with radiation.

At your consult visit, your radiation oncologist will discuss the benefits and risks of each option and help you decide on the best plan for you.

## What Appointments Do I Need?

### Consultation Visit

- On your first visit in the Radiation Medicine department, you will meet with the clinical team and the radiation oncologist.
- After a complete medical history and a physical exam, we will review the details of your case, and discuss your treatment options and the benefits and risks of each option.
- If you decide on radiation therapy, you will need to give written consent.

### Radiation Planning/CT Simulation Visit

The first step in planning your radiation treatment is called *simulation* and it is done in the Radiation Medicine department. At this appointment, your radiation oncologist and one or more radiation therapists, decide upon the best position for you during your radiation treatment(s).

The best position is one that is reliable, reproducible, and comfortable for you. Comfort is important. You will need to remain still in this position during your treatment. Keeping still can be difficult to do if your neck or back is hurting.

Here's what you can expect.

- The therapist(s) will make temporary marks on your skin with a pen. You can shower normally with these marks but **DO NOT SCRUB!** They will come off after your treatment course has ended.
- The therapist(s) will make permanent dots on your skin. They are no bigger than the size of a pin-head. However, they are permanent ink marks, like a tattoo, and will not come off even after your treatment course has ended.
- The therapist(s) may place temporary wire stickers on your skin. These are often used to mark the edge of the radiation area, surgical scars, or other high risk areas. The stickers will be removed before you leave.
- Customizable devices like a headrest, body molds, or a facemask may be used to help position you correctly. This improves the accuracy and safety of your treatments.
- A CT scan is done to help your oncologist plan the exact area(s) to get radiation, and to determine the best way to position the radiation beam(s) for your treatment. On occasion, we may recommend using a contrast (dye). Contrast helps us get clearer pictures of certain areas. Some contrast is given by injection and some can be taken by mouth. If we need to use contrast, we will discuss it with you beforehand.
- Sometimes breathing can affect your treatment because some cancers, such as lung cancer, move as you breathe. For breast cancer, we may ask you to take a deep breath and hold it, filling your lungs with air. This technique may be useful to help minimize radiation to areas in your chest.
- Digital photographs or pictures are taken during simulation. We take a face photo to help identify you when you come for your radiation treatment. We also take photos as part of your medical chart to document how you were positioned for your simulation. This ensures that your daily set up is accurate and consistent throughout your radiation treatments.
- During the simulation visit, we will set up your start day and your daily treatment time. **No radiation treatment is given on this visit.** You will also get your parking permit and directions to the radiation parking lot.

## Verification Visit

- Your next appointment will be the verification appointment, also called the 'dry run' or 'dress rehearsal'.
- When you come for this appointment, your radiation treatment has been planned on the computer, based on the CT scan done during the stimulation visit.
- This verification occurs before you first treatment, either the day before, or on the same day as your first treatment.
- The purpose of this visit is to make sure (verify) that you are positioned correctly and that the radiation beam correctly targets the planned area.
- We will take low-energy digital x-rays and the therapist(s) will make any adjustments that are needed. These x-rays are reviewed and approved by your radiation oncologist before your first treatment.

## Daily Radiation Treatment Visits

- Your daily treatment will be given Monday through Friday. We try to keep your appointments consistent from one day to the next. On occasion, emergencies, other appointments, or machine downtime may require a change in the schedule.
- When you arrive, please change into a dressing gown in the dressing room. (Your breast, chest, and/or other treatment area will need to be exposed during treatment setup.) You may also store your personal belongings in this dressing room. Once in your gown, take a seat in the sitting area next to your treatment machine and wait to be called for your treatment appointment.
- External radiation treatment is painless, like having a simple x-ray taken.
- Your appointment may take 30 minutes or more. While the treatment only takes a few minutes, we need time to set you up in the position planned during your CT simulation visit.
- The treatment room is shielded so radiation cannot leak out and expose the therapist(s) and other patients.
- Once you are in the correct position, the radiation therapist(s) will leave.
- The therapist(s) will be in another room where they will watch you on a TV monitor during your whole treatment. You can talk to them over an intercom, but you must lie as still as possible during setup and treatment.
- It is fairly common for us to take simple x-rays before treatment is given. These x-rays can't give us diagnostic information about your cancer; they are used to make sure you are in the right position. The therapists take these x-rays periodically throughout your course of treatment.
- Once treatment begins, the radiation therapy machine will make a clicking or whirring noise and will move around you.
- If we need you to hold your breath during treatment, we will tell you over the intercom or give you visual feedback on when to breathe and when to hold your breath. **Don't worry, you can't do this the wrong way!** If you do cough or breathe outside of the pre-set limits, the machine will automatically stop. It will only restart when you are ready to try again. In other words, the machine will wait for you.

## On-Treatment Visit (OTV)

While receiving radiation treatments, you will be scheduled to meet with your doctor at least once a week. This extra doctor visit, called an on-treatment visit (OTV) is usually scheduled immediately after your daily treatment.

At this appointment, the doctor will check for any side effects, educate you about what you can expect over the next week, and answer your questions. It is always helpful to write down your questions and bring them to this appointment to discuss.

## What Are Common Side Effects from Breast/Chest Radiation Treatment?

This type of radiation treatment can cause several immediate (acute) side effects and some long-term side effects. All possible side effects, even rare ones, will be discussed with you as part of your consultation visit when we review the informed consent. We've listed the acute and long-term side effects on the next page.

## Acute Side Effects

<b>Fatigue</b>	You may feel more tired than normal while undergoing radiation treatments. Severe tiredness, or fatigue, can be physical, psychological, and/or emotional, and can last for several weeks after treatment has ended.
<b>Skin Problems</b>	Common: Skin in the treated area turns pink, red, or darker, like you had too much sun. Uncommon: The skin in areas of friction or rubbing (under the arm or in the fold under the breast) can chafe and peel. Even less common: Dry, irritated skin can become moist or infected and will require treatment with topical or systemic antibiotics. Skin changes usually heal and fade 1-2 months after treatment has ended.
<b>Breast Changes</b>	Your breasts may feel sore, achy, or heavy. Sometimes this is due to swelling or lymphedema of the breast or arm. If this swelling does not get better within 1-2 months after you finish treatment, contact your doctor about other steps you can take.
<b>Swallowing Problems</b>	Uncommon: If treating regional lymph nodes, patients may notice swallowing problems or a cough. This should resolve within a few days or weeks of finishing treatment.

## Long-Term Side Effects

<b>Breast Changes /Breast Skin Changes</b>	Fibrosis (scar tissue) can form in breast tissue months/years after treatment. It can cause changes in shape, texture, size of treated breast and/or breast skin.
<b>Lymphedema in Breast or Arm</b>	Lymphedema is fluid build-up and swelling. Many things besides radiation can contribute to the risk of lymphedema such as surgery or your medical history. If you had radiation to lymph nodes in your armpit area, you may get lymphedema in your arm. This may be painful and limit how much you can do with that arm.
<b>Lung Fibrosis (scar tissue)</b>	Scarring is usually diagnosed on follow up imaging studies. It doesn't affect your breathing or day-to-day functioning. Rare: Scarring causing long term shortness of breath and a reduced ability to handle exercise.
<b>Heart Problems</b>	Risk of heart attack, cardiomyopathy (weak heart that has trouble pumping blood), or heart failure may be increased when the heart receives a higher radiation dose. (This may occur when treating left-sided breast cancer.) There are several strategies that may help to decrease this risk. These strategies will be discussed with you and the radiation oncologist.

## Caring for Yourself During Treatment

### Be Gentle with Your Skin

- Use only lukewarm water and mild soap. Better yet, use Dove or another synthetic detergent bar (SynDet). Gently blot skin dry.
- If your skin is peeling or becoming flaky, let water run over the area to gently exfoliate the skin.
- Talk to your radiation team if your skin is becoming dry, itchy, or painful.

### Moisturize Daily

Recommended skin care moisturizers include:

- Commercial preparations such as Eucerin®, Cetaphil®, CeraVe®, Lubriderm®, Aveeno®, Aquaphor®, or Vaseline®
- Natural oils/butters such as coconut oil, shea butter, cocoa butter, or calendula

No one moisturizer has been shown to work better than another, so make your choice based on your own preferences and skin sensitivities. We recommend trying one new product at a time. If you use multiple new products at once and you have a reaction, you won't know which one caused the irritation.

Avoid products with added fragrance, tanner, glitter, etc.

### Balance Rest and Activities

- Getting a restful night's sleep can help ease the fatigue you may have during your radiation treatment.
- At the same time, try not to spend too much time in bed; it can make you feel even more tired and weak.
- Keeping up with your normal activities – work, light exercise, and recreation, keeping up your relationships – may also help you manage your fatigue. Try to schedule activities so that you have time to rest.
- Many people find that a few short rest periods (or even naps) are better than one very long one.

### Maintain A Well-Balanced Diet and Good Hydration

- On average, the human body is 60% water. Most of that is inside your cells, which need water to stay alive and do their work. Being dehydrated means your body does not have enough water.
- Drinking plenty of water every day is important to maintaining good hydration and avoiding dehydration - especially when you are having daily radiation treatments. If your doctor has not restricted your fluids, a good rule of thumb is to **drink at least 2-4 quarts/liters every day**.
- Dehydration can worsen fatigue, skin changes, and pain.
- Severe dehydration leads to changes in body chemistry, which may become life-threatening.
- Unless you are given other instructions, it is important to eat a healthy, well-balanced diet to maintain your weight during your radiation treatments. These 3-6 weeks are not the time to start a new weight-loss plan or extreme diet!



## Things to Avoid During Radiation Therapy

Things to Avoid	How?
Rubbing or scrubbing sensitive areas	Do not use harsh or physical exfoliants (loofah sponges, grainy/gritty washes, brushes).
Tight-fitting clothing over the treatment area	Avoid wearing an underwire bra.
Shaving in the treatment area	Do not use a razor blade until all areas of skin changes have healed. If you must shave, an electric razor is safer for your skin. se an electric razor, it is safer for your skin.
Extreme temperatures on the skin	Do not use hot water bottles, hot packs, electric heating pads, ice, or ice packs on skin in the treatment area.
Sun exposure	Keep treated areas out of the sun (or tanning bed). Cover up and always use sunscreen with a SPF30 or more.
Applying anything to the treatment area within 4 hours of a radiation appt.	No lotions, oils, deodorants, makeup, etc.
Using multiple, new skin care products at once	Combining products may cause more irritation. <p>“All natural” and “organic” products may also cause unexpected skin reactions.</p> <p>Look for dermatologist-tested and hypoallergenic products.</p>

## Other Frequently Asked Questions

### **Am I Safe to be Around My Family, Children, and Pets While Going Through Radiation Treatments?**

During external beam radiation therapy, the radiation from the machine will turn off when the treatment is done. It is completely safe for you to be around other people and pets. **You are not radioactive during treatment!**

### **Will I Be Able to Drive to Therapy?**

If you could drive before you start radiation therapy, you should be able to continue to drive to and from your radiation treatments. **But, it's always a good idea to have a backup plan in case you don't feel up to driving.**

When you come for your CT simulation visit, we will give you a parking pass for our private radiation lot and directions on how to enter. If someone else drives you, make sure they have this pass visible when parking in the radiation lot.

### **Can I Work During Radiation Therapy?**

Many patients continue to work. Your treatments are scheduled during the CT Simulation visit. Consider the flexibility of your work hours when scheduling your treatments. What is most convenient? Coming in first thing, before work? Coming during your lunch break? Or at the end of the day so you can go home after your treatment? Please talk to your treatment team if you are concerned about your job and side effects. For example, if you have a physically demanding job and are worried about fatigue. Each patient's situation is different, and we will do our best to counsel and accommodate you while you are undergoing treatment.

### **Will I Lose My Hair?**

If hair loss occurs, it will only be in the treatment area. For patients receiving radiation therapy for breast cancer, that means hair loss in the underarm and chest. If you have had hair loss from chemotherapy or systemic therapy, this hair may start to grow back during your course of radiation treatments.

### **Can I Exercise While Undergoing Radiation? What About Swimming?**

Being physically active during radiation treatment may help relieve fatigue, increase energy, and promote faster healing and recovery. It can also lower stress and anxiety. Regular exercise may also improve outcomes related to your breast cancer! Gentle exercises, such as walking, stretching, yoga, and Pilates are recommended during treatment. Continue with the recommended shoulder and arm exercises as part of your plan to increase your range of motion and prevent lymphedema.

Certain activities, such as swimming should probably be avoided during radiotherapy because radiation can cause skin changes that may get worse from the chemicals in pools (like chlorine). In addition, swimwear can be tight, rubbing the skin and causing discomfort. If you do not have any skin problems, it's possible to continue swimming, but please check with your radiation oncologist first.

## What If I Miss My Radiation Appointment?

Because we treat up to a certain number of “fractions,” and not by the number of days, if you are unable to make one of your daily radiation appointments, we will add an appointment on to the end of your treatment. If you know in advance that you are unable to make one of your appointments, please discuss this with your treatment team, so we can schedule you accordingly. While extending your treatment course by a couple of days is probably okay, missing treatments entirely or significantly extending your treatment time is likely to make the radiation therapy less effective.

## What Do I Do When I’m Done?

Finishing radiation therapy can bring a range of emotions. You may be happy that treatment is done, you may be scared about not seeing your care team as often, or worried about the cancer returning. Even after you have completed treatment, your doctors will continue to monitor you closely. It’s important to continue with all scheduled follow-up appointments and imaging tests. This typically includes:

- A follow-up appointment with your radiation treatment team in 4 weeks. This follow-up may be sooner, depending on the symptoms you experienced during treatment.
- A mammogram about 6 months after surgery in those women who have undergone breast-conserving treatment (lumpectomy, partial mastectomy).
- A follow-up appointment with your radiation treatment team in 6-months to assess for any signs of late radiation side effects.
- Regular (usually every year) mammograms and clinical breast exams with your oncologist. Some women with dense breasts may require additional testing, such as ultrasound or MRI.
- Regular follow-ups with your surgical or medical oncologist while on systemic therapy, such as chemotherapy or endocrine therapy, to assess for any toxicities. If taking tamoxifen or toremifene, pelvic exams should be done annually because these hormone drugs may increase your risk of uterine cancer. Other hormone drugs called aromatase inhibitors, such as anastrozole, letrozole, or exemestane) can affect your bone health. We usually recommend testing with a DEXA scan or bone density scan.

Blood tests and imaging tests such as bone scans or PET scans are not part of the standard follow up, since these costly tests have not been shown to help a patient treated with breast cancer to live longer. However, if you develop concerning symptoms or physical exam findings, let your doctor know right away, and he or she will evaluate whether any additional testing should be done.

## Online Breast Cancer Resources

- **American Cancer Society 1-800-227-2345**  
[www.cancer.org/cancer/breast-cancer](http://www.cancer.org/cancer/breast-cancer)
- **National Cancer Institute 1-800-422-6237**  
[www.cancer.gov/types/breast](http://www.cancer.gov/types/breast)
- **National Comprehensive Cancer Network (NCCN)**  
[www.nccn.org/patients/guidelines/cancers.aspx](http://www.nccn.org/patients/guidelines/cancers.aspx)

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