

# Radiation Therapy

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Radiation therapy is one of a number of treatments for breast cancer. It may be used in addition to surgery, chemotherapy or hormone therapy.

Like many aspects of cancer treatment, radiation therapy techniques continue to improve over time. More accurate planning techniques and modern technology have improved the precision and safety of radiation treatment. Therefore, some of what you may have heard about radiation therapy in the past may no longer be true. The side effects of radiation therapy to the breast also differ from the side effects of radiation therapy to other parts of the body.

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



## How Radiation Affects Cancer Cells

Cancer cells grow and divide at a faster rate than healthy tissue. During radiation treatment, the breast is targeted with high energy beams. Radiation is very effective at stopping cancer cells from dividing and growing.

Radiation therapy is used to treat all stages and sizes of many types of cancers. It can be a treatment option for women with:

- Ductal carcinoma in situ (DCIS or stage 0)
- Early stage invasive breast cancer (stages 1 and 2)
- Advanced disease (stages 3 and 4)

Radiation therapy works best when the cancerous lump or area has been removed. It is commonly recommended following breast conservation surgery (also called a lumpectomy, wide excision or partial mastectomy). After this type of surgery, the remaining breast tissue may contain undetectable cancer cells. Because these cells are too small to see even on a mammogram, your surgeon cannot detect and remove them. Radiation treatments are given to eliminate any cancer cells that may be in the remaining breast and surrounding tissue. The radiation treatment is confined to the breast region and does not spread to other parts of your body.

Radiation therapy is sometimes given after mastectomy. If you are considering a mastectomy, talk with your surgeon about the possibility of needing radiation therapy after surgery. If you have further questions about this, ask to speak with a radiation oncologist.

## Medical Conditions Requiring Special Consideration

Women with certain medical conditions may not be good candidates for radiation therapy. Let your doctor know if you have any of the following conditions: scleroderma, systemic lupus, prior radiation therapy to the breast or chest or if you are or may be pregnant. Your doctor will need this information to determine the best treatment plan for you.

## The Radiation Therapy Process

### *Your initial visit*

Before beginning radiation therapy, you will consult with a radiation oncologist, (a doctor trained to use radiation to treat cancer). During your first visit, the radiation oncologist will review your medical history, mammogram, other imaging studies and pathology report. He or she will also perform a physical exam and discuss the risks and benefits of radiation therapy with you. This is your chance to share your concerns and fears and ask your doctor and radiation oncology staff questions. It is a good idea to bring another person to this appointment since you will receive a lot of information about your treatment plan.

### *The treatment planning or simulation appointment*

If you and your doctor decide breast radiation therapy is best for you, you will have a treatment planning or “simulation” appointment. During treatment planning, the exact area or treatment field will be identified. Your radiation oncologist will use CT images to identify structures in your chest, such as your heart and lungs. After analyzing the images, your radiation oncologist will determine the best way to treat your breast tissue while reducing exposure to the normal tissue nearby.

If you are having whole breast radiation, your skin will be marked to make sure that the radiation therapy is administered exactly as planned. Most treatment centers use a combination of tiny tattoos (about the size of a period at the end of a sentence) and skin marks with semi-permanent ink to mark the treatment field. Do not wash these marks off when you bathe until your radiation oncologist or therapist says that you can. Your doctor will also determine how to position you during your treatment, including your arm position. A special brace or Styrofoam mold may be made to cradle your arm or back in a special position that will hold you securely during each radiation treatment session.

Your simulation visit typically lasts approximately one hour, and you will be lying on a firm surface most of the time. A bolster is often placed under your knees, but the table is very firm under the upper back. This can be uncomfortable. If you have difficulty lying on your back for this period of time, you may want to take some mild pain medication before your visit. Let your doctor know if you have difficulty raising your arm over your head. Stretching to increase the flexibility of your arm before the planning session can help with this. Ask the treatment staff for suggestions if arm mobility is an issue for you. Sometimes a brief course of physical therapy may be needed.

Some women find the process of being analyzed and measured impersonal and feel as if they are being worked on rather than worked with. Treatment planning is a very precise and technical process. Your doctor and the radiation center staff have not lost sight of you, but are concentrating on providing you with the safest and most effective treatment possible.

### *Whole breast radiation treatments*

After you have adequately recovered from prior surgery or chemotherapy, generally about one month, you will begin your actual radiation treatments. If you are receiving whole breast irradiation (WBI), your treatment sessions will occur once a day, Monday through Friday, for three to seven weeks. Your treatment does not need to begin on a Monday, but could start any day of the week. It is important not to interrupt your treatment schedule or to skip appointments. If you know that you will not be available during part of the time you are scheduled to receive your treatments, let your radiation oncologist know before you start your treatments. Some adjustments to the start time may be acceptable. It may be better for you to start your treatments a little later rather than interrupt your schedule.

After checking in at each visit, you will normally be asked to change into a hospital gown from the waist up. It is best to remove necklaces or other jewelry in the neck and chest area during the radiation treatment (earrings do not need to be removed if they are close to the earlobe). You may then have to wait a bit before being called to the treatment area.

Special technologists trained in the delivery of radiation therapy will position you exactly as planned during your simulation appointment. Your unique radiation therapy treatment plan prescribed by your doctor is followed to deliver the



proper dose of radiation therapy for you each day. A high-energy machine called a linear accelerator will deliver the radiation to your breast, a process called external beam radiation therapy (EBRT). EBRT can be done using several techniques: 3D conformal radiation, or Intensity Modulated Radiotherapy (IMRT) or respiratory gated radiotherapy. The appropriate technique is selected for your treatment by your physician to maximize the safety and effectiveness of the treatment. Factors such as breast size, tumor size and location, chest wall shape, and the closeness of the heart to the treatment area help determine the optimal technique of radiation therapy.

No one can be in the treatment room with you during the actual treatment, but the technologist can hear you through a microphone and see you via television cameras during your treatment. If at any time during your treatment you needed assistance, the therapists can aid or reposition you. The treatment can then be safely restarted right where it left off. You need to remain very still during your treatment, but you do not need to hold your breath unless you are asked to do so as part of your treatment plan. Just breathe normally. You will receive radiation treatment from two or

more different angles so do not be surprised if the treatment machine changes position or stops and restarts during the course of your treatment. The linear accelerator makes a buzzing noise during treatment, and occasionally patients may taste or smell a metallic sensation during radiation treatment even when there is no radiation directed at the head or neck area.

Most of the time in the treatment room is taken up in positioning you for precise treatment using lasers to align you on your tattoo marks. The actual radiation treatment delivery usually takes only 3-5 minutes. Your total time in the treatment room will typically be 10-20 minutes. Approximately once a week during the treatment, x-ray pictures will be taken of the treatment position and checked by your doctor. These pictures verify the accuracy of the treatment, and are not like a mammogram to look for breast cancer. Although it takes just a few minutes to do the EBRT, you should plan to spend about 30 to 45 minutes at the treatment center each day to allow time to change clothes and consult with the doctor or nurse if needed. Most centers will schedule your visits for the same time each day.

After completing several weeks of radiation to the whole breast, you may receive additional EBRT targeting just the area where the tumor was removed. This is called boost radiation. The technologist will adjust the equipment so that the radiation field is much smaller and centered on that part of your breast. Boost radiation may use the same machine as EBRT, so you may not notice this change in your treatment. Boost radiation is administered daily at your usual treatment time, Monday through Friday, for one to two weeks.

You will meet with your radiation oncologist once a week during your treatment period. Each week you will have another opportunity to ask questions, discuss side effects and their management, and share your concerns. You can also meet with other members of the radiation oncology team. Many centers have nurses, social workers and dieticians available to help.

## Radiation Side Effects

While each woman is unique and will respond differently to breast radiation treatments, there are a number of common side effects that many women experience. The most common short-term side effects are generalized fatigue, breast tenderness and skin changes of the treated breast.

### *Fatigue*

It's hard to appreciate how radiation affects your body. Some women do not report any fatigue during breast radiotherapy, although it is common to have fatigue some of the time during treatment. Every day, the radiation works on both healthy and cancerous cells in your breast, and your body is expending energy as it heals. The effect of this work isn't noticeable at first. Around the third week of treatment, you may notice that you become more tired by the end of the day. Since the healing process continues after you finish your treatments, the fatigue may also continue for several weeks after completing radiation therapy.

### *Ways to improve your energy level*

- Drink plenty of fluids and eat a healthy diet.
- Take a nap in the afternoon.
- Keep physically active even though you have less energy. Try small amounts of exercise. Some physical activity, such as walking, can energize you and help you feel better.
- Find a balance between activity and rest. You will feel most tired during the last few weeks of your treatment, so plan on taking extra time to rest during this time.
- Consider cutting back on extra activities and commitments during these few weeks. Most women continue to work outside the home while undergoing radiation therapy. If you become tired consider adjusting home and work commitments.

- Women receiving chemotherapy before their radiation treatments will feel more fatigued than those receiving only radiation therapy. Make sure to get enough rest so you don't become exhausted. Accept offers of help, such as cooking meals or cleaning your house. Think of what others can do for you, and don't be afraid to ask for help.



### *Temporary skin changes*

At first you may not notice any skin changes. The skin changes of radiotherapy are gradual. Many women notice a tan that can progress over the weeks of radiotherapy to a light pink color similar to sunburn. There can be skin irritation or itching, and topical creams can help soothe the skin. The nurse and physician can help advise you on the best skin products for your particular situation. Don't use any product on your skin during radiotherapy without checking with your care team first. The skin irritation can continue for several weeks following treatment, but gradually improves after you complete treatment. Your breast skin may also become dry or sensitive. You need to be very gentle with the skin in the treatment area during radiation therapy. Your care team will advise you about skin care during the first week of treatment to help with any symptoms you may experience.



### *Skin care tips*

- Take extra good care and avoid irritating the treated skin. Be gentle when you bathe or shower. Do not scrub, scratch or rub the treated area. Use only warm water and a mild soap, such as Dove or pure glycerin, when you wash. Patting the area dry is better than rubbing the area dry.
- Talk with your medical team about how to care for red, dry skin.
- If the area itches, apply a cool compress or one of the gels your medical team recommends.
- If uncomfortable, avoid constricting clothing, including bras. Instead wear something soft and loose, such as a cotton camisole with a “shelf” bra. If you feel you need a bra for support, ask the radiation oncology center nursing staff about what option is best for you.
- Heat and cold can be damaging to the skin. Avoid applying hot items to the area, such as hot packs that can be heated in the microwave.
- Avoid soaking in a hot tub or using a sauna during your treatment.
- Avoid applying ice or very cold items to the treatment area.
- Avoid shaving under your arm on the side of your treatment. If you must shave, use an electric razor.
- Some products such as deodorants, powders, creams, perfumes, body oils, ointments, lotions or home remedies can be irritating to your skin in the treatment area. Avoid such products while you’re being treated and for several weeks afterward. If you have any questions regarding skin care products talk with your doctor or nurse.
- Protect your treated skin from the harmful effect of the sun by wearing comfortable clothing over the treatment area when outdoors. Talk to your medical team about applying sunscreen. Do not use tanning beds as they expose you to the same harmful effects as the sun.

You can also develop another type of skin reaction called a moist reaction. This is caused by friction and irritation where two surfaces rub together. The most common sites are under the breast and the underarm area. When a moist reaction develops, the skin breaks down and becomes sore. If you notice any skin breakdown, talk with your doctor or nurse. They will tell you how to care for this type of skin condition.

### *Other short term side effects*

After surgery or radiation therapy, the breast may be tender, especially when you have a mammogram or when your breast is examined. You may also experience a sharp stabbing or burning sensation occasionally. Muscles in your chest wall under the treated breast may feel tight or sore. These sensations are most common during the first months after surgery or radiation therapy. Such sensations will lessen in intensity and frequency over time.

Radiation therapy usually does not significantly affect your blood count. If you have chemotherapy prior to radiation therapy, your blood count may be monitored.

Lung tissue can rarely become inflamed after radiation treatment to the breast. This condition (called radiation pneumonitis) is not common but can occur within the first few months of treatment. If this happens, you may develop a dry cough, harder time breathing during activity, and possibly a low-grade fever. Radiation pneumonitis will usually go away without treatment. If it persists, your radiation oncologist may prescribe anti-inflammatory drugs to reduce the severity of the symptoms.

### *Long term side effects*

Radiation therapy can cause a change in the feel, look or size of your breast. Breast swelling during treatment is common for the first one to four months. In some cases, your breast may become smaller over time. The shape and size of your breast is mostly determined by the amount and location of tissue removed during surgery. Most breasts are firmer and appear more uplifted after the radiation treatment. You may experience tanning of the breast that can last for months and may be permanent in some cases.

Many women worry that radiation therapy will harm their heart and lungs. With modern radiation therapy techniques specifically designed to minimize or eliminate radiation exposure to the heart, these risks are very small. If you are concerned about this, or have a history of heart disease, discuss your concerns with your radiation oncologist.

You are at greater risk of developing lymphedema (swelling of the hand or arm) if you have a lymph node dissection in the underarm area and then have radiation therapy to the underarm area where lymph nodes are located. This is caused by fluid that can build up when lymphatic channels under the arm are blocked by scarring caused by breast cancer surgery or radiation. For additional information about lymphedema prevention and treatment, refer to the “Surgery Options and Postoperative Care” section of this notebook.

Fortunately, serious side effects of radiation therapy for breast cancer are very uncommon. On rare occasions, radiation treatment to the breast can cause a second cancer to develop in the treated area later in life. It is important to realize that this risk is extremely small and for most patients is far outweighed by the benefits of treating your breast cancer.

### **Accelerated Partial Breast Irradiation**

Accelerated partial breast irradiation (APBI) is an alternative to standard whole breast irradiation. Not all women are suitable candidates for this. One of the benefits of APBI is that APBI reduces the treatment area from the whole breast to the tissue surrounding the lumpectomy site, the area the cancer is most likely to reoccur. In addition, APBI requires fewer treatment sessions compared to WBI reducing the time and travel burdens of radiation treatments. With APBI, the radiation dose is concentrated to the tissue surrounding the lumpectomy cavity, sparing much of the breast tissue and critical organs such as the heart and lung from radiation. The best way to determine if APBI is a good choice for you is to discuss this with your surgeon and radiation oncologist. There are a number of ways of administering APBI.

APBI can be delivered using external beam radiotherapy. Treatments are delivered using the linear accelerator, two times a day for five days.

The more common forms of APBI use a technique called “brachytherapy,” in which a catheter is inserted into the breast with the tip in the space where the tumor was removed. The radiation only travels a very limited distance. Several of the most common types are listed below.

**Strut Assisted Volume Implant** (e.g. SAVI brachytherapy consists of a device that is made up of a bundle (7-11) of soft, tiny plastic catheters (struts) that can be adjusted to conform to your lumpectomy cavity. The radiation dose is adjusted for each individual’s needs by varying the placement of the radiation source in each of the catheters.

**Balloon Devices** are forms of brachytherapy that use a catheter (tube) that has a balloon on the end. The balloon end of the catheter is placed in the breast where the tumor was removed. The balloon is filled with sterile water to hold it in place. Balloon devices can contain a single catheter, or several catheters in which the radiation source can be placed.

The treatment administration is similar for both these types of APBI. After your lumpectomy, your surgeon and radiation oncologist will review your pathology report, and if appropriate, the option of APBI will be discussed with you. If you agree to this treatment, your surgeon will insert the device in the lumpectomy cavity. This procedure usually occurs about one to three weeks after your lumpectomy. Commonly the device will be inserted in your surgeon's office. You will be awake and able to talk during the insertion procedure. After injecting a local anesthetic, your surgeon will insert the device. The tip of the device that will contain the radiation source will be positioned in the space where the tumor was removed; the end of the catheter extends outside the breast. A CT scan will be performed to determine the position of the catheter and to help with treatment planning. The radiation therapy treatment will take place in the radiation oncology center. The radiation oncologist will determine the appropriate dose for you. The radiation dose is administered by attaching the end of the catheter that is outside your breast to a machine. The machine places the radiation pellets inside the catheter. The treatments take 10 to 20 minutes. When the treatment is completed the machine removes the radiation pellets. Treatments take place twice a day, at least six hours apart, for five days.

**Intraoperative Radiotherapy (IORT)** is a newer technique that delivers a single radiation treatment in the operating room during your breast surgery. While a woman is still under anesthesia, a special applicator is placed into the area of the breast where the tumor has just been removed. The radiation treatment is given through the applicator within the breast. The whole treatment lasts about 30 minutes. The goal of this therapy is that no additional radiation treatments will be needed. However in some cases external beam irradiation may still be needed. This will depend on your pathology results. Since this treatment occurs at the same time as your lumpectomy, you will meet with your radiation oncologist prior to surgery.

With all types of APBI there is less exposure of healthy breast tissue to radiation, so you will typically experience less fatigue, less redness of the skin, less burning of the skin and less skin discoloration. Side effects associated with APBI include increased wound infections, increased seroma formation (swelling of the breast) and a risk of developing fibrosis of the breast.

APBI is a quicker way to give radiation treatments; however, not all patients are suitable for APBI and not all centers provide all types of APBI. The best way to determine if APBI is the best treatment for you is to discuss it with your surgeon and radiation oncologist. If your physician refers you for brachytherapy, you will be provided with additional information at that time.

*What happens when radiation treatments are over?*  
Once you have finished radiation therapy you will have follow-up care for a number of years. This will consist of check-ups with your radiation oncologist and your other physicians. During your check-up appointments, your radiation oncologist will talk to you about how you are feeling, examine the treated area, answer any questions and respond to your concerns.

*You have gone through a great deal being diagnosed with breast cancer and going through your treatments. Give yourself some time to heal physically and emotionally. Often, as treatment is ending you have time to participate in support programs offered at your cancer center or in the community. This notebook has suggestions and you can ask your nurse about programs and resources that are available to assist in your recovery.*

