

# A Guide to Proton Therapy for Patients with Breast Cancers



Every year, almost 276,500 women and 2,620 men are diagnosed with a new case of invasive breast cancer. Breast cancer patients often get radiation therapy as part of their treatment regimen. Proton therapy is an option that aims to decrease the risk of damage to organs like the heart and lungs. Standard X-ray therapy can deliver excess radiation that may cause side effects years or decades after treatment ends. Side effects can include heart and lung disease and a small risk of secondary cancers.

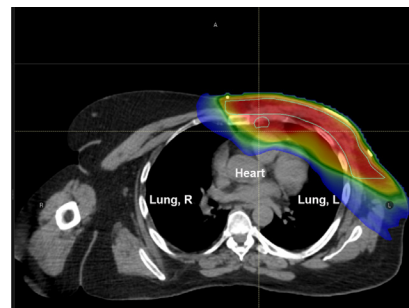
A study found that major heart events occur more often as the radiation dose delivered to the heart increases. To decrease the risk of side effects, doctors often deliver a lower dose of radiation to the breast, chest wall and lymph nodes.

## Advantages of Proton Therapy

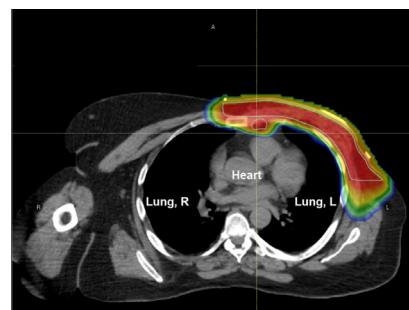
Proton therapy is a next-generation, precisely targeted radiation technology. It was developed to treat tumors with the goal of minimizing radiation to healthy tissue. Proton therapy can reduce the risk of adverse heart events and side effects because it lowers radiation exposure to the heart. It also lessens radiation to the lung and healthy breast tissue. By lowering the dose to nearby healthy organs, proton therapy allows maximum radiation dose to tumor cells.

## Proton Therapy vs. Standard Therapy with X-rays

### Standard radiation



### Proton therapy



### Radiation levels



The illustration shows the difference between proton therapy on the bottom, where less healthy tissue is subjected to radiation, and standard X-ray radiation on the top, where more radiation affects surrounding, healthy tissue.

Many patients with breast cancer are good candidates for proton therapy. To better understand the use of proton therapy in your treatment, call to schedule a consultation with a radiation oncologist. They will discuss different treatment options with you and determine if you will benefit from proton therapy. The specialists who practice at the proton therapy center also use other forms of radiation to treat breast cancer. They will provide an expert recommendation for you to consider. Often, radiation treatment is used in conjunction with other treatment types such as surgery and chemotherapy.

### **Proton therapy is a good choice for your breast cancer if you have:**

- A need for radiation to the lymph node areas.
- Preexisting heart or lung conditions.
- A need for treatment near your heart and lungs that puts you at risk of receiving extra radiation.

### **About Proton Therapy**

#### **The Bragg Peak**

During proton therapy, a beam of subatomic particles called protons is sped up in an accelerator and then aimed at the tumor. The nature of protons is such that the radiation dose increases suddenly, in what is called a Bragg Peak. Then the radiation falls effectively to zero. This

allows radiation oncologists to precisely target tumors, minimize radiation to healthy tissue in front of the tumor, and avoid healthy tissue behind the tumor. Radiation oncologists can spread the Bragg Peak to cover the entire tumor.

### **The Advantages of Pencil Beam Scanning (PBS)**

PBS is the latest proton technology that allows for even greater accuracy when treating cancer with proton radiation. PBS uses a narrow proton beam to paint the tumor with radiation. Because the pencil beam can be targeted even more precisely, higher, more effective doses can be used. The pencil beam deposits radiation starting at the deepest layer, and works slice by slice through the tumor.

### **About our Specialists**

All our radiation oncologists are faculty at the University of Washington School of Medicine and all are board certified.

### **References**

1. American Cancer Society. Breast Cancer. Updated 2020. <https://www.cancer.org/cancer/breast-cancer/about/how-common-isbreastcancer.html>. Accessed June 11, 2020.
2. American Cancer Society. Breast Cancer in Men. Updated 2020. <https://www.cancer.org/cancer/breast-cancer-in-men/about/key-statistics.html>. Accessed June 11, 2020.
3. Bush DA et al. Int J Radiat Oncol Biol Phys. 2014; 90(3):501-5
4. Jimenez RB et.al. J Clin Onc 2019; 37(30):2778-2785.
5. Cuaron JJ et.al. Chin Clin Oncol 2016; 5(4):52. 6. Early Breast Cancer Trialists' Collaborative Group (EBCTCG). Lancet. 2005;366:2087-2106.

#### **Find out more.**

To learn more about proton therapy for breast cancer or to schedule a consultation, please call us at **(888) 645-6934** or visit **FredHutch.org/protontherapy**

### **Fred Hutch Cancer Center - Proton Therapy**

Located on UW Medicine's Northwest Campus  
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