



# A Guide to Proton Therapy for Patients with Brain Cancers



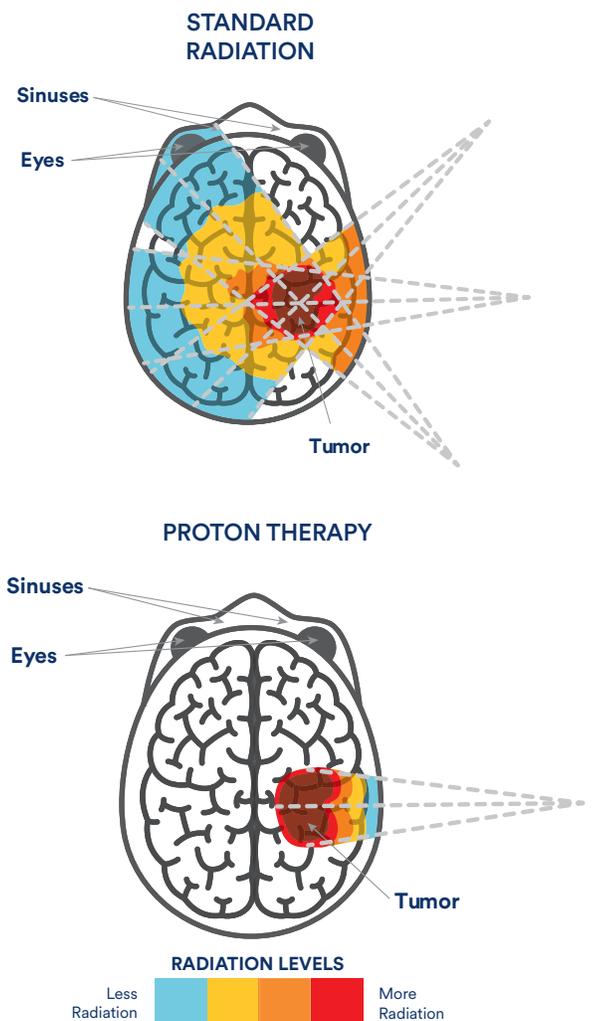
## Brain and Central Nervous System Tumors

The brain is very complex. A tumor of the brain, whether benign (non-cancerous) or malignant (cancerous), can create serious health concerns. Benign brain tumors can press on sensitive areas or become malignant over time. Tumors can originate in the brain or spread there from other areas. Either way, treatment of the brain might have long-term effects on the nervous system or other organs. If you or someone you love has been diagnosed with a brain tumor, we recommend you learn about all your options before you decide what treatment to get.

## Advantages of Proton Therapy

Too much radiation to the brain can cause neurological problems. Proton therapy precisely targets the tumor to minimize radiation to brain tissues, eyes, optic nerves, and the pituitary gland. This reduces the chance of secondary cancers and helps the patient keep better overall brain function. Because proton therapy avoids healthy tissue, higher, more curative doses of radiation can be used in treatment.

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



The illustration shows the difference between standard X-ray radiation and proton radiation, where fewer healthy tissues are subjected to radiation.

## Treatment Options at a Glance

- **Proton therapy:** Proton therapy is a non-invasive treatment that uses proton radiation to kill cancer cells by preventing them from dividing and growing. **Considerations:** Proton therapy sends less radiation to healthy brain tissue than standard therapy that uses X-rays.
- **Standard therapy with X-rays:** X-ray therapy is a commonly used treatment to kill cancer cells. The X-rays prevent the cancer cells from dividing and growing. Options include intensity-modulated radiation therapy (IMRT) and 3D conformal therapy. **Considerations:** X-ray therapy is often suitable for metastatic tumors or when there is more than one tumor in the brain.
- **Surgery:** The surgeon will remove as much of the tumor and affected cells as possible. **Considerations:** Radiation may still be needed to make sure all cancerous cells have been removed.
- **Chemotherapy:** Chemotherapy is the use of drugs to kill or alter the cancer cells in the brain. It is often combined with other therapies. **Considerations:** Brain tumors often do not respond well to chemotherapy drugs. The drugs become more useful when they're used with other therapies.

## 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. All our physicians are experts in proton therapy and other forms of radiation. They will provide you with an expert recommendation for you to consider.

### Find out more.

To learn more about proton therapy for brain cancer or to schedule a consultation, please call us at **888.645.6934** or visit **[fredhutch.org/protontherapy](http://fredhutch.org/protontherapy)**

### Fred Hutchinson Cancer Center - Proton Therapy

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