

This article was written for the Childhood Brain Tumor Foundation, Germantown, MD.

Proton Therapy: A Treatment Option for Children with Brain Tumors



The diagnosis of a brain tumor is never welcome news for anyone. But this type of cancer is especially problematic in children, as their developing nervous systems are particularly sensitive to the effects of radiation, a major form of treatment for brain and other solid pediatric tumors.

Despite careful measures to minimize damage to healthy tissue close to the brain tumor, conventional radiation therapy, which uses X-rays to destroy cancer cells, may result in impaired growth, cognitive deficits, and the other undesirable long-term side effects.

Massachusetts General Hospital is one of only three hospitals in the U.S. that offers another alternative—proton beam therapy—for children with brain tumors, such as medulloblastomas and ependymomas, as well as optic gliomas and skull-base tumors. Through the department of Radiation Oncology’s Northeast Proton Therapy Center, young patients undergo treatment that delivers high-dose radiation precisely to their tumor while minimizing damage to healthy tissue.

Protons, which are generated by a cyclotron, deposit their radiation dose differently than X-rays, which are generated by a linear accelerator. In general terms, X-rays deliver energy to the entire area, while proton beams primarily target only the tumor. This property is especially valuable when treating tumors close to sensitive tissues or critical organs, such as the brain.

Proton treatment for brain tumors requires highly individualized planning to ensure that the radiation conforms precisely to the tumor throughout the entire course of treatment, which is typically administered five days a week for 4 to 6 weeks.

Requiring the expertise of a multidisciplinary team under the direction of the patient’s radiation oncologist, this planning involves using computed tomography (CT) and sometimes magnetic resonance imaging (MRI) to create three-dimensional images of the tumor and surrounding structures so that radiation can be appropriately dosed and targeted. It also requires creating individualized devices to position and immobilize the patient so that each day’s treatment can be accurately and consistently reproduced. Young children unable to remain still for treatment planning and daily treatments may also require general anesthesia.

For more information about the Northeastern Proton Therapy Center through Massachusetts General Cancer Care for Children, call 617-724-1836 or visit www.massgeneral.org/cancer.

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