Proton Beam Radiation Therapy

Proton beam therapy is an advanced type of radiation therapy aimed at destroying cancerous cells using protons. The treatment offers sub-millimeter precision that delivers high-energy proton beams directly to tumors, minimizing damage to surrounding healthy tissue.

Benefits of Proton Therapy

- Proton therapy is especially beneficial for cancers in sensitive areas and for children.
- High-energy, precisely-targeted proton beams can deliver high doses of radiation to destroy cancerous cells, reducing recurrence rates for many cancer cases.
- Proton therapy is non-invasive and may reduce side effects.
- Patients treated with proton therapy may have increased tolerance for chemotherapy.
- Patients can maintain their current quality of life during and after treatment.
- It is sometimes used effectively to treat areas that have already been treated with radiation.
- Proton therapy can treat both malignant and benign tumors.

Cancer Treated by Proton Therapy

Proton therapy most often treats tumors in sensitive areas where conventional therapy may not be the best option. Proton therapy is a beneficial option for treating pediatric cancers because it can minimize damage to their smaller and still developing bodies. Proton therapy is not appropriate for all cancers, but it is particularly applicable to treat certain cancers including:

- Anal
- Bladder
- Brain
- Breast
- Cervical
- Colorectal
- Esophageal
- Head, neck, and skull base
- Lymphoma
- Liver
- Lung and thorax
- Ovarian
- Pancreatic
- Pediatric
- Prostate
- Sarcoma
- Spinal
- Stomach
- Recurrent disease
- Testicular
- Uterine

How Proton Therapy Works

Creating Protons: Protons are extracted from hydrogen atoms and accelerated to almost the speed of light using a cyclotron. Electromagnets focus and bend the protons down a beamline to a treatment room.

Precise Targeting: Using images from a patient's computed tomography (CT) and/or magnetic resonance imaging (MRI), a radiation oncologist and his/her team plan the therapy that directs proton beams at the targeted tumor while minimizing exposure to normal tissues. The gantry rotates around the patient, who is lying on a robotic table, and uses magnets to steer and focus the proton beam to precisely deliver radiation to conform to the shape, size, and depth of the tumor. The protons delivered to the tumor then destroy the cancerous cells, while minimizing damage to the surrounding tissue.

Proton beams can be targeted so that the highest energy of the beam is deposited at the tumor site to kill cancer cells. Less radiation is delivered as the proton beam enters the body and little to no radiation is delivered after it hits the tumor, reducing damage to surrounding healthy tissue and potential acute and late side effects.

Adaptive Treatment Planning: Proton therapy may also utilize ongoing treatment planning based on the most current and accurate "picture" of the tumor possible. Repeat scans during a treatment course assess the changing, shrinking tumor volume. The clinical team may adapt the treatment plan to continue targeting only the tumor to minimize exposure to nearby healthy tissue.

Duration: Treatment sessions typically last for 15-40 minutes with the complete course of treatment lasting an average of six weeks.

Sources: American Brain Tumor Association, National Cancer Institute, and National Association for Proton Therapy

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Targeting Cancer, Precisely