ProCure Proton Therapy Center

Pencil Beam Scanning – More Precise Proton Therapy

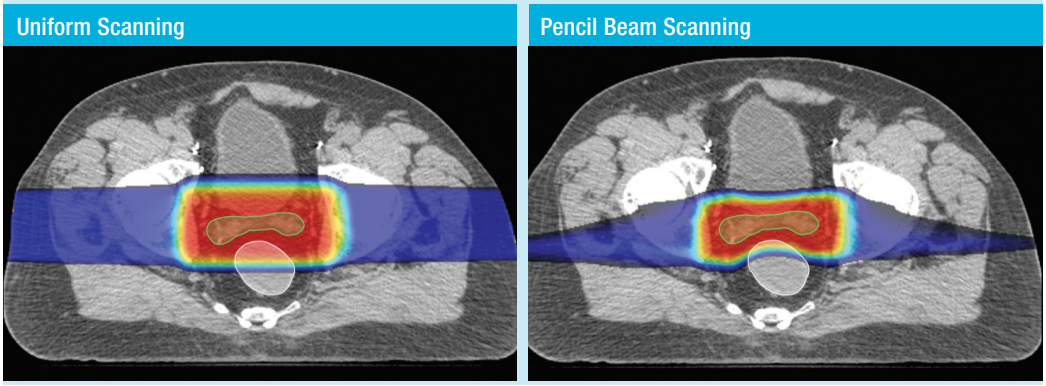
CoRadiation oncologists have used proton therapy for over 50 years to effectively treat solid tumors with a lower integral dose per treatment than photon (X-ray) therapy. Conventional delivery method for proton therapy is a passive scattering through apertures to shape the proton beam and deliver a uniform dose to the tumor.

Now Pencil Beam Scanning (PBS) provides a new technique which not only maintains the maximum dose to the tumor but dramatically decreases acute or long term toxicity to surrounding tissues.

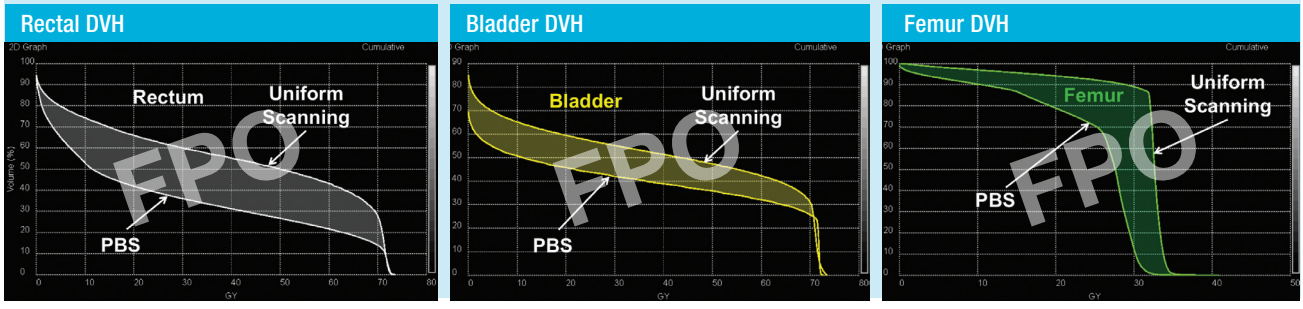
This new advantage is due to an ability to more accurately target the tumor. PBS provides precise control over plotting the proton beams, allowing radiation oncologists to distribute energy in a pattern that essentially mimics the size and shape of a solid tumor – while avoiding surrounding structures almost completely.

Pencil Beam Scanning – A New Delivery System

Pencil Beam Scanning builds on the benefits of proton therapy. With PBS a radiation oncologist can control exactly where the proton releases the bulk of its energy.



Post Prostectomy



Area beneath the curves represents a significant reduction of dose to normal tissue with the use of PBS compared to uniform scanning.

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Pencil Beam Scanning meets the goal of radiation oncology:

“Deliver the maximum does of radiation to the malignant tumor with minimum damage to healthy surrounding tissue.”

More Targeted

With this technology, ultra fine proton beams are directed by powerful scanning magnets which steer them one-by-one through the tumor, sweeping a single proton beam back and forth across the tumor. This deposits the radiation doses layer by layer like the brush strokes of a painter.

New Benefit: *PBS is ideal for adaptive planning to sites where the tumor size may change. The previous proton delivery system would require the design and construction of new apertures and compensators which could delay treatment for several days.*

Higher Concentration of Dose Goes to Tumor

The typical tumor may have between 1,000 and 2,000 proton spots arranged in up to 24 layers in a single treatment. Because of this ability to intricately plan the treatment, the radiation dose is deposited with maximum potency to the exact dimensions of the tumor – thereby leaving the nearby tissue untouched and drastically reducing side effects.

New Benefit: *Improved 3D conformity to the target tumor means nearby organs and other healthy tissue are more protected from radiation toxicity.*

Little to No Radiation Outside the Tumor

Using rapidly fired pulses to hit each programmed spot within the tumor with a prescribed dose of radiation, it begins at the deepest level and then layers up, line by line in succession (like a 3D printer) until the entire tumor is saturated with the radiation.

New Benefit: *The new delivery method spares a greater amount of adjacent healthy tissue, and likewise reduces the risk of secondary malignancies in pediatric patients.*

Shorter Treatment Time

PBS has the capacity to approach a tumor from multiple directions, which makes it ideal to deliver high doses of radiation to irregularly shaped tumors as well as those embedded near to or wrapped around critical structures. The ability to create a “U” shape around critical areas like the eye, brain or esophagus means these organs are preserved and protected from scattered radiation.

New Benefit: *There is no more need to laboriously construct the beam shaping devices, resulting in greatly reduced treatment times for patients.*

Specific Sub Group Application

PBS is especially beneficial to patients who have solid tumors with defined borders.

New Benefit: *Because of the reduced toxicity, this delivery method allows for increased use of combined radiation and chemotherapy modalities.*

Increased Re-Treatment Options

Approximately 20-30 percent of all patients treated with X-ray therapy will ultimately fail locally. PBS allows for this sub-group to be retreated because of its tissue-sparing delivery system.

New Benefit: *Patients who use PBS initially may diminish or completely avoid acute and/or long term skin toxicity, resulting in permanent discoloration and/or thinning of the epidermis as well as subcutaneous fibrosis.*