



## How Proton Therapy Works

A unique form of radiation treatment, proton therapy uses the latest technological advances in physics, computer science, engineering and medical diagnostics to produce and aim a proton beam that precisely targets tumors.

Proton therapy destroys cancer cells and minimizes damage to healthy cells by delivering a powerful punch of radiation right to the tumor site. Because proton beam radiation can be more precisely controlled, doctors can prescribe higher doses of radiation with less impact on the health of surrounding tissue.

Protons have physical characteristics different from X-rays commonly used in conventional radiation, such as IMRT. X-rays enter the body at a high energy level, travel through the body to the tumor, and then exit the body on the other side, exposing all tissue in their path to damaging radiation. In contrast, protons enter the body at a low energy level and release most of their energy upon impact with the tumor, so there is no "exit" dosage of radiation to healthy tissue. This results in a low incidence of side effects and, especially in children, fewer long-term effects. The targeted dose of radiation is also a benefit when the tumor is located in sensitive areas like the eye, brain, head, neck, lung or prostate.

### **Making the Proton Beam**

It all starts with water, H<sub>2</sub>O. Through electrolysis, protons are obtained from water. These protons are then injected into a 440,000-pound cyclotron, where they are accelerated to two-thirds the speed of light. They are then guided through a pipeline with magnets into one of four treatment rooms. Electromagnets keep the beam on track and a beam degrader device slows the protons to an optimal energy for treatment. The speed at which the proton travels will dictate how far the proton will travel through the patient's body and where it will stop and release its energy.

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### Treating the Patient

When a patient is referred to the UF Health Proton Therapy Institute, our physicians will work with the referring physician to determine whether the patient is a candidate for the treatment. Once a patient has received a diagnosis and proton therapy is prescribed, a team of clinicians pinpoints the tumor, measuring its exact depth and size to precisely deliver proton beams to the tumor while avoiding damage to healthy organs. During treatment, the patient lies on a sophisticated treatment table and is placed into position with the guidance of precision lasers. The circular gantry can move the treatment nozzle 360 degrees around the patient, stopping to aim the proton beam at the best entry point to deliver radiation to the tumor. Patients receive daily treatment over a six- to eight-week period and the referring physician is kept up-to-date on the patient's progress.

For more information about the UF Health Proton Therapy Institute, please visit [www.floridaproton.org](http://www.floridaproton.org), or call (904) 588-1800 or toll-free (877) 686-6009.

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