

Using Proton Therapy to Treat Pediatric Cancers

Overview

Proton therapy is a powerful treatment tool for fighting pediatric cancers, and it is available to patients at the Maryland Proton Treatment Center (MPTC). Physicians at MPTC use the latest pencil-beam scanning (PBS)/intensity modulated proton therapy (IMPT) to target tumors and deliver high doses of radiation with unmatched precision.

Because children are still growing, they are more susceptible to the side effects of chemotherapy and traditional radiation therapy. Proton therapy is different: the accuracy of the proton beam limits the chance that healthy tissue around the tumor will be affected. This has shown the potential to lower the risks of short-term side effects that pediatric patients often develop during their treatment as well as complications later in life, such as growth and developmental delays and secondary cancers.

Proton therapy can be used to treat a wide variety of pediatric cancers, such as:

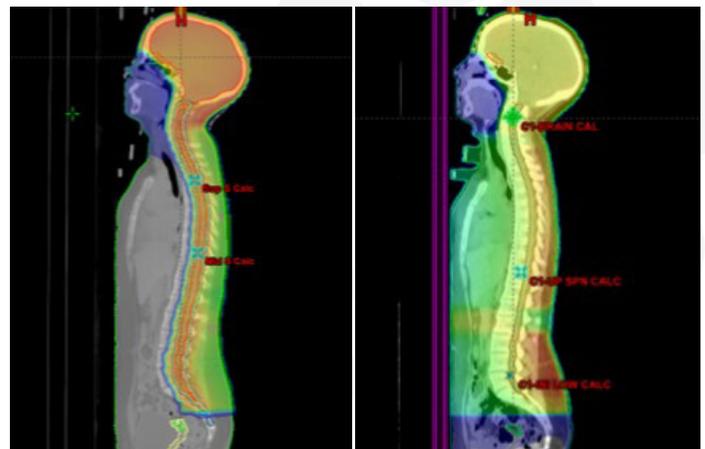
- Atypical teratoid rhabdoid tumors (AT/RTs)
- Craniopharyngioma
- Ependymoma
- Ewing's sarcoma
- Germ cell tumors
- Low- and high-grade gliomas, including juvenile pilocytic astrocytomas and optic pathway gliomas
- Lymphomas, including Hodgkin's disease
- Medulloblastomas and primitive neuroectodermal tumors (PNETs)
- Neuroblastoma
- Optic pathway glioma
- Pituitary adenoma
- Recurrent tumors, including recurrent benign tumors
- Rhabdomyosarcoma

For more information

on our currently available clinical trials, please call our research department at **410-369-5353**.

Proton Therapy Versus Photon Therapy

Because of the physics of proton particles, proton radiation goes to the site of the tumor and stops. This means that proton therapy allows for higher doses of radiation to be delivered to the tumor while minimizing damage to surrounding healthy tissue and organs. The image below shows the areas surrounding the tumor exposed to radiation (dose delivered to tumor and surrounding tissue shown in color) during treatment. The proton therapy (*left*) delivers significantly less radiation to the surrounding areas than the photon treatment (*right*).



Proton therapy

Photon therapy

MPTC-Specific Clinical Trial Offerings

MPTC is dedicated to advancing scientific knowledge about the role of proton therapy in the treatment of pediatric cancers. All patients treated at the center have access to a wide range of clinical trials available through the Maryland Proton Alliance. Plans are also underway at MPTC to open in-house clinical trials in addition to multi-institutional trials.

Clinical trials at MPTC include:

- NCT01255748: Evaluation Tracking Project: A Prospective Chart Review of Patients Treated with Radiation Therapy
- NCT01696721: Pediatric Proton Consortium Registry (PPCR): A Multi-Center Registry of Pediatric Patients Treated with Proton Radiation Therapy

The Magic Castle Program

On a pediatric patient's first day of treatment at MPTC, he or she will be taken to the Magic Castle to make three wishes. Through the support of the Children's Cancer Foundation, MPTC is able to grant one wish for each child. On the last day of treatment, a special ceremony is held at the Magic Castle and the child is presented with one of their wishes come true. The Magic Castle serves as a joyful symbol of hope for young patients.

Outcomes

Your patients may be hesitant to explore different treatment options and may pose questions related to side effects and outcomes. Proton therapy is an effective, noninvasive, low-risk treatment option that can improve the quality of life for cancer patients and survivors. Clinical literature in pediatric oncology supports this treatment's power and precision, and proton therapy's unique properties can improve outcomes for many pediatric patients with cancer.¹⁻² Studies have shown reduced doses to organs at risk when utilizing proton therapy, which is expected to result in a decreased risk of heart disease and radiation-induced breast cancer when treating tumors in the chest.³⁻⁴

Proton therapy is also expected to result in a decreased risk of infertility when treating pelvic tumors.⁵

A 2016 study authored by University of Maryland Professor of Radiation Oncology Robert Malyapa concluded that pencil beam scanning proton therapy led to excellent outcomes in children with rhabdomyosarcoma (RMS), which is one of the most common types of soft-tissue cancer in children.⁶ Systematic review of studies of patients treated with proton therapy have indicated equivalent tumor control and survival outcomes with an improved side effect profile favoring proton therapy as compared to photon therapy.⁷

About the Maryland Proton Treatment Center

The Maryland Proton Treatment Center is affiliated with the University of Maryland Marlene and Stewart Greenebaum Comprehensive Cancer Center, an NCI-designated comprehensive cancer center.

MPTC is focused on clinical excellence, affordability, accessibility, as well as comfort and convenience for your patients. In addition, our team has initiated the Maryland Proton Alliance to bring the latest research and clinical trials to patients and physicians. We have taken a leadership role in the industry by offering proton therapy at the same cost as IMRT.

MPTC provides a unique level of proton therapy experience and expertise. Our University of Maryland Department of Radiation Oncology physicians have a combined 20-plus years of proton therapy experience. Associate Professor and MPTC Medical Director Charles Simone has more than 5 years of experience from the University of Pennsylvania Proton Therapy Center; Professor Robert Malyapa has more than 12 years of experience from the Paul Scherrer Institute, which is world renown as a key innovator of proton therapy, and University of Florida Proton Therapy Institute; Assistant Professor Adeel Kaiser has three years of experience from the Loma Linda Proton Therapy Center and Assistant Professor Shahed Badiyan trained at the Paul Scherrer Institute.

The dedicated pediatric team from the University of Maryland Department of Radiation Oncology is fully integrated with the University of Maryland Children's Hospital (UMCH). UMCH is recognized statewide and regionally as a center of excellence for children with critical illnesses and complex, chronic conditions. The Division of Pediatric Hematology/Oncology at UMCH is nationally recognized for its comprehensive pediatric cancer program and provides groundbreaking research, clinical trials and treatment.

Contact Information

To refer a patient or to discuss treatment options with one of our physicians, please call **410-369-5200** or email us at info@mdproton.com.

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¹ "Comparing Intelligence Quotient Change After Treatment With Proton Versus Photon Radiation Therapy for Pediatric Brain Tumors." J Clin Oncol. 2016;34(10):1043-9.

² "Preliminary results of a phase II trial of proton radiotherapy for pediatric rhabdomyosarcoma." J Clin Oncol. 2014;32(33):3762-70.

³ "A comparative study on the risks of radiogenic second cancers and cardiac mortality in a set of pediatric medulloblastoma patients treated with photon or proton craniospinal irradiation." Radiother. Oncol. 2014; 113, 84-88.

⁴ "Breast cancer screening for childhood cancer survivors after craniospinal irradiation with protons versus x-rays: a dosimetric analysis and review of the literature." Pediatr. Hematol. Oncol. 2013; 35, 462-467.

⁵ "Preserving fertility in adolescent girls and young women requiring craniospinal irradiation: a case report and discussion of options to be considered prior to treatment." J. Adolesc. Young Adult Oncol. 2014; 3(2), 96-99.

⁶ Malyapa R. "Tumour control and Quality of Life in children with rhabdomyosarcoma treated with pencil beam scanning proton therapy." Radiother Oncol. 2016 Jul;120(1):163-8.

⁷ "Proton therapy in children: a systematic review of clinical effectiveness in 15 pediatric cancers." Int. J. Radiat. Oncol. Biol. Phys. 2016. 95(1), 267-278.