

Using Proton Therapy to Treat Sarcomas

Overview

Proton therapy is a powerful treatment tool for sarcoma, and it is now 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. Using proton therapy, the tumor can receive higher doses of radiation, while sparing more of the surrounding healthy tissue.

Sarcomas can be challenging to treat depending on their location, type, and other factors. They may require high doses of radiation to have an oncologic effect, yet they may be located near critical structures that could be damaged by high doses of radiation. Proton therapy can reduce side effects and allow for safer dose escalation for sarcomas in challenging anatomic locations such as the head and neck, retroperitoneum, pelvis, and spine. Proton therapy is also safe to deliver concurrently with chemotherapy agents.

This revolutionary treatment is a non-invasive and low-risk option, which can benefit patients with sarcomas, including:

- Angiosarcoma
- Chondrosarcoma
- Ewing's sarcoma
- Fibrosarcoma
- Gastrointestinal stromal tumor
- Leiomyosarcoma
- Liposarcoma
- Malignant peripheral nerve sheath tumor
- Osteosarcoma
- Pleomorphic sarcoma
- Rhabdomyosarcoma
- Synovial sarcoma

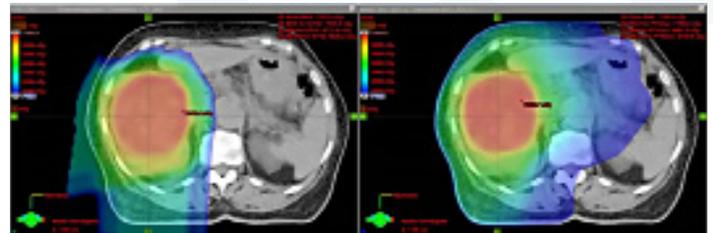
Proton therapy is likely to benefit additional sarcoma patient subgroups, including:

- **Pediatric patients:** While there is no threshold below which radiation is risk free, proton therapy can expose a smaller volume of tissue to radiation, offering a benefit for pediatric patients, whose growing bodies are especially susceptible to radiation damage.
- **Patients with disease recurrence:** Proton therapy can aim a higher dose of radiation precisely at the site of the recurrence, limiting normal tissue exposure and potentially leading to better outcomes

- **Patients with a retroperitoneal location:** Proton therapy can aim higher doses of radiation therapy while avoiding the bowel and kidneys.

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 without damaging surrounding healthy tissues 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

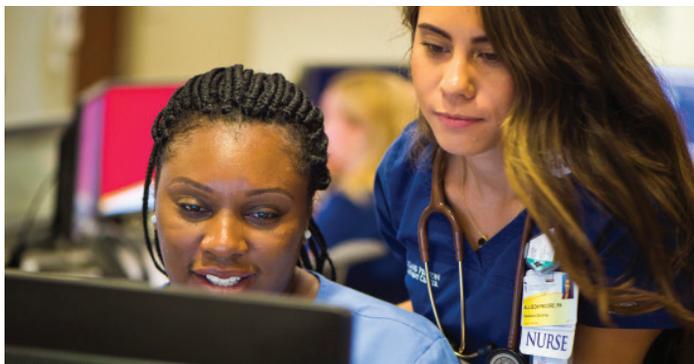
MPTC-Specific Clinical Trial Offerings

MPTC is dedicated to advancing scientific knowledge about the role of proton therapy in the treatment of sarcoma. All patients treated at the center have access to a wide range of clinical trials available through the Maryland Proton Alliance, including currently open and additional planned in-house and multi-institutional clinical trials.

Current clinical trials at MPTC include:

- NCT01255748: Evaluation Tracking Project: A Prospective Chart Review of Patients Treated with Radiation Therapy

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



Outcomes

Your patients may be hesitant to explore new treatment options for sarcoma and may pose questions related to side effects and outcomes. Studies are ongoing, and early results confirm this proton treatment's power and precision. Proton therapy's unique properties can improve outcomes for many patients with sarcoma.

In 2014, a study of proton therapy's long-term outcomes for sarcoma patients found that local control was high in patients with primary tumors and late morbidity was acceptable.¹

A study comparing proton therapy with conformal photon therapy and IMRT found both proton therapy and IMRT to be more conformal and homogeneous than photon therapy and identified proton therapy's dosimetric advantage.² A study of osteosarcoma patients published in *Cancer* concluded that, "proton therapy to deliver high radiotherapy doses allows locally curative treatment for some patients with unresectable or incompletely resected osteosarcoma."³ Overall, prospective data demonstrate an improvement in local control by using proton therapy for dose escalation with an acceptable toxicity profile.

In a study of retroperitoneal sarcomas, proton therapy was found to be able to "deliver sufficient radiation dose to the posterior margin to control microscopic residual disease. This strategy may minimize radiation-related morbidity and reduce local recurrence."⁴

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.

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 "Long-term results of Phase II study of high dose photon/proton radiotherapy in the management of spine chordomas, chondrosarcomas, and other sarcomas." *J Surg Oncol*. 2014 Aug;110(2): 115-122.

² "Comparison of three-dimensional (3D) conformal proton radiotherapy (RT), 3D conformal photon RT, and intensity-modulated RT for retroperitoneal and intra-abdominal sarcomas." *Int J Radiat Oncol Biol Phys*. 2012 Aug 1;83(5):1549-1557.

³ "Proton-based radiotherapy for unresectable or incompletely resected osteosarcoma." *Cancer* 2011 Oct 1;117(19): 4522-4530.

⁴ "Proton-beam, intensity-modulated, and/or intraoperative electron radiation therapy combined with aggressive anterior surgical resection for retroperitoneal sarcomas." *Ann Surg Oncol*. 2010;17(6):1515-29.