

Using Proton Therapy for Reirradiation

Overview

Proton therapy is a powerful treatment tool for fighting a variety of cancers, and it is now available to patients at the Maryland Proton Treatment Center (MPTC). Physicians at MPTC use the most advanced form of proton therapy, called pencil-beam scanning (PBS), or intensity modulated proton therapy (IMPT) to target tumors with unmatched precision, while minimizing damage to surrounding healthy tissue.



When any part of the body is radiated a second time, the risk of short- and long-term side effects increases.

Proton therapy can be used for reirradiation of almost any disease site. The ability of proton therapy to spare normal tissues that have been previously irradiated can be particularly helpful for this high-risk scenario.

According to a 2014 study, “there are special cases where proton therapy may offer a substantial potential benefit compared to photon treatments where toxicity concerns dominate. Reirradiation may theoretically be made safer with proton therapy due to lower cumulative lifetime doses to sensitive tissues.”¹

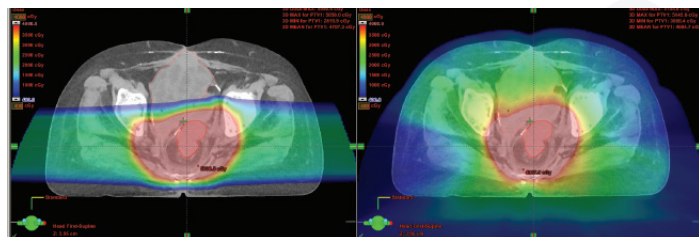
For this reason, patients who have previously received radiation from prior cancers are often good candidates for proton therapy’s precision targeting. For patients with disease recurrence, proton therapy can aim a higher dose of radiation precisely at the site of the recurrence, limiting normal tissue exposure and potentially leading to better outcomes.

IMPT can allow for dose escalation, resulting in potentially improved cure rates. IMPT is also well suited for tumors with complex shapes: the proton beam “paints” the radiation on layer-by-layer. These attributes allow physicians to treat tumors aggressively while reducing the risk of short- and long-term side effects of reirradiation.

Proton Therapy Versus Photon Therapy

One reason proton therapy is so promising in reirradiation scenarios is that the highly targeted proton beams go to the site of the tumor and stop, eliminating “exit radiation.” Like photon therapy, proton therapy can be used alone, or in conjunction with surgery and/or chemotherapy.

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 cancer. 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.

Clinical trials at MPTC include:

- NCT01730950: Randomized Phase II Trial of Concurrent Bevacizumab and Reirradiation Versus Bevacizumab Alone as Treatment for Recurrent Glioblastoma

¹“Special cases for proton beam radiotherapy: re-irradiation, lymphoma, and breast cancer.” Semin Oncol. 2014 Dec;41(6):807-819.

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.**

Published Research and Outcomes

MPTC is led by nationally recognized radiation oncologists from the University of Maryland School of Medicine who are involved in cutting-edge research and clinical trials.

Your patients may be hesitant to explore new treatment options and may pose questions related to side effects and outcomes. Proton therapy's unique properties can improve outcomes for many patients with a variety of cancers who are undergoing radiation for a second time.

A study of patients with chordoma found that "full-dose proton reirradiation of recurrent chordoma is clinically feasible and provides encouraging initial local disease control and survival."² Likewise, a 2015 study of pediatric intracranial ependymoma found proton reirradiation to be "safe and efficacious."³

In a 2017 multi-center prospective clinical trial report authored by MPTC Medical Director Charles B. Simone, II, he found "Proton RT is ideally suited to the challenge of reirradiation" and that prolonged survival can be achieved for recurrent lung cancer.⁴

In a 2016 publication, Dr. Simone also found reirradiation to be feasible and associated with limited toxicity for gynecologic tumors.⁵

In 2016, researchers examined reirradiation for patients with esophageal cancer and their data showed that "proton reirradiation is feasible, with an encouraging symptom control rate, modest radiation-related toxicity, and favorable survival in this high-risk population."⁶ For patients with locally recurrent head and neck cancers, reirradiation represents "the only potentially curative option," according to a 2016 multi-institutional study of early outcomes. The researchers concluded that "Proton beam reirradiation of the head and neck can provide effective tumor control with acceptable acute and late toxicity profiles likely because of the decreased dose to the surrounding normal, albeit previously irradiated, tissue."⁷

For patients with squamous cell carcinoma of the head and neck (HNSCC), a 2016 study demonstrated that reirradiation of HNSCC patients using proton therapy can result in improved sparing of surrounding organs that may "translate into lower severe complication rates."⁸

Another 2016 clinical study of recurrence head and neck cancers found that "proton beam therapy can be a safe and effective curative reirradiation strategy."⁹

About the Maryland Proton Treatment Center

MPTC 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**.

Maryland Proton Treatment Center
850 West Baltimore Street
Baltimore, MD 21201
410-369-5200
mdproton.com

² "Proton Therapy for Reirradiation of Progressive or Recurrent Chordoma." Int J Radiat Oncol Biol Phys. 2013 Dec 1;87(5):1107-1114.

³ "Use of proton therapy for reirradiation in pediatric intracranial Ependymoma." Radiother Oncol. 2015 Aug;116(2):301-308.

⁴ Simone CB 2nd et al. "Multi-Institutional Prospective Study of Reirradiation with Proton Beam Radiotherapy for Locoregionally Recurrent Non-Small Cell Lung Cancer." J Thorac Oncol. 2017 Feb;12(2):281-292.

⁵ Simone CB 2nd et al. "Proton radiotherapy for gynecologic neoplasms." Acta Oncol. 2016 Nov;55(11):1257-1265.

⁶ "A Prospective Study of Proton Beam Reirradiation for Esophageal Cancer." Int J Radiat Oncol Biol Phys. 2016 May 1;95(1):483-487.

⁷ "Proton Beam Reirradiation for Recurrent Head and Neck Cancer: Multi-institutional Report on Feasibility and Early Outcomes." Int J Radiat Oncol Biol Phys. 2016 May 1;95(1):386-395.

⁸ "Benefit of particle therapy in reirradiation of head and neck patients. Results of a multicentric in silico ROCOCO trial." Radiother Oncol. 2016 Dec;121(3):387-394.

⁹ "Reirradiation of Head and Neck Cancers With Proton Therapy: Outcomes and Analyses." Int J Radiat Oncol Biol Phys. 2016 Sep 1;96(1):30-41