Overview
Proton therapy is a powerful treatment tool for fighting skull base tumors, 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 receives maximum-dosed radiation, while sparing more of the surrounding healthy tissue.

This revolutionary treatment is a non-invasive and low-risk option that delivers highly precise beams of protons. Proton therapy can be an excellent treatment option for skull base tumors because it can deliver high doses of radiation to the tumor without damaging healthy tissue including the brainstem, optic chiasm and visual/auditory pathways. 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 radiation therapy.

Specific tumor types that can benefit from proton therapy include:
- tumors of cranial nerves
- schwannoma (acoustic neuroma)
- esthesioneuroblastoma
- glomus tumors
- mengioma
- orbital tumors
- tumors of the middle ear
- optic nerve sheath meningioma
- optic nerve glioma
- lacrimal gland/lacrimal sac tumors
- head and neck cancers: nasopharynx, oropharynx, tonsil, base of tongue, nasal cavity and paranasal sinus, nasopharynx, skin with perineural invasion
- skull base chordoma and chondrosarcoma

Proton therapy is likely to benefit additional skull base tumor patient subgroups, including:
- **Patients with prior radiation to the head or neck:** When any part of the body is radiated a second time, the risk of short- and long-term side effects increases. For this reason, patients who have previously received radiation to the head or neck from prior cancers are often good candidates for proton therapy’s precision targeting.
- **Patients with disease recurrence:** Proton therapy can aim a higher dose of radiation precisely at the site of the recurrence, limiting normal tissues’ exposure and potentially leading to better outcomes.
- **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.

Proton Therapy Versus Photon Therapy
One reason proton therapy is so promising 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).
MPTC-Specific Clinical Trial Offerings
MPTC is dedicated to advancing scientific knowledge about the role of proton therapy in the treatment of skull base tumors. 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.

Current clinical trials at MPTC will soon include:

- **NCT01893307**: Phase II/III Randomized Trial of Intensity-Modulated Proton Beam Therapy (IMPT) Versus Intensity-Modulated Photon Therapy (IMRT) for the Treatment of Oropharyngeal Cancer of the Head and Neck Cancer
- **NCT01255748**: Evaluation Tracking Project: A Prospective Chart Review of Patients Treated with Radiation Therapy (available now)

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

Published Research
The Maryland Proton Treatment Center 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. Below are several published papers, co-authored by our own Dr. Robert Malyapa, highlighting research involving proton treatment for patients with skull base tumors.


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

A 2014 study of skull base chordomas found proton therapy to be an effective treatment modality.1 In 2016, a large study reported the outcome of patients with low-grade skull base chondrosacroma treated with pencil-beam scanning, concluding that “data indicate that protons are both safe and effective.”2

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.

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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