The Cranial-Base Program
A Multidisciplinary Approach to Rare, Complex Tumors

**KEY POINTS**

- Neoplasms of the cranial base are among the most complex and challenging conditions to treat.
- Depending on their location, cranial-base tumors can affect vision, hearing, olfaction, speech, swallowing, movement, or cognition.
- Many patients require both surgery (open and/or endoscopic) and radiation therapy; some may benefit from chemotherapy, as well.
- The inherently conformal nature of proton radiation therapy is particularly important for patients with cranial-base tumors.
- Cranial-Base Program specialists have expertise in minimally invasive procedures and microvascular reconstruction.
- Therapy must be aimed not only at improving survival, but also on preserving neurologic function and maximizing quality of life.
- Achieving the best possible outcomes for cranial-base tumors requires experience, expertise, and a highly multidisciplinary approach.

Because of their location close to a dense concentration of critical structures (the cranial nerves, spinal cord, and major blood vessels to and from the brain), neoplasms of the cranial base — the bony interface separating the brain from the structures outside the cranium — are among the most complex and challenging conditions to treat. Whether benign or malignant, cranial base tumors may be equally problematic; depending on their location, they can affect vision, hearing, olfaction, speech, swallowing, movement, or cognition.

Achieving the best possible outcomes for patients with these tumors requires a blend of experience, specialized expertise and a highly multidisciplinary approach to diagnosis, treatment, and follow-up care.

With the goal of providing the highest possible cure rates and functional and aesthetic results for patients with cranial-base tumors, specialists from the Massachusetts General Hospital Cancer Center Stephen E. and Catherine Pappas Center for Neuro-Oncology and the Massachusetts Eye and Ear Infirmary (MEEI) Department of Otolaryngology joined together to create the Mass General Cancer Center/MEEI Cranial-Base Program (see page 15).

The Mass General Cancer Center/MEEI Cranial-Base Program provides evaluation and state-of-the-art, multimodality treatment of all types of cranial-base tumors, including:

- acoustic neuroma
- chondrosarcoma
- chordoma
- craniopharyngioma
- esthesioneuroblastoma
- glomus tumor
- meningioma
- pituitary adenoma
- sinonasal carcinoma
- squamous cell carcinoma involving the cranial base
- other types of sarcoma
- trigeminal schwannoma

Involving clinicians spanning a broad range of specialties and subspecialties, the Mass General Cancer Center/MEEI program is one of only a few in the nation to offer this breadth and depth of expertise for patients with these complex disorders.
The program’s team comprises:
- neurosurgery
- head and neck oncology and reconstructive surgery
- otolaryngology
- rhinology/endoscopic sinus surgery
- radiation oncology
- radiology, neuroradiology
- head and neck medical oncology
- otology, neurotology
- neuroradiology
- neuropathology
- ophthalmology, oculoplastic surgery
- speech and language therapy rehabilitation services

As needed, other Mass General and MEEI subspecialists may be involved in patients’ treatment, including, for example, clinicians from Mass General’s Neuroendocrine Clinical Center or MEEI’s voice specialists.

**Multidisciplinary team approach**

For the convenience of patients and families, many of whom travel considerable distances to receive care through the program, every effort is made to schedule appointments with the appropriate specialists on the same day during the program’s weekly clinic.

The multidisciplinary Cranial-Base Program team meets twice monthly to discuss new and/or complex patients and ensure that the treatment plans reflect the consensus of all experts. This conference is also used to review images and records sent by physicians or patients seeking a consultation or second opinion. Because treatment for each patient must be individually tailored based on the tumor characteristics and location, extent of disease, the patient’s age and anatomy, and numerous other factors, this integrated, team approach is essential to achieving the best possible outcomes.

For example, many patients with cranial-base tumors require both surgery (open and/or endoscopic) and radiation therapy (some may benefit from chemotherapy, as well), so the close collaboration among surgical subspecialists and radiation oncologists (and, when appropriate, medical oncologists) in developing a coordinated, properly timed treatment plan is vital. Collaboration is equally, if not more, critical for many surgical treatments, which often require the highly choreographed teamwork of two or more surgical subspecialists (e.g., a neurosurgeon and an otolaryngologist or head and neck surgeon) working side-by-side in the operating room.

**Proton radiation therapy**

The Mass General Cancer Center/MEEI Cranial-Base Program has several major strengths that differentiate it from other programs. One is the availability of the Cancer Center’s Francis H. Burr Proton Therapy Center, the only proton therapy facility in the Northeast. Many patients with cranial-base tumors require radiation therapy; the inherently conformal nature of proton therapy, which offers superior dose distribution while sparing normal tissue, is particularly important for patients with cranial-base tumors. The benefit of proton therapy may be lifesaving for some patients with tumors who require high radiation doses to optimize the chance of tumor control or a cure.

**Minimally invasive expertise**

Another key strength of the program is its expertise and experience in minimally invasive cranial-base surgery, which it has played a key role in developing. Navigating a
The Massachusetts General Hospital Cancer Center/Massachusetts Eye and Ear Infirmary Cranial-Base Program

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The Massachusetts General Hospital Cancer Center/Massachusetts Eye and Ear Infirmary (MEEI) Cranial-Base Program provides multidisciplinary, state-of-the-art care for patients with malignant or benign tumors and other disorders affecting the cranial base and the cranio-cervical junction between the brain and the face and neck.

Bringing together experts from the Cancer Center’s Stephen E. and Catherine Pappas Center for Neuro-Oncology and the Department of Otolaryngology at MEEI, this program offers a multidisciplinary approach and the most advanced diagnostic and therapeutic modalities for the treatment of these complex disorders. The program’s specialists also offer treatment for non-tumor conditions including trauma and central spinal fluid leaks.

The Cranial-Base Program offers consultations; treatment in partnership with referring physicians; or complete, long-term patient management that includes:
- evaluation and diagnosis
- the most advanced surgical, radiologic, and medical treatments, including minimally invasive endoscopic surgery and proton radiation therapy
- access to multi-center clinical trials
- comprehensive support and rehabilitation services, including social work, physical and occupational therapy, speech therapy, nutrition

For more information about the services of the Mass General Cancer Center/MEEI Cranial-Base Program or to refer a patient, please call 877-789-6100, or visit massgeneral.org/cancer. Appointments can usually be arranged within one week.

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**SELECTED REFERENCES AND RESOURCES**


The North American Skull Base Society: nasbs.org
pathway to the skull base using an endoscope placed through the nose, surgeons can resect some large skull-base tumors without making an incision and can avoid retraction on the brain. Furthermore, the field of view provided by the endoscope improves access to deep lesions and allows for more intraoperative flexibility, making tumor resection safer around critical structures.

The surgical team also has expertise in microvascular reconstruction, a critical component for repair of skull-base defects left after radical resection of malignant tumors. Whether open, endoscopic, or a combination of the two, the program’s surgical approach is always driven by the goal of achieving optimal outcomes.

High patient volume is another advantage in the treatment of these rare disorders, as this has been shown to be associated with better outcomes. For example, a 2005 paper authored by several members of the program’s neurosurgical team and published in the Journal of Neurosurgery (see Selected References) demonstrated that patients in the United States undergoing craniotomy for meningioma between 1988-2000 had significantly lower rates of in-hospital mortality when treated in hospitals with the highest patient volumes. Specifically, the in-hospital mortality rate for hospitals performing 24 or more craniotomies annually for meningioma was approximately 5% versus about 18% for hospitals with a caseload of just one to three patients.