Neurosurgery
Residency Training Program
Massachusetts General Hospital
Harvard Medical School
Boston, Massachusetts
The goal of the residency training program at the Massachusetts General Hospital (MGH) is to train neurosurgeons who will become leaders in academic neurosurgery. The program has a long and proud tradition of training surgeons who have made major clinical and scientific contributions to the field of neurosurgery. More recently, the program has undergone a significant expansion with appointment of new faculty members and the planned move into new operative suites and patient units in the Building for the Third Century (B3C), with a doubling of the department’s laboratory space. The program is dynamic, growing, and strongly positioned to continue this tradition of leadership into the 21st century.

The philosophy of the program is to expose residents to a large number of high-quality cases spanning the entire range of neurosurgery. The Massachusetts General Hospital is a tertiary referral center for the entire New England area as well as for many parts of the United States and the world. Accordingly, the program benefits from access to an excellent variety and quantity of cases. As training progresses, residents gain more responsibility in performing surgery and in managing cases. This process reaches its culmination when the trainee becomes a full attending of the North service at the MGH for a six-month period at the end of the program. During this period the North attending has full admitting and operating privileges and runs his or her own service with the support of the faculty.

In addition to excellent clinical training, the program also has a strong emphasis on research. Residents spend two years in a laboratory of their choice as part of the residency training. The research opportunities in the Boston area are unrivaled and include the MGH (the largest recipient of NIH funding among US hospitals), Harvard Medical School, and the Massachusetts Institute of Technology. The MGH residents have historically been extremely productive during this research period and many have converted their research experience into successful scientific and academic careers.

The program is designed to allow residents to concentrate on neurosurgery and to still have time for personal growth. The hospital has excellent ancillary staff in nursing, hematology, radiology, and other services so that residents can focus their energies. In addition, we have a dedicated eighteen-bed Neuroscience ICU that is staffed continuously. Finally, there is a tradition in the program of respect and camaraderie among the residents, and between the residents and staff which leads to an exceptionally supportive and stimulating educational environment. The combination of excellent clinical training, superb research, and the many outstanding opportunities available at the MGH allows graduating residents to successfully pursue the career track of their choice.

‘We aim to produce excellent clinical surgeons with a passion for pushing forward the frontiers of neurosurgery’
The basic training model for our residency program is one of direct patient care and gradual assumption and mastery of clinical and operative skills under the guidance of experienced attending neurosurgeons. There is no substitute for direct and frequent surgical experience in training competent neurosurgeons. Moreover, the field is highly diverse with many subspecialties (Functional, Pediatric, Peripheral Nerve, Tumor, Skull-base, Spine, Vascular). Skills mastered in one area, for example spinal instrumentation, do not readily transfer to other areas such as epilepsy surgery or endovascular surgery. Hence it is essential that residents be exposed to each subspecialty in sufficient depth and breadth to become fully competent. Hence the program is designed to give each trainee a focused experience in each of the main subspecialties working in close conjunction with an expert senior attending.

The residency program is structured into six-weeks to six-months blocks. All residents proceed through the various rotations sequentially, gaining experience and responsibility as they progress. The structured nature of the program allows the trainees to plan their time, studies, and research efforts. This organization leads to a more predictable and productive training experience.

### THE PROGRAM

#### Clinical Training

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### PGY Overview:

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| PGY 3 - Year Three | PGY 6 - Year Six |
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| Children’s Hospital - (three months) | West Team Chief - (six months) |
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### Program Descriptions:

#### PGY 1 – YEAR ONE:

**General Surgery – MGH (six months)**

Beginning with July 2009, the ACGME restructured the training programs to integrate the PGY 1 year into neurosurgery programs. Residents match directly into neurosurgery to become acclimated with the requisite and fundamental skills associated with neurosurgery education. The PGY-1 program includes six months in General Surgery of structured rotations in surgery, critical care, trauma, and other related rotations. Residents also spend three months of training in neurology, six weeks in Neurosurgery, and six weeks in neuro-critical care.
Neurosurgery & ICU – MGH (three months)
This is the resident’s first exposure to neurosurgery. He or she begins developing basic skills in the assessment and pre-operative, post-operative, and outpatient management of neurosurgical patients.

The resident will gain increased familiarity with a focused neurological examination in the context of acute trauma, stroke or hemorrhage. He or she will also gain increasing familiarity with the various diagnostic modalities such as CT, MRI, and Ultrasound.

The resident will learn fundamental aspects related to the management of neurological and neurosurgical patients in the neuroscience ICU. Specific areas of focus will include the management of intracranial pressure, management of IV fluids, and basic management of acute neurological, cardiac, and pulmonary issues common to these patients. Residents will learn by rounding with the ICU fellows and Attendings, by conferences, and by supervised management of patients.

Neurology Service – MGH (three months)
During this rotation the resident shares clinical responsibilities with MGH Neurology residents taking part in the activities and conferences of that service. This includes familiarization with MRI, CT, EEG and other diagnostic techniques.

PGY 2 – YEAR TWO

Endovascular Neuroradiology – MGH (three months)
The objective of this rotation is to give the trainee a comprehensive educational experience in endovascular surgical neuroradiology. The trainee works closely with Dr. Ogilvy and other members of the endovascular team performing diagnostic angiograms, and participating in therapeutic procedures such as coiling and embolization.

This expertise includes the management of patients with neurological disease, the performance of endovascular surgical neuroradiology procedures, and the integration of endovascular surgical neuroradiology therapy into the clinical management of patients.

West Team Junior – MGH (three months)
The resident shares clinical responsibilities with the West Senior Resident caring for patients under the direct supervision of the responsible Staff neurosurgeon. He or she will acquire the skills necessary to manage uncomplicated emergencies, participate in pre- and post-operative patient care, and evaluate straightforward outpatient neurosurgical problems.

Simple invasive ward procedures and basic operative techniques are learned. Clinical responsibilities, including Emergency Ward coverage, are carried out under the supervision of the North Attending neurosurgeon and other MGH Staff including Senior Residents.

Radiosurgery – MGH (three months)
This rotation provides exposure to radiosurgery and its important role in the management of intracranial disorders. The resident will become familiar with the indications for treatment and planning of single fraction radiosurgery, primarily proton beam radiosurgery and the linear accelerator (LINAC). The trainee will become familiar with some radiobiology and radiation physics, as well as the avoidance of critical neuroanatomic structure,

North Team Junior – MGH (three-six months)
In this rotation the resident assists the recently graduated North Service Attending. Clinical responsibilities include Emergency Ward and ICU coverage and a significant opera-
tive experience under the supervision and guidance of senior residents and staff. During this period, residents gain extensive diagnostic and operative skills.

**PGY 3 – Year Three**

*East Team Junior – MGH (three months)*
The resident shares clinical responsibilities with the East Senior Resident to care for patients on the East Team. The East Team includes staff members with interests in vascular, functional, and pediatric neurosurgery. The East Junior has a significant operative experience and shares in the clinical management of the patients.

*Boston Children’s Hospital (three months)*
MGH residents spend three months at Boston Children’s Hospital. During this period, the residents gain additional experience in the clinical and surgical management of pediatric patients.

*Spine Team Senior – MGH (six months)*
This rotation provides a concentrated, systematic exposure to the management of spinal disorders including spinal tumors and spinal instrumentation. The spine senior is also responsible for organizing material for the weekly resident journal club.

**PGY 4 and PGY 5 – Year Four and Five**

*Research / Fellowship*
Years four and five are dedicated to research. Residents are encouraged to immerse themselves in one of the many excellent neuroscience labs. Clinical responsibilities are proportionately decreased. During the first research year, the residents take night call 1-2 times per week. The second year of research is free of any clinical responsibilities. Residents take the written portion of the neurosurgery boards.

**PGY 6 – Year Six**

*East Team Senior – MGH (six months)*
The East Senior assumes a large role in the operative and clinical management of complex cases under the supervision of the staff neurosurgeons on the East Team. The East

Residents can work with the program director and Chief of Neurosurgery to make the program as flexible as possible. As Dr. Brian Hoh, a recent graduate said “I came to Mass General for the excellent clinical experience, wide range of neurosurgical specialization, excellent mentoring from leaders and experts in their respective fields, and excellence in laboratory and basic science research. I knew early on from my research experience and interest in the pathophysiology of cerebrovascular disease that I wanted to pursue a career in cerebrovascular. I knew that in order to pursue [this career] I would like to do a two-year fellowship in endovascular neurosurgery and interventional neuro-radiology and Dr. Martuza and Dr. Chapman allowed me the flexibility to complete that full training within my residency.”
Senior works closely with the East Junior and plays an important teaching role. Operative experience is extensive with a special emphasis on vascular problems including aneurysms, arteriovenous malformations, and occlusive cerebrovascular disease.

**West Team Chief Resident – MGH (six months)**
The West Chief Resident plays a large role in the operative and clinical management of complex tumor and spine cases under the supervision of the staff neurosurgeons on the West Team. There is a special emphasis on technically difficult tumors of the skull base. The West Chief resident is also in charge of the call schedule, the operating room assignments, and has considerable responsibility for the teaching and supervision of other residents.

**PGY 7 – Year Seven**

**South Team Chief Resident – MGH (six months)**
The South Chief Resident manages the South Team and works closely with the Chief of Service, Dr. Robert Martuza. The clinical emphasis is on brain tumors and on learning the issues involved in managing a busy academic practice. In addition, there is a significant experience with the transsphenoidal approach to pituitary tumors.

**North Attending – MGH (six months)**
The North Attending is appointed as full member of the neurosurgery staff. The North attending has his or her own office, secretary, and clinic. In addition, the North attending has full admitting and operating privileges. The North Attending is assisted by the North Junior Resident, a nurse practitioner, and residents. During this period, the North attending performs a wide spectrum of cases including brain tumors, aneurysms, trauma and a variety of spinal cases. Most graduates feel that this period is the highlight of the training because they are performing a large and varied number of major cases while still having the support of the other Attendings for particularly unusual or challenging cases. Formal teaching rounds are held on a weekly basis and with the Attending neurosurgeon of the week.

In addition to formal rounds, the North Attending meets informally with other Attendings for case management and teaching discussions. The North Attending does not take part in the in-hospital call rotation.

One of the most attractive and unique aspects of the program is the North Attending position at the end of the residency training. In a comment by Dr. Joseph Neimat, a recent graduate, he said, “I think what initially drew me to Mass. General and what is still the most attractive aspect of the residency here is the North Chief-ship which gives you the opportunity to operate as an independent surgeon for an outstanding number and variety of cases, yet with the full advantage of the neurosurgery staff here for advice and guidance when necessary,” said Joseph Neimat, who joined the clinical faculty in the North Attending position in June 2004. “I think as the Chief Resident in most programs you are afforded some responsibility; you get your choice of cases but you still are not operating independently, not making your own decisions, and that I think is the biggest leap forward that you make as a surgeon. I think everybody does this during their first year of practice, but the opportunity to do it while still with the ability to fall back on experts in every area of the field is a real advantage, and is a nice way to take that first step.”
Stephen E and Catherine Pappas
Center for Neuro-oncology
The neuro-oncology center is a multi-disciplinary group including neurooncologists, neurosurgeons, and radiation oncologists. Cases are referred from all over the world. About 500 brain tumor cases are performed each year at the MGH. Of these about 100 cases per year are for vestibular schwannomas.

Functional and Stereotactic Center
The functional and stereotactic center provides treatment for epilepsy, movement disorders, pain and certain chronic psychiatric disorders. There is also a practice in microvascular decompressions and certain other pain syndromes. There specific multidisciplinary conferences including ones for epilepsy (weekly), movement disorders (biweekly), and psychiatric neurosurgery (monthly). Overall there are about 400-500 functional cases per year.

Neurovascular Center
The MGH Neurovascular Center offers multiple modalities of treatment including endovascular and open treatment of aneurysms, arteriovenous malformations, cavernous malformations and carotid stenosis. Approximately 350 craniotomies are performed for vascular disorders each year. A multidisciplinary case conference is held for two hours each week where 15-20 patients are reviewed and decisions are made on treatment modality based on estimated risks and efficacy of each treatment.

Pediatric Neurosurgery Center
The formation of the MassGeneral Hospital for Children has led to an active pediatric neurosurgery program. The MGH Pediatric Neurosurgery Unit specializes in the surgical treatment of pediatric brain and spinal tumors, hydrocephalus, spinal dysraphism, and other disorders in conjunction with a team including pediatric neurooncologists and pediatric medical oncologists.

Pituitary Tumor - Neuroendocrine Center
The Neuroendocrine Center has a very active program and about 120 transsphenoidal operations for pituitary tumors are performed each year. Many cases are performed utilizing the intra-operative MRI at the MGH.

Proton Stereotactic Radiosurgery Center
The Proton Beam Neurosurgical Program was founded in 1961 and has the largest
experience with proton-based stereotactic radiosurgery of any center in the world. The Francis H. Burr Proton Therapy Center is located on the MGH main campus and offers treatment for a variety of benign and malignant tumors as well as arteriovenous malformations.

Spine and Peripheral Nerve Center
The spine surgery program at MGH includes a large number of the staff and is particularly strong in spine tumors and complex spinal instrumentation. Approximately 1000 spine cases are performed by neurosurgeons at the MGH of which about 30% involve some type of instrumentation.

CLINICAL FACULTY

Robert L. Martuza, M.D., William and Elizabeth Sweet Professor of Neuroscience
Chief, Department of Neurosurgery
Clinical Interests: Brain, pituitary, and spinal tumors; acoustic neuromas; meningiomas, peripheral nerve tumors; and stereotactic neurosurgery.

Fred G. Barker II, M.D., Associate Professor of Surgery (Neurosurgery)
Director, Cranial Base Center
Clinical Interests: Skull base tumors, primary and metastatic brain tumors, microvascular decompression.
Research Interests: Prospective clinical trials, large database analysis and Statistical Methodology

Lawrence F. Borges, M.D., Associate Professor of Surgery (Neurosurgery)
Director, Neurosurgical Spine Center
Clinical Interests: Spinal tumors, Arnold-Chiari, Spinal disorders
Research Interests: Physiology of Corneal Innervation


William E. Butler, M.D., Assistant Professor of Surgery (Neurosurgery)
**Clinical Interests:** Computer assisted minimally invasive neurosurgery and endoscopic neurosurgery. Tethered spinal cord, disorders of cerebrospinal fluid dynamics-including hydrocephalus and syringomyelia, congenital anomalies-including Chiari malformation, and pediatric brain and spinal tumors, craniosynostosis.

**Research Interests:** Functional neuroimaging


Paul Chapman, M.D., Nicholas T. Zervas Professor of Neurosurgery
Director, Cyclotron Proton Beam/Neurosurgical Radiosurgery Unit
Unit Chief, Pediatric Neurosurgery
**Clinical Interests:** Stereotactic Radiosurgery and Radiation Oncology, Pediatric Neurosurgery

**Research Interests:** The Radiobiology of Proton Beam Radiation


Jean-Valéry Coumans, M.D., Assistant Professor of Surgery (Neurosurgery)
**Clinical Interests:** Spinal disorders, complex spinal instrumentation

**Research Interests:** Spinal cord injury


William Curry, M.D., Assistant Professor of Surgery (Neurosurgery)
**Clinical Interests:** Benign and Malignant Tumors of the Brain, Spine and Spinal Cord Tumors, Neurofibromatosis, minimally invasive / endoscopic skull base surgery
Research Interests: Tumor immunology, Immunotherapy for brain tumors, Brain tumor clinical trials.

Emad Eskandar, M.D., Associate Professor of Surgery (Neurosurgery)
Director of Stereotactic and Functional Neurosurgery
Director, Neurosurgery Residency Training Program
Clinical Interests: Epilepsy, movement disorders, microvascular decompression for trigeminal neuralgia, brain and spinal tumors
Research Interests: Cortical and basal ganglia physiology, deep brain stimulation
Pezaris JS, Eskandar EN. Getting signals into the brain: visual prosthetics through thalamic microstimulation. Neurosurg Focus. 2009 Jul;27(1)

Ernest S. Mathews, M.D.
Director, Facial Pain/Trigeminal Neuralgia Center;
Director of Evaluations, Neurosurgical Spine Center
Clinical Interests: Trigeminal Neuralgia, Spine Disorders.
Research Interests: Trigeminal Neuralgia

Michael D. Medlock, MD
Clinical Interests: Pediatric Neurosurgery, Spinal disorders
Research Interests: Gene therapy

Christopher S. Ogilvy, M.D., Robert G. and A. Jean Ojemann Professor of Neurosurgery
Director, Brain Aneurysm/AVM Center;
Director, Cerebrovascular Surgery Unit
Clinical Interests: Intracranial aneurysms, arteriovenous malformations, carotid artery disease, cavernous malformation, spinal arteriovenous malformation, Moya-Moya disease
Research Interests: Cerebral protection, vasospasm, clinical outcomes, tissue engineer-
ing for aneurysm treatment

Johnny C. Pryor, M.D., Instructor in Surgery (Neurosurgery)
Clinical Interests: Interventional Neuroradiology, Cerebrovascular
Research Interests: Emolic treatment of cerebrovascular disease.

Brooke Swearingen, M.D., Associate Professor of Surgery (Neurosurgery)
Co-Director, Neurological Intensive Care Unit
Clinical Interests: Pituitary tumors, skull base tumors, spinal disorders
Research Interests: Intraoperative MRI imaging, neuroendocrine disorders

Ziv Williams, MD., Assistant Professor of Surgery (Neurosurgery)
Clinical Interests: Reconstructive peripheral nerve surgery, stereotactic and functional neurosurgery for epilepsy, movement and mental disorders, neural prosthetics, tumors of the brachial plexus and peripheral nerves, surgery of the spine, general neurosurgery.
Research Interests: Understanding the mechanisms by which individual neurons communicate locally and across cortical areas, and investigate new approaches for reconstituting the line of communication across areas disrupted within the CNS.
There are many areas of research within MGH Neurosurgery including the Molecular Neuroscience Laboratory, the Molecular Neuro-Oncology Laboratory, the Laboratory of Molecular Neurophysiology, the Center for Nervous System Repair, the Laboratory for Cellular Engineering and the Laboratory for Sensorimotor Integration. Residents can develop research projects in conjunction with the Neurosurgery research faculty, in collaboration with other MGH departments and throughout the Harvard or MIT communities. The clinical faculty, most of whom have a significant research interest, are joined in the department by basic researchers covering a broad spectrum of neurobiology, neurophysiology, and neuropathology. One example is the Center for Nervous System Repair headed by Dr. Jeffrey Macklis, Director which offers exciting new opportunities. “We are focused in the general fields of CNS repair, neural precursor /"stem cell" biology, and adult neurogenesis. We are working toward the cellular repair of cerebral cortex output neuron circuitry lost in neurodegenerative diseases and damaged by spinal cord injury (in particular, corticospinal motor neurons and the corticospinal tract). We are especially focused toward induction of adult neurogenesis; elucidating the molecular controls over the development of corticospinal motor neurons and other important lineages of cortical projection neurons; directed differentiation of replacement neurons; and functional integration of replacement neurons derived from adult neural precursors, also called “adult neural stem cells”.

Resources
The quality of research at MGH is outstanding. It is the single largest recipient of NIH funding among independent hospitals at about 600-700 million dollars per year. Neurosurgery has outstanding facilities at the Main Campus, Simches Research Center, and the Charlestown Navy Yard campus. Within the department we have excellent facilities.
with about 4000 square feet of space housing the laboratories of Drs. Martuza, Curry and Rabkin at the new Simches Center. We also have an additional 4000 square feet of space in the Edwards building housing the labs of Drs. Macklis. Finally, we have about 5000 square feet of space in the Thier building housing the labs of Drs. Eskandar, Williams, Pezaris, and Sweadner. In addition, there are excellent core facilities, with large and small animal surgical suites, and two outstanding machine shops.

The program contains two contiguous and dedicated research years for the trainees. The trainees are not required to work in departmental labs and frequently choose to work at one of the many outstanding labs at MGH, MIT, or Harvard Medical School. The trainees are also encouraged to obtain their own research fellowships, and about 90% are successful in doing so. Most trainees find the research time to be a pivotal period and use the experience as a springboard to obtaining the next level of funding and moving directly into academic careers without necessarily doing additional fellowships. Three recent graduates are excellent examples, with Manish Aghi, MD now a faculty member at UCSF; Clark Chen, MD PhD a faculty member at the Beth Israel and Dana Farber Cancer Center; and Dan Cahill, MD PhD, a faculty member at MD Andersen Cancer Center.

RESIDENTS BRIAN NAHED AND SAMEER SHETH

Sameer Sheth, MD, PhD
“...My research interests are in functional neurosurgery, including neurophysiology and mapping. As neurosurgeons we have a unique opportunity to study the physiology of the human brain, whether during deep brain stimulation procedures for Parkinson’s Disease, or with chronically implanted electrodes in patients with medically intractable epilepsy. My current projects include studying the role of the subthalamic nucleus and nucleus accumbens in decision-making and risk, the role of the cingulate gyrus in contending with cognitive interference, and the role of the pre-frontal cortex in motor planning. Dr. Eskandar’s lab also offers the opportunity to study physiology in the controlled model of non-human primates. My primate research centers on neuromodulation and learning enhancement. I am also interested in developing better ways of mapping eloquent cortex intraoperatively. I am developing novel optical imaging techniques to provide high-resolution images of cortical function. MGH provides a unique blend of phenomenal surgical training with unparalleled research opportunities. The opportunities are endless and there is a camaraderie and support from your co-residents, attendings, and the larger Harvard Community that is unbelievable.”

Brian Nahed, MD
“I work at the MGH Cancer Center in the laboratory of Dr. Daniel Haber where we aim to identify and capture circulating tumor cells from glioma patients. In collaboration with Dr. Mehmet Toner and Dr. Maheswaran, we have designed a GBM specific microfluidic device which can isolate tumor cells from whole blood. Until now, methods at identifying circulating tumor cells were laborious and resulted in low yield and purity. However, using this device, we hope to capture and characterize these cells to better understand the mechanisms which lead to spread of gliomas and the relationship with the primary tumor. Through our project, we hope to provide patients and physicians the ability to better monitor disease and ultimately further our understanding to lead to our improved treatment.

The neurosurgical training at MGH is absolutely phenomenal - Upon completion of your junior residency, you are poised to jump into your lab years and work with leaders in science at Harvard, MIT, Dana Farber, the Broad. The number of resources available and the ease with which collaboration occurs allows for an unparalleled research experience.”
Accomplishments

They are too numerous to describe fully, but the department has several million annually in NIH funding by Neurosurgery PI’s. As mentioned, the residents have also been frequent recipients of their own fellowships including awards from the NIH (NRSA, K08) NREF, ABTA, Parkinson Disease Foundation, American Parkinson Disease Associations, Burroughs Welcome Fund, and many others. Numerous residents have had high quality publications in journals such as Nature Neuroscience, Nature Medicine, Journal of Neuroscience, Journal of Neurosurgery, and Neurosurgery, among many others.

Most recently, we have been awarded a prestigious R25 training grant by the NIH to support the resident research years.

RESEARCH FACULTY

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<th>Elena Aristakhova, PhD</th>
<th>Shelley Fried, PhD</th>
<th>John Penniston, PhD</th>
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<td>Lawrence Borges, MD</td>
<td>Giulia Fulci, PhD</td>
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<td>William E. Butler, MD</td>
<td>John Gale, PhD</td>
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<td>Paul H. Chapman, MD</td>
<td>Noriyuki Kishi, PhD</td>
<td>Samuel Rabkin, PhD</td>
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<td>Jean-Valery Coumans, MD</td>
<td>Jeffrey D. Macklis, MD, DHST</td>
<td>Kathleen Sewardner, PhD</td>
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<td>William T. Curry, M.D.</td>
<td>Robert L. Martuza, MD</td>
<td>Hiroaki Wakimoto, PhD</td>
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<td>Emad N. Eskandar, MD</td>
<td>Christopher S. Ogilvy, MD</td>
<td>Ziv Williams, MD</td>
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Residents at MGH are currently doing research in such varied areas as nervous system repair, viral gene therapy, molecular genetics, behavioral neurophysiology, movement disorders, learning and memory formation, spinal cord injury and repair. Dr. Sameer Sheth has undertaken his research under the direction of Dr. Emad Eskandar, who has both a busy clinical and extensive research program. “The basal ganglia play a critical but enigmatic role in many aspects of brain function including movement, motivation, reward, and addiction. The goal of our lab is to explore the role of basal ganglia in adaptive learning and motor control in awake-behaving primates and in human subjects undergoing surgery.”

Collaborative research is encouraged as shown by the project designed by recent graduate Dr. Dan Cahill. “I work in the lab with Dr. David Louis in pathology and we study the molecular genetics that are at the basis of primary brain tumors. In general we study gliomas and oligodendrogliomas and understand the molecular differences that are at the basis of their natural history. For example, all oligodendrogliomas are tumors that are markedly chemosensitive and that chemosensitivity has been correlated to a specific pattern of chromosome loss, and we try to understand what the basis for this is by analyzing these tumors in comparison to gliomas.” The most interesting thing about the research is that it gets at the basic biology of tumor genesis, so in many ways...you’re trying to discover something that is at the core of the process as opposed to things that are downstream. If you really understand [how] these things are caused, then you have a chance at a real hope for treatment.”

“Mass General’s at the forefront of research and it’s an exciting place to work, and certainly anybody who had a chance to work within this system would take it.” -- Dan Cahill
Residents are regularly exposed to lectures, informal group discussions and symposiums with leading national and international researchers, clinicians and neurosurgeons. The department sponsors annually a two-day Frye Halloran symposium which includes more than 20 leaders in the field of oncolytic viruses. In addition, the department has joined with neurology, psychiatry and the departments of otolaryngology and ophthalmology from the Massachusetts Eye and Ear Infirmary to organize a year-long neuroscience lecture series. MGH residents frequently present at American Association of Neurological Surgeons, the Academy of Neurological Surgeons, the Society of Neurological Surgeons, the Congress of Neurological Surgeons, Subspeciality or Section meetings and at local and regional meetings.

**RESIDENT SELECTION**

The department is committed to recruiting a talented and diverse group of residents. All factors are taken into account with no one factor taking precedence. We are interested in recruiting residents who are willing to work as a team and are committed to academic neurosurgery. Grades, board scores, and research are important factors but we are as interested in a candidate’s future potential as we are in their previous accomplishments.

The program accepts three residents a year.

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<th>Resident</th>
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<td>Travis Tierney, MD, PhD</td>
<td>Creighton</td>
<td>Johns Hopkins</td>
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<td>Wael Asaad, MD, PhD</td>
<td>Amherst</td>
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<td>Rollin Hu, MD</td>
<td>Stanford</td>
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<td>Jason Gerrard, MD, PhD</td>
<td>U of Arizona</td>
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<td>Eric Chang, MD</td>
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<td>Brian Nahed, MD</td>
<td>UCLA</td>
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<td>Sameer Sheth, MD, PhD</td>
<td>Harvard</td>
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<td>David Jho, MD, PhD</td>
<td>Yale</td>
<td>U of Illinois at Chicago</td>
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<td>Gavin Dunn, MD, PhD</td>
<td>Princeton</td>
<td>Washington U</td>
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<td>U of Arkansas</td>
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<td>Navid Redjal, MD, PhD</td>
<td>UCLA</td>
<td>Harvard</td>
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<tr>
<td>Brian Walcott,MD</td>
<td>Seton Hall Tech</td>
<td>Loyola</td>
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<tr>
<td>Giannina Garces-Ambrossi,MD</td>
<td>Mary Baldwin</td>
<td>Johns Hopkins</td>
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<td>Pamela Jones, MD</td>
<td>Stanford</td>
<td>Tulane</td>
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<td>Anoop Patel, MD</td>
<td>Yale</td>
<td>Harvard</td>
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**MEDICAL STUDENT ROTATION**

Students in their 3rd and 4th years of medical school who are interested in neurosurgery are encouraged to arrange for a rotation through the Harvard Medical School. For information visit the HMS website at http://medcatalog.harvard.edu This rotation is a great opportunity to explore the field of Neurovascular, Neuroncology, Spine, Pediatrics, and Functional neurosurgery. For information e-mail the HMS Registrar at exclerks@hms.harvard.edu Select clinical neurosurgery number SU509M.3A to ensure you are assigned to Massachusetts General Hospital Neurosurgery. If you have any questions, please contact the program director’s office at 617-726-5143.
Boston offers the best of a large, cosmopolitan city, coupled with a small-town neighborhood style of life. Virtually all attractions are within walking distance or are a short trip away as are several world-famous institutes of higher learning and numerous high-tech and bio-tech companies. This combination results in Boston being a vibrant and dynamic city in which to live. The Boston area has a tremendous wealth of cultural, educational, athletic, and recreational opportunities. What follows is only a brief synopsis of some of the offerings available in the Boston and New England area. The Boston area is home to more than 50 colleges and universities, with a young, educated, and international population. The city center is surrounded by neighborhoods. Each has its own flavor, style and attractions and are well-worth exploring. A walking tour of Boston’s Freedom Trail is a great way to learn the history of the city which prides itself on being the seat of the American Revolution. Some of the better-known areas where MGH residents have lived include Harvard Square in Cambridge, Beacon Hill, Back Bay, South End, North End, and Coolidge Corner. There are many dance clubs, live music venues, ethnic, and avant-garde restaurants catering to all tastes. Boston also has a rich cultural tradition and is home to the world-famous Boston Symphony Orchestra, Boston Ballet Company, and Boston Opera as well as the Museum of Fine Arts, Isabella Stewart Gardner Museum and the Museum of Science.
Each year the Boston Pops concert along the Charles River marks the celebration of the Fourth of July. The Boston area is home to four major league sports franchises - the Celtics, Bruins, Red Sox, and Patriots. Each team has a huge tradition and a loyal following. Watching a game live or with friends at a club is a unique experience in Boston. The Boston area offers unparalleled opportunities for sports and for outdoor activities. Near the hospital, the Esplanade is a great location for jogging, bicycling, or sailing on the Charles.

The Boston Marathon attracts the world’s elite runners at this annual world class event.

The Boston area has four distinct seasons although the weather is tempered by the city’s proximity to the ocean. There are limitless opportunities for outdoor recreation throughout the seasons. During the summer months Cape Cod, Martha’s Vineyard, and other area beaches provide beautiful getaways. Ferries can take you to Provincetown from downtown Boston. The White Mountains of New Hampshire and the Berkshire Mountains of western Massachusetts are within one-two hours by car and have hundreds of areas for hiking, camping, and fishing. During the summer the Boston Symphony moves to its summer home of Tanglewood, west of the city in the Berkshires. The fall foliage in New England is spectacular and attracts millions of so-called leaf peepers annually. During the winter months skiing and snowboarding are available at dozens of resorts, all within one-two hour drive.
Department of Neurosurgery
Massachusetts General Hospital
55 Fruit Street – White 502
Boston, Massachusetts 02114
617-726-8583
http://neurosurgery.mgh.harvard.edu

APPLICATIONS
Applications must be submitted via ERAS/NRMP.
Applicants must be graduates of a medical school accredited by the American Association of Medical Colleges.
Application deadline is November 1st