Department of Neurosurgery

Instruction in neurological surgery begins with an introduction to the anatomy and physiology of the nervous system presented in the first-year course in neural sciences directed by the Department of Neuroscience (http://neurosci.wustl.edu) with participation of the neurosurgery faculty. In the second year, the Department of Neurosurgery (http://www.neurosurgery.wustl.edu) presents the course in Diseases of the Nervous System in conjunction with the departments of Neurology, Pathology & Immunology, Molecular Microbiology, Medicine and Pediatrics. The course emphasizes how knowledge derived from basic or clinical investigations leads to improvements in clinical care. In the third year, students may elect to participate in a two- or four-week Neurosurgery clerkship which introduces them to the clinical care of patients with diseases of the nervous system. Neurosurgical faculty members work with the neurologists in providing lectures, demonstrations and teaching exercises in patients with neurological diagnoses as part of the Clinical Medicine course. Students may elect to fulfill their Neurology requirement by rotating on the neurosurgery service. Students may also choose neurosurgery as part of the Surgical Specialty rotations. Neurorsurgical diagnosis, critical care, operative treatment and ethical issues in patient management are emphasized. In the fourth year, students may choose from several advanced electives including clinical externships in neurosurgery and experiences in basic or clinical/translational research.

Neurosurgical Specialties

With one of the most comprehensive neurological programs in the region and in the nation, Washington University neurosurgeons offer exceptional care in a variety of specialties.

Tumors

The Department of Neurosurgery at Washington University School of Medicine offers a comprehensive, multidisciplinary approach for the treatment of all types of neurological tumors, including brain tumors, inoperable tumors, pituitary tumors, skull-base tumors, and spine tumors. Depending upon the type of tumor, our multidisciplinary team comprises ophthalmologists, otolaryngologists, radiation oncologists, neuroradiologists, neuroanesthesiologists, medical oncologists and other specialists.

Aneurysms and Cerebrovascular Disorders and Diseases

The multidisciplinary medical team focuses on treatment of aneurysms, arteriovenous fistulas, arteriovenous malformations, carotid stenosis, cavernous malformations, moyamoya, and stroke, and includes cerebrovascular surgeons, who perform microsurgical procedures; and interventional radiologists, who offer minimally invasive endovascular treatment options. We also have a team of critical care neurologists who coordinate post-procedure care in a dedicated neuro-intensive care unit as well as neurologists who coordinate neuro-rehabilitation care at The Rehabilitation Institute of St. Louis.

Spine Injury and Disorders

Washington University spinal neurosurgeons are recognized as national leaders in the treatment of disorders of the spine, spinal cord and peripheral nervous system. We use a multidisciplinary approach to treating spinal diseases and disorders. Personalized care of each patient is emphasized. Where appropriate, spine patients receive comprehensive, collaborative care from both neurosurgeons and specialists in thoracic surgery, vascular surgery, ear, nose and throat surgery, medical oncology, radiation oncology, anesthesia, pain management, and physiatry.

Peripheral Nerve

Washington University neurosurgeons work with a multidisciplinary group of surgeons, neurologists and therapists to customize patient treatments to maximize functional outcomes. Washington University neurosurgeons have extensive expertise in advance microsurgical reconstructive techniques and are on the forefront for new innovative ways to improve patient outcomes.

Pediatric Neurosurgery

The entire spectrum of neurosurgical disorders in children is treated by pediatric neurosurgeons and physicians in related disciplines. Our pediatric neurosurgeons also are part of multidisciplinary teams that provide care in several specialized pediatric centers: brachial plexus center, center for cerebral palsy spasticity, neurofibromatosis clinic, pediatric epilepsy center, pediatric gamma knife program, pediatric neuro-oncology program, and spina bifida clinic.

Epilepsy

Our neurosurgeons are nationally recognized for epilepsy patient care and research and are part of a multidisciplinary team that works together to develop the optimal plan to control or minimize seizures. The Department of Neurosurgery offers care for both adults and children with medically intractable seizures and provides a full range of surgical options for intractable epilepsy, including implantable seizure-control devices, resection of seizure foci, and vagal nerve stimulation.

Movement Disorders

The multidisciplinary team specializes in the treatment of movement disorders such as ataxia, catatonia, dystonia, essential tremor, Huntington's disease, myoclonus, Parkinson's disease, and Tourette Syndrome. For some patients with...
Parkinson's disease or essential tremor, medications are often inadequate to control disabling symptoms. These patients may benefit from stereotactic neurosurgical procedures to improve their function.

Website: http://www.neurosurgery.wustl.edu

Degrees & Requirements

While the Department of Neurosurgery does not offer its own degree, some of the department's courses are open to students in the MD and MSTP (MD/PhD) programs. Further information about the MD and MSTP degrees can be found in the Degrees & Programs Offered (http://bulletin.wustl.edu/medicine/degrees) section of this Bulletin.

Research

Michael R. Chicoine, MD
Phone: 314-747-6143
Outcomes analysis for adult patients with brain tumors. Current clinical studies focus on outcomes of patients with benign and malignant brain tumors utilizing a prospective brain tumor database. Particular emphasis includes the impact of intraoperative MRI (iMRI) upon outcomes for patients with brain tumors and other diseases. We are establishing a multicenter database pooling data from multiple iMRI centers in North America.

Ian G. Dorward, MD
Phone: 314-747-6142
Research interests include outcomes analysis in spinal reconstruction surgery, including the impact of age, obesity, and other clinical variables on costs, complications, and patient satisfaction. Another area of interest is the evaluation of novel techniques in spinal deformity correction and minimally invasive spinal surgery. Additional work focuses on etiologic factors in spinal deformity, both in adolescents and adults.

Gavin P. Dunn, MD, PhD
Phone: 314-747-6141
Studies focus on examination of molecular mechanisms in the endothelial cells and smooth muscle cells in the intracerebral microcirculation and the contribution of glial cells to their impairment after hypoxia/reoxygenation. In vitro techniques for studying isolated perfused microvessels are used to examine questions centered on endothelial smooth muscle and glial cell integration of cerebral blood flow responses.

Albert H. Kim, MD, PhD
Phone: 314-747-6141
I have laboratory and clinical research interests in the cancer stem cell state and the genetics of glioblastoma using human tumor specimens. I additionally have clinical projects examining patient outcomes for two common types of brain tumors, meningiomas and pituitary tumors.

Eric C. Leuthardt, MD
Phone: 314-747-6146
Pursuing research in the areas of neuroprosthetics, brain computer interfaces (BCIs), and advanced imaging modalities. These include opportunities in basic neurophysiology, engineering for BCIs, and functional MRI imaging research for applications toward brain tumors.

David D. Limbrick, MD, PhD
Phone: 314-454-4630
Clinical and translational research into newborn brain injuries, including post-hemorrhagic hydrocephalus. Main research areas include cerebrospinal fluid protein markers of disease, MRI diffusion tensor imaging, and prospective clinical trials. Also, multi-institutional clinical research opportunities exist for syringomyelia associated with Chiari I malformation.

T.S. Park, MD
Phone: 314-454-2810

Wilson Z. Ray, MD
Phone: 314-362-3114
Clinical and translational research on peripheral nerve and spinal cord injuries. Lab-based opportunities for longer research electives investigating peripheral nerve regeneration and peripheral neuroprosthetics incorporating transient electronics.

Keith M. Rich, MD
Phone: 314-747-6142
Research on neuronal and glioma cellular apoptosis after treatment with DNA-damaging agents. Techniques include growing human brain tumor cells in culture, bioassay for apoptosis with fluorescent staining, protein immunoblotting, and PCR.

Matthew Smyth, MD
Phone: 314-454-4454
Clinical outcomes studies for pediatric epilepsy surgery and craniosynostosis surgery, basic and translational research in advanced clinical imaging, and translational research in the development of focal brain cooling devices for the treatment of epilepsy.

Gregory J. Zipfel, MD
Phone: 314-747-6141
My NIH-funded research program involves both basic and clinical research efforts focused on two main conditions: 1) Cerebral amyloid angiopathy and its contribution to ischemic stroke, vascular dementia, and Alzheimer’s Disease; and 2) Vasospasm-induced delayed cerebral ischemia and long-term cognitive deficits following aneurysmal subarachnoid hemorrhage. My work spans from basic experimental methods including cell culture and ex vivo vascular techniques to in vivo studies utilizing animal models of ischemic stroke and
subarachnoid hemorrhage and live animal epifluorescent and confocal imaging to Phase I clinical trials in patients.

**Faculty**

**Department Head**
Ralph G. Dacey, MD

Visit our website for more information about our faculty (http://www.neurosurgery.wustl.edu/patient-care/find-a-physician/clinical-faculty-243) and their appointments.

<table>
<thead>
<tr>
<th>Faculty Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael R Chicoine, MD</td>
<td>Professor of Neurological Surgery (primary appointment)</td>
</tr>
<tr>
<td>August A. Busch, Jr.</td>
<td>Distinguished Professor</td>
</tr>
<tr>
<td>BS University of Illinois 1985</td>
<td>MD University of California 1990</td>
</tr>
<tr>
<td>Ralph G Dacey Jr, MD</td>
<td>Henry G and Edith R Schwartz Professor of Neurological Surgery (primary appointment)</td>
</tr>
<tr>
<td>Head of the Department of Neurological Surgery</td>
<td>BA Harvard University 1970</td>
</tr>
<tr>
<td>MD University of Virginia 1974</td>
<td></td>
</tr>
<tr>
<td>Ian G Dorward, MD</td>
<td>Assistant Professor of Neurological Surgery (primary appointment)</td>
</tr>
<tr>
<td>BS University of Colorado Boulder 2000</td>
<td></td>
</tr>
<tr>
<td>MD Washington Univ in St. Louis 2005</td>
<td></td>
</tr>
<tr>
<td>Joshua L Dowling, MD</td>
<td>Professor of Neurological Surgery (primary appointment)</td>
</tr>
<tr>
<td>MD Tulane University 1989</td>
<td></td>
</tr>
<tr>
<td>BA Yale University 1985</td>
<td></td>
</tr>
<tr>
<td>Gavin P. Dunn, PHD, MD</td>
<td>Assistant Professor of Neurological Surgery (primary appointment)</td>
</tr>
<tr>
<td>Assistant Professor of Pathology and Immunology</td>
<td></td>
</tr>
<tr>
<td>BA Princeton University 1998</td>
<td></td>
</tr>
<tr>
<td>PHD Washington Univ in St. Louis 2006</td>
<td></td>
</tr>
<tr>
<td>MD Washington Univ in St. Louis 2006</td>
<td></td>
</tr>
<tr>
<td>Robert L Grubb Jr, MD</td>
<td>Professor of Neurological Surgery (primary appointment)</td>
</tr>
<tr>
<td>Professor of Radiology</td>
<td></td>
</tr>
<tr>
<td>BA University of North Carolina 1961</td>
<td></td>
</tr>
<tr>
<td>MD University of North Carolina 1965</td>
<td></td>
</tr>
<tr>
<td>Ammar H Hawasli, MD, PHD</td>
<td></td>
</tr>
<tr>
<td>Assistant Professor of Neurological Surgery (primary appointment)</td>
<td></td>
</tr>
<tr>
<td>Assistant Professor of Neuroscience</td>
<td></td>
</tr>
<tr>
<td>Assistant Professor of Orthopaedic Surgery</td>
<td></td>
</tr>
<tr>
<td>MD University of Texas Southwest 2009</td>
<td></td>
</tr>
<tr>
<td>PHD University of Texas Southwest 2009</td>
<td></td>
</tr>
<tr>
<td>BA Washington Univ in St. Louis 2002</td>
<td></td>
</tr>
<tr>
<td>Matthew A Howard</td>
<td>Adjunct Assistant Professor of Neurological Surgery (primary appointment)</td>
</tr>
<tr>
<td>Sarah C. Jost</td>
<td>Adjunct Assistant Professor of Neurological Surgery (primary appointment)</td>
</tr>
<tr>
<td>Albert H Kim, MD, PHD, MA</td>
<td>Associate Professor of Neurological Surgery (primary appointment)</td>
</tr>
<tr>
<td>Associate Professor of Developmental Biology</td>
<td></td>
</tr>
<tr>
<td>Associate Professor of Neurology</td>
<td></td>
</tr>
<tr>
<td>MD New York U. School of Medicine 2003</td>
<td></td>
</tr>
<tr>
<td>PHD New York U. School of Medicine 2002</td>
<td></td>
</tr>
<tr>
<td>BA Harvard University 1994</td>
<td></td>
</tr>
<tr>
<td>MA Washington Univ in St. Louis 1999</td>
<td></td>
</tr>
<tr>
<td>Eric Claude Leuthardt, MD</td>
<td>Professor of Neurological Surgery (primary appointment)</td>
</tr>
<tr>
<td>Professor of Mechanical Engineering and Applied Science</td>
<td></td>
</tr>
<tr>
<td>Professor of Neuroscience</td>
<td></td>
</tr>
<tr>
<td>BS Saint Louis University 1995</td>
<td></td>
</tr>
<tr>
<td>MD University of Pennsylvania 1999</td>
<td></td>
</tr>
<tr>
<td>David D Limbrick Jr, PHD, MD</td>
<td>Professor of Neurological Surgery (primary appointment)</td>
</tr>
<tr>
<td>Professor of Pediatrics</td>
<td></td>
</tr>
<tr>
<td>PHD Virginia Comm University 2001</td>
<td></td>
</tr>
<tr>
<td>BS College of William and Mary 1995</td>
<td></td>
</tr>
<tr>
<td>MD Virginia Comm University 2001</td>
<td></td>
</tr>
<tr>
<td>Matthew R. MacEwan, PHD</td>
<td>Assistant Professor of Neurosurgery (primary appointment)</td>
</tr>
<tr>
<td>BS Case Western Reserve Univ 2004</td>
<td></td>
</tr>
<tr>
<td>PHD Washington Univ in St. Louis 2015</td>
<td></td>
</tr>
<tr>
<td>James Patterson McAllister, PHD</td>
<td>Professor of Neurological Surgery (primary appointment)</td>
</tr>
<tr>
<td>PHD Purdue University 1976</td>
<td></td>
</tr>
<tr>
<td>BA Earlham College 1970</td>
<td></td>
</tr>
<tr>
<td>Joshua William Osbun, MD</td>
<td></td>
</tr>
</tbody>
</table>
Assistant Professor of Neurosurgery (primary appointment)
MD University of Texas Southwest 2007
BA Texas A&M University 2002

P
Tae Sung Park, MD
Shi Hui Huang Professor of Neurological Surgery (primary appointment)
Professor of Neuroscience
Professor of Pediatrics
MD Yonsei University 1971
BS Yonsei University 1967

R
Wilson Z Ray, MD
Associate Professor of Neurological Surgery (primary appointment)
Associate Professor of Biomedical Engineering
Associate Professor of Orthopaedic Surgery
MD University of Iowa 2004

Keith M Rich, MD
Professor of Neurological Surgery (primary appointment)
Professor of Neuroscience
Professor of Radiation Oncology
MD Indiana University Bloomington 1977
BA Taylor University 1974

S
Paul Santiago, MD
Professor of Neurological Surgery (primary appointment)
Professor of Orthopaedic Surgery
BS Stanford University 1990
MD Yale University 1995

Gerwin Schalk
Adjunct Assistant Professor of Neurological Surgery (primary appointment)

Itender Singh, PHD
Assistant Professor of Neurological Surgery (primary appointment)
PHD UNIVERSITY OF DELHI 2004

Matthew D Smyth, MD
Professor of Neurological Surgery (primary appointment)
Professor of Pediatrics
MD University of CA San Francisco 1996
BA Cornell University 1992

Jennifer Mae Strahle, MD
Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Orthopaedic Surgery
Assistant Professor of Pediatrics
MD University of Minnesota 2008

BS Bates College 2002

W
Neill Marshall Wright, MD
Herbert Lourie Professor of Neurological Surgery (primary appointment)
Professor of Orthopaedic Surgery
MD University of California 1993
BA University of California 1989

Y
Hiroko Yano, PHD, MS
Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Genetics
Assistant Professor of Neurology
BS Science University of Tokyo 1991
PHD University of Tokyo 1996
MS University of Tokyo 1993

Liya Yuan, MS, PHD
Instructor in Neurological Surgery (primary appointment)
MS Tongji University 1987
PHD Tongji University 1994

Z
Gregory Joseph Zipfel, MD
Professor of Neurological Surgery (primary appointment)
Professor of Neurology
MD Northwestern University Med 1995
BS University of Illinois 1991

Courses

Clerkship Opportunities
Students may elect to obtain their neurology clerkship experience on the neurosurgery service, or they can choose neurosurgery as part of the surgical specialty rotations. Third-year students participate with the residents and attendings on hospital rounds, evaluate patients in the neurosurgery outpatient department and participate in the neurosurgical operating room. The main objectives of the rotation include: 1) the evaluation of comatose or head-injured patients; 2) clinical presentation, diagnostic work-up and treatment of cervical and lumbar disc disease; and 3) evaluation and treatment of patients with hemorrhagic and ischemic stroke.

M40 NeurSurg 805 Neurosurgery
The goal is to provide an overview of neurological surgery. The fourth-year medical student will participate in patient work-ups, pre-, intra- and postoperative care, and diagnostic procedures. Students will also scrub in cases with senior-level
and chief residents assisting with neurosurgical procedures and observing the more critical portions of these procedures. It is expected that they will learn how to perform basic neurosurgical procedures such as lumbar punctures, ICP monitor placement, and ventricular drain placement. Fourth-year medical students are encouraged to participate in Grand Rounds, Neurosurgery Resident Curriculum conference, and Journal Club with the neurosurgery residents. At least one day/week is spent in an outpatient neurosurgery office setting. A week spent on the pediatric service at St. Louis Children’s Hospital is also strongly encouraged as a component of this fourth-year elective.