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 the participation of the neurosurgery faculty. During 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. During the third year, students may elect to participate in a two- or four-week neurosurgery clerkship that introduces them to the clinical care of patients with diseases of the nervous system. Neurosurgical faculty members work with the neurologists to provide lectures, demonstrations and teaching exercises involving 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. Neurosurgical diagnosis, critical care, operative treatment and ethical issues in patient management are emphasized. During 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

As members of one of the most comprehensive neurosurgical programs in both the region and 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 on 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 the treatment of aneurysms, arteriovenous fistulas, arteriovenous malformations, carotid stenosis, cavernous malformations, moyamoya and stroke. It 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 postprocedure care in a dedicated neurointensive care unit, as well as neurologists, who coordinate neurorehabilitation care at The Rehabilitation Institute of St. Louis.

Spine Injuries 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. The 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 Nerves

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 advanced microsurgical reconstructive techniques and are on the forefront of new and 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 are also part of multidisciplinary teams that provide care in several specialized pediatric centers, including the brachial plexus center, the center for cerebral palsy spasticity, the neurofibromatosis clinic, the pediatric epilepsy center, the pediatric gamma knife program, the pediatric neuro-oncology program, and the spina bifida clinic.

Epilepsy

Our neurosurgeons are nationally recognized for their care of patients with epilepsy as well as research in this field. They are part of a multidisciplinary team that works together to develop the optimal plan to help patients control or minimize their seizures. The Department of Neurosurgery offers care for
both adults and children with medically intractable seizures; it 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's 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](http://www.neurosurgery.wustl.edu)

**Faculty**

**Department Head**


**C**

Michael R Chicoine, MD
Professor of Neurological Surgery (primary appointment)
August A. Busch, Jr. Distinguished Professor
MD University of California 1990
BS University of Illinois 1985

**D**

Ralph G Dacey Jr, MD
Henry G and Edith R Schwartz Professor of Neurological Surgery (primary appointment)
MD University of Virginia 1974
BA Harvard University 1970

Ian G Dorward, MD
Associate Professor of Neurological Surgery (primary appointment)
Associate Professor of Orthopaedic Surgery
MD Washington Univ in St. Louis 2005
BS University of Colorado Boulder 2000

Joshua L Dowling, MD
Professor of Neurological Surgery (primary appointment)
MD Tulane University 1989
BA Yale University 1985

Gavin P. Dunn, PHD, MD
Associate Professor of Neurological Surgery (primary appointment)
Associate Professor of Neurology

G

Charles M Gaona, MA
Adjunct Assistant Professor of Neurological Surgery
BA University of Colorado Boulder 1994
MA Air Force Institute Tech 2005

H

Gabriel E. Haller, PHD
Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Genetics
Assistant Professor of Neurology
BS University of Chicago 2008
PHD Washington Univ in St. Louis 2013

Matthew A Howard
Adjunct Assistant Professor of Neurological Surgery (primary appointment)

J

Sarah C. Jost
Adjunct Assistant Professor of Neurological Surgery (primary appointment)

K

Albert H Kim, PHD, MA, MD
Associate Professor of Neurological Surgery (primary appointment)
Associate Professor of Developmental Biology
Associate Professor of Neurology
PHD New York U. School of Medicine 2002
BA Harvard University 1994
MA Washington Univ in St. Louis 1999
MD New York U. School of Medicine 2003

L

Eric Claude Leuthardt, MD
Professor of Neurological Surgery (primary appointment)
Professor of Mechanical Engineering and Applied Science.
Professor of Neuroscience
BS Saint Louis University 1995
MD University of Pennsylvania 1999

David D Limbrick Jr, MD, PHD
Professor of Neurological Surgery (primary appointment)
Professor of Pediatrics
BS College of William and Mary 1995
MD Virginia Comm University 2001
PHD Virginia Comm University 2001

Associate Professor of Pathology and Immunology
PHD Washington Univ in St. Louis 2006
MD Washington Univ in St. Louis 2006
BA Princeton University 1998
Matthew R. MacEwan, PHD  
Assistant Professor of Neurological Surgery (primary appointment)  
BS Case Western Reserve Univ 2004  
PHD Washington Univ in St. Louis 2015

James Patterson McAllister, PHD  
Professor of Neurological Surgery (primary appointment)  
PHD Purdue University 1976  
BA Earlham College 1970

Sean David McEvoy, MD, MHS  
Assistant Professor of Neurological Surgery (primary appointment)  
Assistant Professor of Pediatrics  
MD Yale University 2010  
BS University of Iowa 2005  
MHS Yale University 2010

Camilo Alejandro Molina, MD  
Assistant Professor of Neurological Surgery (Pending Executive Faculty Approval) (primary appointment)  
MD Johns Hopkins University 2013  
BA Miami University 2008

Joshua William Osbun, MD  
Assistant Professor of Neurological Surgery (primary appointment)  
BA Texas A&M University 2002  
MD University of Texas Southwest 2007  
BA Texas A&M University 2002

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

Wilson Z Ray, MD  
Professor of Neurological Surgery (primary appointment)  
Professor of Biomedical Engineering  
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  
BA Taylor University 1974

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)

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

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

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

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

Gregory Joseph Zipfel, MD  
Ralph G Dacey Distinguished Professorship of Neurological Surgery (primary appointment)  
Head of the Department of Neurological Surgery  
Professor of Neurology  
MD Northwestern University Med 1995  
BS University of Illinois 1991
Research Electives

Neurosurgery Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Michael R. Chicoine, MD
Phone: 314-747-6143

Our focus is on outcomes analysis for adult patients with brain tumors. Current clinical studies focus on the outcomes of patients with benign and malignant brain tumors utilizing a prospective brain tumor database. Particular emphasis includes the impact of intraoperative MRI (iMRI) on 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

Our 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 of spinal deformity in both adolescents and adults.

Gavin P. Dunn, MD, PhD
Phone: 314-747-6141

Our studies focus on the 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.

Ammar H. Hawasli, MD, PhD
Phone: 314-747-6144

Our functional spinal neurosurgery research laboratory aims to understand the physiological and pathophysiological relationships between the spine and the brain. We study brain physiology and connectivity in spinal disorder patients, leveraging expertise in both spinal neurosurgery and brain physiology and a network of high-level collaborators at Washington University School of Medicine.

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

Our lab is 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

Our lab investigates clinical and translational research into newborn brain injuries, including posthemorrhagic hydrocephalus. Our main research areas include cerebrospinal fluid protein markers of disease, MRI diffusion tensor imaging, and prospective clinical trials. In addition, multi-institutional clinical research opportunities exist for syringomyelia associated with Chiari I malformation.

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

Our ongoing projects include outcome studies of selective dorsal rhizotomies for the treatment of spastic cerebral palsy in children and brachial plexus repair after birth injury. We are also involved in a multicenter outcome study of syringomyelia associated with Chiari I malformation in children.

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 after aneurysmal subarachnoid hemorrhage. My work includes the following: basic experimental methods, including cell culture and ex vivo vascular techniques; in vivo studies utilizing animal models of ischemic stroke and subarachnoid hemorrhage and live animal epifluorescent and confocal imaging; and phase I clinical trials in patients.

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 Subinternship
The goal of this elective 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 a component of this fourth-year elective.

M40 NeurSurg 900 Research Elective - Neurosurgery
Research opportunities may be available. If interested, please contact the Department of Neurosurgery.