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**


**B**

Peter Brunner, PHD, MS
Associate Professor of Neurological Surgery (Pending Executive Faculty Approval) (primary appointment)
PHD University of Graz 2013
MS University of Graz 2005
BS University of Graz 2004

**C**

Michael R Chicoine, MD
Professor of Neurological Surgery (primary appointment)
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MD University of California 1990
BS University of Illinois 1985

**D**

Ralph G Dacey Jr, MD
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MD University of Virginia 1974
BA Harvard University 1970

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Associate Professor of Orthopaedic Surgery
BS University of Colorado Boulder 2000

**E**

Joshua L Dowling, MD
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MD Tulane University 1989
BA Yale University 1985

**G**

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Associate Professor of Pathology and Immunology
MD Washington Univ in St. Louis 2006
PHD Washington Univ in St. Louis 2006
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**H**

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**K**

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MD New York U. School of Medicine 2003
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**L**

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Professor of Pediatrics
BS College of William and Mary 1995
MD Virginia Comm University 2001
PHD Virginia Comm University 2001

**M**

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BS University of Iowa 2005
MHS Yale University 2010
MD Yale University 2010

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BA Miami University 2008
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O

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Assistant Professor of Radiology
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MD University of Texas Southwest 2007

P

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R

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Professor of Orthopaedic Surgery
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S

Paul Santiago, MD

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Matthew D Smyth, MD
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BA Cornell University 1992
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Associate Professor of Pediatrics
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W

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PHD University of Texas Southwest 2005

Y

Hiroko Yano, PHD, MS
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Associate Professor of Genetics
Associate Professor of Neurology
BS Science University of Tokyo 1991
PHD University of Tokyo 1996
MS University of Tokyo 1993

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

Z

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