

# 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, cataplexy, 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>

## Faculty

**Ralph G. Dacey, MD** (<http://www.neurosurgery.wustl.edu/patient-care/find-a-physician/clinical-faculty/ralph-g-dacey-jr-md-229/>)  
Department Head

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.

## B

**Peter Brunner, M.S., Ph.D.**

Associate Professor of Neurological Surgery (primary appointment)  
Associate Professor of Neurology  
Bachelor of Science, University of Graz, 2004  
Master of Science, University of Graz, 2005  
Doctor of Philosophy, University of Graz, 2013

## C

**Michael R Chicoine, M.D.**

Professor Emeritus of Neurological Surgery  
Champaign, 1985  
Doctor of Medicine, University of California, 1990

## D

**Ralph G Dacey, M.D.**

Professor of Neurological Surgery (primary appointment)  
Bachelor of Arts, Harvard University, 1970  
Doctor of Medicine, University of Virginia, 1974

**Deepti Diwan, M.S., Ph.D.**

Instructor in Neurosurgery (Pending Dean's Approval) (primary appointment)  
Bachelor of Science, Chaudhary Charan Singh Haryana Agricultural University, 2008  
Master of Science, Mody University, 2010  
Doctor of Philosophy, Saitama University, 2015

**Ian G Dorward, M.D.**

Associate Professor of Neurological Surgery (primary appointment)  
Associate Professor of Orthopedic Surgery  
Bachelor of Science, University of Colorado Boulder, 2000  
Doctor of Medicine, Washington University in St Louis, 2005

**Joshua L Dowling, M.D.**

Professor of Neurological Surgery (primary appointment)  
Bachelor of Arts, Yale University, 1985  
Doctor of Medicine, Tulane University, 1989

## H

**Daniel Michael Hafez, Ph.D., M.D.**

Assistant Professor of Neurosurgery (Pending Executive Faculty Approval) (primary appointment)  
Champaign, 2007  
Doctor of Philosophy, Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 2012  
Doctor of Medicine, Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 2014

**Gabriel E. Haller, Ph.D.**

Assistant Professor of Neurological Surgery (primary appointment)  
Assistant Professor of Neurology  
Assistant Professor of Genetics  
Bachelor of Arts, University of Chicago, 2008  
Doctor of Philosophy, Washington University in St Louis, 2013

## J

**Deeptee Jain, M.D.**

Assistant Professor of Neurological Surgery  
Doctor of Medicine, Duke University, 2013

**Muhammad Burhan Ud Din Janjua, M.D.**

Assistant Professor of Neurosurgery (Pending Executive Faculty Approval) (primary appointment)  
Doctor of Medicine, King Edward Medical University, 2002

## K

**Michael Patrick Kelly, M.D.**

Associate Professor of Neurological Surgery  
Bachelor of Science, Boston College, 1999  
Doctor of Medicine, University of Massachusetts Amherst, 2005

**Albert H Kim, M.A., Ph.D., M.D.**

Professor of Neurological Surgery (primary appointment)  
Professor of Neurology  
Professor of Developmental Biology  
August A. Busch, Jr. Professor of Neurological Surgery  
Bachelor of Arts, Harvard University, 1994  
Master of Arts, Washington University in St Louis, 1999  
Doctor of Philosophy, New York University School of Medicine, 2002  
Doctor of Medicine, New York University School of Medicine, 2003

**Caroline Ko**

Associate Professor of Neurological Surgery (Pending Executive Faculty Approval) (primary appointment)

## L

**Eric Claude Leuthardt, M.D.**

Professor of Neurological Surgery (primary appointment)  
Professor of Mechanical Engineering and Applied Science.  
Professor of Neuroscience  
Shi Hui Huang Professor of Neurological Surgery  
Bachelor of Science, Saint Louis University, 1995  
Doctor of Medicine, University of Pennsylvania, 1999

**David D Limbrick, Ph.D., M.D.**

Professor of Neurological Surgery (primary appointment)  
Professor of Pediatrics

Director - Division of Pediatric Neurosurgery  
T. S. Park, M.D., Chair in Pediatric Neurological Surgery  
Bachelor of Science, College of William and Mary, 1995  
Doctor of Philosophy, Virginia Commonwealth University, 2001  
Doctor of Medicine, Virginia Commonwealth University, 2001

## M

### **Matthew R. MacEwan, Ph.D.**

Assistant Professor of Neurological Surgery (primary appointment)  
Bachelor of Science, Case Western Reserve University, 2004  
Doctor of Philosophy, Washington University in St. Louis, 2015

### **James Patterson McAllister, Ph.D.**

Professor of Neurological Surgery (primary appointment)  
Bachelor of Arts, Earlham College, 1970  
Main Campus, 1976

### **Sean David McEvoy, M.H.S., M.D.**

Assistant Professor of Neurological Surgery (primary appointment)  
Assistant Professor of Pediatrics  
Bachelor of Science, University of Iowa, 2005  
Master of Health Science, Yale University, 2010  
Doctor of Medicine, Yale University, 2010

### **Jogender Mehla, M.S., Ph.D.**

Instructor in Neurosurgery (primary appointment)  
Master of Science, All India Institute of Medical Sciences, 2007  
Doctor of Philosophy, All India Institute of Medical Sciences, 2013

### **Camilo Alejandro Molina, M.D.**

Assistant Professor of Neurological Surgery (primary appointment)  
Assistant Professor of Orthopedic Surgery  
Oxford, 2008  
Doctor of Medicine, Johns Hopkins University, 2013

## O

### **John Ogunlade, D.O.**

Assistant Professor of Neurosurgery (Pending Executive Faculty Approval) (primary appointment)  
Doctor of Osteopathic Medicine, Nova Southeastern University, 2014

### **Joshua William Osburn, M.D.**

Associate Professor of Neurological Surgery (primary appointment)  
Associate Professor of Neurology  
Associate Professor of Radiology  
Bachelor of Arts, Texas A&M University, 2002  
Doctor of Medicine, University of Texas Southwest, 2007

## P

### **Tae Sung Park, M.D.**

Professor of Neurological Surgery (primary appointment)  
Professor of Neuroscience  
Professor of Pediatrics  
Margery Campbell Fort Professor of Neurological Surgery  
Bachelor of Science, Yonsei University, 1967  
Doctor of Medicine, Yonsei University, 1971

### **Brenton Henry Pennicooke, M.S., M.D.**

Assistant Professor of Neurological Surgery (primary appointment)  
Assistant Professor of Orthopedic Surgery  
Bachelor of Science, Johns Hopkins University, 2008  
Master of Science, Johns Hopkins University, 2008  
Doctor of Medicine, Harvard University, 2012

## R

### **Wilson Z Ray, M.D.**

Professor of Neurological Surgery (primary appointment)  
Professor of Biomedical Engineering  
Professor of Orthopedic Surgery  
Henry G and Edith R Schwartz Professor of Neurological Surgery  
Doctor of Medicine, University of Iowa, 2004

### **Keith M Rich, M.D.**

Professor of Neurosurgery (Pending Executive Faculty Approval)  
Bachelor of Arts, Taylor University, 1974  
Doctor of Medicine, Indiana University Bloomington, 1977

### **Jarod Roland, M.D.**

Assistant Professor of Neurosurgery (Pending Executive Faculty Approval) (primary appointment)  
Doctor of Medicine, Texas Tech University Health Sciences Center, 2009

## S

### **Alexander Stegh, M.A., Ph.D.**

Professor of Neurological Surgery (Pending Executive Faculty Approval) (primary appointment)  
Master of Arts, Medizinische Hochschule Hannover, 1998  
Doctor of Philosophy, Medizinische Hochschule Hannover, 2000

### **Jennifer Mae Strahle, M.D.**

Associate Professor of Neurological Surgery (primary appointment)  
Associate Professor of Pediatrics  
Associate Professor of Orthopedic Surgery  
Bachelor of Science, Bates College, 2002  
Doctor of Medicine, University of Minnesota, 2008

## V

### **Ananth Kesav Vellimana, MBBS**

Assistant Professor of Neurosurgery (Pending Executive Faculty Approval) (primary appointment)  
Foreign MD equivalent, All India Institute of Medical Sciences, 2009

## W

### **Jon T. Willie, Ph.D., M.D.**

Associate Professor of Neurological Surgery (primary appointment)  
Associate Professor of Neuroscience  
Associate Professor Neurology  
Associate Professor of Psychiatry  
Bachelor of Arts, University of Texas Austin, 1996  
Doctor of Philosophy, University of Texas Southwest, 2005  
Doctor of Medicine, University of Texas Southwest, 2005

## Y

### **Hiroko Yano, M.S., Ph.D.**

Associate Professor of Neurological Surgery (primary appointment)  
Associate Professor of Genetics  
Associate Professor of Neurology  
Bachelor of Science, Science University of Tokyo, 1991  
Master of Science, University of Tokyo, 1993  
Doctor of Philosophy, University of Tokyo, 1996

## Z

### **Gregory Joseph Zipfel, M.D.**

Professor of Neurological Surgery (primary appointment)  
Ralph G Dacey Distinguished Professorship of Neurological Surgery  
Head of the Department of Neurological Surgery  
Professor of Neurology  
Champaign, 1991  
Doctor of Medicine, Northwestern University, 1995

## Research Electives

### Neurosurgery Research Electives

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

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### **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.

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### **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.

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### **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.

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### **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.

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### **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.

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### **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.

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### **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.

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### **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.

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**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.

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**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.

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**Matthew Smyth, MD**

Phone: 314-454-4454

Clinical outcomes studies for pediatric epilepsy surgery and craniostomosis 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.

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**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.

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.

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**M40 NeurSurg 810 Neurosurgery (Clinical Elective)**

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**M40 NeurSurg 910 Neurosurgery Advanced Clinical Rotation (ACR)**

Credit 140 units.

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## Courses

Visit online course listings to view offerings for M40 NeurSurg (<https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M40>).

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## 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