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. Neurosurgical 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 neurosurgical 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](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.

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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.