Department of Neurology

Neurology concerns itself with the diseases of brain, spinal cord, peripheral nerves and muscles. An introduction to the anatomy and physiology of the nervous system is presented in the first-year neuroscience course by faculty from the Department of Neuroscience (http://neurosci.wustl.edu), with participation of faculty from the Department of Neurology (http://neuro.wustl.edu). A first-year selective titled Clinical Correlations in Neurosciences (FYSelect 5017) is available, which is an opportunity for interested students to shadow physicians in neuro-related fields and attend basic science or clinical conferences. In the second year, the Department of Neurology presents the course Diseases of the Nervous System (Neurol 632) in conjunction with the departments of Pathology & Immunology (http://pathology.wustl.edu), Neurosurgery (http://neurosurgery.wustl.edu) and Ophthalmology & Visual Sciences (http://ophthalmology.wustl.edu). The course emphasizes the pathophysiology, pathology, clinical manifestations and treatment of the major neurological and neurosurgical diseases. The department also participates in the Practice of Medicine course, providing lectures, demonstrations and teaching exercises with patients in neurological physical diagnosis.

For more information about the Department of Neurology and its 13 divisions, please visit the department website.

Website: https://neuro.wustl.edu/education

Degrees & Requirements

While the Department of Neurology 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

M35 Neurol 900

In the fourth year, opportunities exist for many varieties of advanced clinical or research experience.

Beau Ances, MD
Taylor Avenue Building Extension, 2nd Floor
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Neuroimaging of Neurodegenerative Disorders. Students can work in a neuroimaging laboratory that is focused on translational discovery of neuroimaging biomarkers for neurodegenerative diseases. The laboratory focuses on the pathogenesis of Alzheimer’s disease (AD) and HIV-associated neurocognitive disorders (HAND). We are investigating the effects of neurodegenerative diseases on brain network level using functional (blood oxygen level dependent imaging, arterial spin labeling), structural (volumetrics, diffusion tensor imaging), and metabolic (PET amyloid and tau). Multiple projects that involve bioengineering, neuroimaging, and infectious disease are available depending on the interest of the student.

Randall Bateman, MD
Biotechnology Center, Room 304
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Central nervous system protein metabolism in aging and dementia. This research elective will expose the student to translational research in the study of Alzheimer’s disease and other neurodegenerative diseases. The student will participate in multiple areas of the research including participant recruitment, consent, enrollment, and admission to a research hospital unit. Lumbar puncture for CSF sample collection, blood collection, and intravenous labeling methods will be demonstrated and taught. The student will participate in sample analysis including processing for mass spectrometry quantitation, ELISA, and western gel methods. Quantitation, analysis and modeling of the data will be taught in the context of data interpretation and study design.

Anne H. Cross, MD, and Laura Piccio, MD, PhD
McMillan, 3rd Floor
Phone: 314-747-4591 or 314-747-0405

Understanding interactions of the immune system with the central nervous system as it relates to multiple sclerosis and other neuroimmunological disorders. Our goal is to understand how immune cells cross the blood-brain barrier and initiate the cascade of events leading to lesions of multiple sclerosis. We are also funded to study the effects of diet and adipokines on neuroinflammation. Depending upon the time commitment of the student and their individual interests and goals, they will either assist with ongoing projects or be given a laboratory project on which to work. Projects may involve animal models for MS, cell culture or studies of human samples (CSF, blood, autopsied specimens). Interested students should contact Dr. Cross (crossa@neuro.wustl.edu) or Dr. Piccio (piccio@neuro.wustl.edu) several weeks in advance before signing up for this research to allow for sufficient planning.

Robert T. Naismith, MD
McMillan, Room 310B
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Clinical Imaging Research in Multiple Sclerosis (8 weeks). The student will learn about neuroimaging, imaging analyses, data collection, data management, and clinical study endpoints in multiple sclerosis (MS). They will observe patient participants undergoing a detailed evaluation of disability measures, such as ambulation, symptom scales, cognition, vision, upper extremity function, etc. They will witness the entire process of image acquisition, processing, analyses, and data extraction. They will have the opportunity to interact with many people who are vital to the research, including research coordinators, imaging
technologists, imaging physicists/chemists, and specialized research clinicians (i.e., neurocognitive and physical therapy research specialists).

The student will assist with hands-on clinical investigative research. They will gain an excellent appreciation of MS, from its pathophysiology within the central nervous system, to how it affects the neurological function of individuals. Through detailed and quantitative imaging analysis, the student will become very adept at analyzing brain MRI scans. They will mark and track lesions, determine their effects on clinical function, normal appearing white matter, cortex and gray-matter structures. They will become familiar with Amira Imaging Analysis Software, SPSS Statistical Analysis Software, SIENA Volume Analysis Software, and Matlab Imaging Analysis Software.

Steven E. Petersen, PhD
East Building, Room 2108
Phone: 314-362-3319
This lab is interested in brain organization and function, particularly for language, attention, and memory. Our main approaches to these issue is through functional MRI and large-scale network analysis.

Joel S. Perlmutter, MD
East Building, 2nd Floor
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Pathophysiology of Movement Disorders. The lab is primarily interested in etiology, pathophysiology and treatment of basal ganglia disorders. We have several studies of PD. We investigate mechanisms of action of deep brain stimulation, a dramatic new treatment. These studies combine PET, cognitive testing and quantified measures of movement. We also test new drugs that might rescue injured nigrostriatal neurons (a model of PD). For these, we use PET to measure dopamine pathways and also quantitify motor behavior. We also have an active program developing and validating neuroimaging biomarkers for PD and integrity of the nigrostriatal pathway that includes studies in people and animal models of PD. We have an active program combining a variety of approaches to develop biomarkers and investigate the pathophysiology of dementia associated with PD. We use PET to measure radioligand binding and sensorimotor processing in dystonia. We developed a new animal model of dystonia to investigate pharmacologic and physiologic changes. We use PET to investigate drug-mediated pathways in the brain and parse out the effects of selective dopaminergic agonists. We also are working to develop MR-based methods including DTI and resting-state functional connectivity to investigate brain mechanisms underlying PD and dystonia.

Brad A. Racette, MD
McMillan, 9th Floor
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Our lab is primarily interested in environmental risk factors associated with Parkinson's disease. We use a variety of techniques to study these risk factors, including traditional field epidemiology in which we evaluate workers exposed to metals in the U.S. and residents living near a smelter in South Africa, neuroimaging where we study the pathophysiology of toxin-mediated parkinsonism, geographic information systems research where we associate environmental toxin exposures with incident and prevalent Parkinson's disease in the U.S. and Finland, and neuropathologic studies in manganese-exposed workers from South Africa. There are numerous opportunities available for students to be involved with any of these projects. Students will have some clinical exposure, as well, to familiarize them with pertinent clinical syndrome.

Marcus E. Raichle, MD
Neuro Imaging Laboratory – East Building, 2nd Floor
Phone: 314-362-6907
In vivo brain hemodynamic, metabolic and functional studies of human cognition and emotion using cyclotron-produced isotopes and emission tomography (PET) as well as functional magnetic resonance imaging (fMRI) in humans. Refer also to the listing on this page for Steven E. Petersen, PhD.

Gregory Wu, MD, PhD
McMillan, 3rd Floor
Phone: 314-362-3293
Understanding how immune responses are generated that target the central nervous system. Specifically, studies on antigen presentation cell contributions to autoimmune animal models of multiple sclerosis. Our goal is to understand what cellular interactions are critical to the development of immune-mediated demyelination.

Faculty

Department Chair
David Holtzman, MD
Visit our website for more information about our faculty (https://neuro.wustl.edu/Faculty) and their appointments.

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PHD Oklahoma St University 1998  

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Associate Professor of Neurology (primary appointment)  
B MUS University of Adelaide 2000  
MD University of Adelaide 1998  

David M Peeples, MD  
Instructor in Clinical Neurology (primary appointment)  
MD University of Chicago 1986  
BA Vanderbilt University 1982  

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Assistant Professor of Clinical Neurology (primary appointment)  
BS Ohio State University 1975  
MD Ohio State University 1979  

Joel S Perlmutter, MD  
Professor of Neurology (primary appointment)  
Professor of Neuroscience  
Professor of Occupational Therapy  
Professor of Physical Therapy  
Professor of Radiology  
MD University of MO Columbia 1979  
BA Princeton University 1975  

Alan Pestronk, MD  
Professor of Neurology (primary appointment)  
Professor of Pathology and Immunology  
BA Princeton University 1966  
MD Johns Hopkns University Medc 1970  

Steven E Petersen, PHD  
James S McDonnell Professor of Cognitive Neuroscience in Neurology (primary appointment)  
Associate Professor of Neurological Surgery (Neuropsychology)  
Professor of Biomedical Engineering  
Professor of Neuroscience  
Professor of Psychological & Brain Sciences  
Professor of Radiology  
BA University of Montana Missoula 1974  
PHD California Institute Technolo 1982  

Daniel Phillips, MD, BE  
Assistant Professor of Clinical Neurology (primary appointment)  
MD Washington Univ in St. Louis 1980  
BE Northwestern University 1982  
BS Northwestern University 1976  

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Assistant Professor of Neurology (primary appointment)  
BS Cambridge University 2003  
MD Cambridge University 2006  
MS Harvard University 2016  
MS1 Cambridge University 2007  

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MD University of Milan 1997
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BS University of Notre Dame 1994
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BA Dartmouth College 1971

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MD Ohio State University 1974

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BA School Not Listed 1979

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BS University of MO Columbia 1998
PHD Vanderbilt University 2004
MD Vanderbilt University 2006

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MS University of Tokyo 2005
PHD University of Tokyo 2008
BS University of Tokyo 2003

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PHD University of Kentucky 2011
BS University of Kentucky 2005

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BBA Washington Univ in St. Louis 1985
JD Washington Univ in St. Louis 1988
PHD Washington Univ in St. Louis 2001

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BS Millsaps College 1999
MD Washington Univ in St. Louis 2008
PHD Washington Univ in St. Louis 2008

Kathleen Marie Schoch, PHD
Instructor in Neurology (primary appointment)
BS Bradley University 2007
PHD University of Kentucky 2013

Earl R Schultz, MD
Professor of Clinical Neurology (primary appointment)
Associate Professor of Clinical Psychiatry
BS University of Missouri 1953
BA Southeast Missouri St Univers 1952
MD Washington Univ in St. Louis 1955

Christian T Sheline, PHD
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PHD University of California 1989
BA Dartmouth College 1983

Gordon L Shulman, PHD, MS
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BA Yale University 1975
PHD University of Oregon 1979
MS University of Oregon 1977

Todd B Silverman
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Barry A. Singer
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Christopher D Smyser, MD
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Associate Professor of Pediatrics
Associate Professor of Radiology
BS University of Iowa 1998
MD University of Iowa 2004

Barbara Joy Snider, MD, PHD
Richard Brian Sommerville, MD
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BS McGill University 1987
PHD University of Florida 1997
MS University of Florida 1994

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Instructor in Neurology (primary appointment)
MD Addis Ababa University 1989

Kwee L Thio, MD, PHD
Professor of Neurology (primary appointment)
Professor of Neuroscience
Professor of Pediatrics
MD Washington Univ in St. Louis 1992
BS Brown University 1984
PHD Washington Univ in St. Louis 1992

Jeffrey B. Titus, PHD, MA
Assistant Professor of Clinical Neurology (primary appointment)
PHD Ball State University 2002
BS Evangel College 1997
MA University of Northern Colora 1999

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BS Davidson College 2005
MD Baylor College of Medicine 2010

Norman Edwin Trevathan III, MD, MS
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MD Emory University 1982
BS David Lipscomb University 1977
MS Emory University 1982

Angela M Tripp
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Keisuke Ueda, MD
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MD Keio University 2006

Jason Daniel Ulrich, PHD
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BS Quincy College 2004

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MD Washington Univ in St. Louis 2007
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BA Texas A&M University 1991
MD Univ Texas Health Science Ctr 1997

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Assistant Professor of Pediatrics
BE Catholic University America 1998
MD Vanderbilt University 2006
PHD Vanderbilt University 2004

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Professor of Medicine
MD Minsk State Medical Institute 1976

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BS University of CA Riverside 1989
MD University of Missouri 1993

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Adjunct Research Assistant Professor of Neurology (primary appointment)
MD Beijing Medical University 1977

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MD University of Chicago 2001
BS University of Illinois 1993
PHD University of Chicago 1998

Judith L. Weisenberg, MD
Associate Professor of Neurology (primary appointment)
BS Barnard College 1998
MD University of Minnesota 2002

Howard I Weiss, MD
Assistant Professor of Clinical Neurology (primary appointment)
Course Information


**M35 Neurol 554 Neural Science**

Neural Science is an intensive seven-week course that covers the structure, function and development of the nervous system as seen from molecular, cellular and systems-oriented perspectives. The emphasis is on the organization and function of the nervous system in health, but there is frequent reference to the clinical relevance of material presented. The course includes regular lectures, conference sessions and laboratories, plus a number of clinically oriented presentations and Special Topics sessions that address selected issues in greater depth. Computer-aided instructional programs, accessible from a variety of locations, provide auxiliary modes of self-paced learning and review. The midterm and final emphasize the core body of important facts and principles presented in lectures and laboratories. Limited space is available for non-medical students with instructor's permission. Non-medical students should register under the cross-listed number L41 Biol 554 (spring only).

Credit 109 units.

**M35 Neurol 632 Diseases of the Nervous System**

The goal of this course is to provide an introduction to the diseases of the central and peripheral nervous systems, including their clinical manifestations, pathology, pathophysiology and pharmacotherapy. The course includes reading assignments, lectures, laboratories, team activities, and clinical presentations.

Credit 53 units.

**M35 Neurol 720 Neurology Clerkship**

During the four-week Neurology clerkship, students will gain proficiency in understanding diseases of the nervous system, the neurologic work-up, localization and differential diagnosis generation, and devising a treatment plan. A variety of settings are available, which could include adults or pediatric services, with both inpatient and outpatient experiences. Students will provide care for patients with neurologic problems under the supervision of residents, fellows and attendings.

Credit 154 units.

**M35 Neurol 827 Neurology Sub-Internship for WUSM Students**

This four-week elective will be customized to include inpatient and outpatient experiences desired by WU students who have completed the WU Neurology Clerkship. Students may choose this elective to further improve their neurology knowledge and skills. Students considering neurology as a career may also desire additional exposure to supplement their prior clerkship experience. The elective is split into two two-week rotations which may include: 1. Adult Inpatient General Service (with one clinic/week) 2. Adult Inpatient Stroke Service (with one clinic/week) 3. Adult Inpatient Consult Service (with one clinic/week) 4. Pediatric Neurology Consult Service (with one clinic/week) 5. Adult Neurology ICU (with one clinic/week) 6. Outpatient Clinics (with 8-10 clinics/week).

Credit 154 units.
**M35 Neurol 828 Neurology Sub-Internship for Visiting U.S. Medical Students**

This four-week elective for fourth-year visiting students from a U.S. medical school provides the option (space permitting) of four weeks of Adult Inpatient Service (Stroke for two weeks, General Neurology for two weeks), or two weeks on an Adult Inpatient Service and two weeks on the Adult Consult Service. Students on the inpatient service will function as a sub-intern under the supervision of their junior resident, chief resident, and attending physician. The student will also attend weekly clinical conferences and a weekly outpatient clinic experience. This elective is suitable for visiting fourth-year students interested in neurology, who wish to improve their neurology knowledge and skills.

**M35 Neurol 830 Neuro-Oncology**

Provide an outpatient-oriented combined pediatric and adult neuro-oncology experience for fourth-year medical students.

1. Attend multidisciplinary adult and pediatric neuro-oncology clinics and cancer conferences (as scheduled); 2. Attend adult and pediatric radiation oncology clinics; 3. Attend neuropathology brain tumor review; 4. Participate in subspecialty brain tumor clinics; 5. Attend monthly brain tumor research conferences.

**M35 Neurol 851 Clinical Aspects of Aging and Dementia**

This elective provides the opportunity to learn about clinical research and clinical care in health brain aging and dementia. Students should contact the course directors to discuss this, as the elective is customized based on student interests. This can be a two-week or four-week elective. Students can gain proficiency in interviewing techniques and in the neurologic examination of the geriatric patient, and be introduced to neuropsychology, neuropathology, biomarkers, neuroimaging, genetics, and other biomedical procedures important in the diagnostic evaluation of older adults. The Knight ADRC is an interdisciplinary group, so students have the opportunity to interact with physicians, nurse clinicians, psychologists and social workers, and to explore the neuropsychology, neuropathology, biomarkers, neuroimaging, genetics, and other biomedical procedures used in the diagnosis of dementing disorders such as Alzheimer’s disease, dementia with Lewy bodies, frontotemporal dementias, cerebrovascular disorders, and affective disorders.

**M35 Neurol 859 Neonatal Neurology**

The Neonatal Neurology elective will consist of a combination of inpatient and outpatient experiences designed to provide medical students with comprehensive exposure to the field. Through the rotation, students will actively participate in all aspects of patient care, acquiring the knowledge and skill necessary to effectively manage infants with neurological disorders, including encephalopathy, stroke, seizures, hypotonia, intraventricular hemorrhage, and periventricular leukomalacia, among others. Clinical activities will be tailored to fit the interests and goals of the individual student and include a combination of inpatient and outpatient exposures. Inpatient experiences will occur in the St. Louis Children's Hospital Neonatal Intensive Unit as part of the Neonatal Neurology Consultation service. Outpatient activities will occur in the St. Louis Children's Hospital Outpatient Clinics. Students will also attend educational conferences specific to the field during the rotation, including Neonatal Neurology Clinical Conference and Neonatal Neuroradiology Conference.

**M35 Neurol 860 Pediatric Neurology**

The senior elective experience in child neurology is designed to adapt to the individual goals and objectives of students. The elective takes place in one or two 2-week blocks that occur among five possible venues as chosen by the student:

1. Outpatient clinics, 2. Inpatient ward service, 3. Inpatient general consult service, 4. NICU consult service, and 5. Video EEG (VEEG) monitoring service. The combination of services and experiences will be arranged directly between the student and the course director prior to beginning the rotation. In the outpatient clinics, students will rotate between a variety of subspecialty clinics and work with a variety of attendings in order to experience the breadth of outpatient pediatric neurology. Students rotating on the inpatient ward service will have a different role than the third-year student on pediatrics. The fourth-year student will focus solely on neurology patients and work closely with the pediatric neurology resident to develop neurology-specific care plans. No call or weekend duties will be expected on this rotation. On the general consult services, students will work with the consult attending and pediatric neurology residents on that team to see consults in the PICU, CICU, ER, and other hospital floors. The NICU consult team focuses on infants in the NICU. Student rotating on the VEEG monitoring service will focus on learning the indications and uses of VEEG and basic EEG reading skills.

**M35 Neurol 861 Neurology/Neurosurgery ICU**

The student will be integrated into the Critical Care Team that provides care in the Neurology/Neurosurgery ICU. Diseases frequently encountered include intracerebral hemorrhage, head trauma, subarachnoid hemorrhage, and stroke. The student will follow patients, participate in rounds and perform some procedures under supervision. Didactic sessions will be provided as conferences or lectures from the ICU attending.

**M35 Neurol 865 Adult and Pediatric Epilepsy**

Students will learn how epileptologists diagnose and manage epilepsy in adults and children. They will learn how to use the history and physical exam and laboratory studies such as EEG, MRI, PET, and SPECT to diagnose and manage patients with new onset epilepsy, established epilepsy, and medically intractable epilepsy. They will become familiar with the medical management of epilepsy as well as the treatment options for medically intractable epilepsy including surgery, the vagus nerve stimulator, and the ketogenic diet. They will also learn how to manage the co-morbid conditions that accompany epilepsy such as depression, behavioral problems, cognitive impairment, sleep disturbance, and non-epileptic events. Students will accomplish these goals by attending epilepsy clinics and rounding on the inpatient epilepsy service with the epilepsy team at Barnes-Jewish Hospital and St. Louis Children's Hospital. They will attend the Adult Epilepsy Conference, the Pediatric Epilepsy Conference, and Neurology Grand Rounds. Students will also have the opportunity to observe epilepsy surgery if they wish. They will have the option to present one 15-30 minute talk on a topic relevant to epilepsy.

**M35 Neurol 872 MS Center/Outpatient - Missouri Baptist**

Students will develop their skills in taking histories and performing neurological examinations on patients with multiple sclerosis under direct supervision of multiple sclerosis specialists. Localization of neurological findings and symptoms to the neuro-axis will be emphasized. A major goal for the students will be to increase the understanding of comprehensive patient management including disease treatment, symptom
management, adjunctive therapy services, and psychosocial issues. The outpatient rotation will be four weeks at The MS Center for Innovations in Care at Missouri Baptist Medical Center with Dr. Barry Singer and Dr. Mark Tullman. An additional goal for students will be to understand process of clinical research and translation into approved therapies. The center has been a leader in clinical trial development of therapeutics that have been or will soon be FDA-approved as new medications for multiple sclerosis.

M35 Neurol 900 Research Elective - Neurology
Research opportunities may be available. If interested, please contact the Department of Neurology.