Welcome to the Spring Update for the Department of Neurological Surgery at the University of Wisconsin School of Medicine and Public Health. This has been an extremely productive time for the department in every way—clinically, and in research and teaching. The purpose of this new communication is to inform—and thank you for your support and contributions to the department over the years.

In these pages, you will read summaries of our research labs and studies and the successful recruitment of Dr. Wendell Lake, who will be heading our functional program and expanding our epilepsy care program.

Our departmental goals are many but our priorities can be summarized in two simple statements:

1. We dedicate ourselves completely to the needs of the people who come to us with neurosurgical problems.
2. We provide the best care in the world and constantly strive to improve.

This is the basis of our research and our teaching both here and worldwide. We are grateful for your involvement and will continue to keep you informed of our good work.

Robert J. Dempsey, MD, FACS
Chairman and Manucher J. Javid Professor of Neurological Surgery
Department of Neurological Surgery, University of Wisconsin
Chairman, Foundation for International Education in Neurological Surgery
Chair, Coordinating Committee for International Initiatives of the WFNS
Past President, Society of Neurological Surgeons

NOTES FROM OUR CHAIRMAN

We welcome Wendell B. Lake, MD, to our faculty as an assistant professor of neurological surgery and director of adult functional and stereotactic neurological surgery. He is coming to us after completing a fellowship in functional neurosurgery at Vanderbilt University Medical Center in Nashville, TN. His neurosurgical residency was at the University of Wisconsin Hospital and Clinics.

Dr. Lake specializes in functional neurosurgery, epilepsy and movement disorders including deep brain stimulation (DBS) and Parkinson’s disease. In addition, he will treat a broad range of general neurosurgical disorders. Dr. Lake will see patients at the UW Health Neurological Surgery Clinic and will perform surgery at UW Hospital and Clinics and Meriter Hospital beginning this summer.

Sara DeTienne has been named director of development for the Department of Neurological Surgery at the UW School of Medicine and Public Health. Sara is an accomplished development professional who understands the importance of philanthropy in supporting research, education and patient care. Because federal grants for basic research are decreasing, and departmental funds are not enough to support basic and translational research, philanthropic support is essential to maintain and enhance excellence to improve the quality of life for people with neuroscience disorders. Sara’s primary responsibilities are to build relationships with individuals, foundations and corporations in supporting the Department of Neurological Surgery.

To learn more about funds or to donate online, visit neurosurgery.wisc.edu/make-a-gift or contact Sara at Sara.DeTienne@supportuw.org or (608) 890-1519.

Your privacy is our top priority. If you do not wish to receive communications from us, please send an email with your name and address to uwhealthoptout@uwhealth.org or call us at (844) 300-2002. If you are a patient at UW Health, you will continue to receive information related to your care. Thank you.
A LOOK AT OUR LABS

Mustafa K. Baskaya, MD
Neuroanatomical and skull base lab: Surgeons increase their skills, techniques and confidence enabling them to better employ safer, more innovative approaches to access the skull base anatomy during difficult cerebrovascular and tumor removal surgeries.

Cerebrovascular lab: The focus is to understand the cellular and molecular mechanisms of stroke-related injury and stem cell-mediated repair with the goal of developing effective therapeutic approaches to reduce damage and enhance recovery.

Nathaniel Brooks, MD
The Surgical Interface Design Lab explores novel software and hardware tools to improve visualization and navigation during surgical procedures.

Robert J. Dempsey, MD, FACS
This cerebrovascular lab examines the molecular mechanisms of stroke and atherosclerosis to better clarify the process of brain injury repair and recovery and develop more effective treatment strategies, especially for “silent strokes.”

Regenerative neurosurgery lab: This lab develops new ways to understand and modify the genetic and chemical factors which influence repair of the brain injured by stroke, trauma or degenerative disorder.

Amgad S. Hanna, MD
This lab explores innovative ways to locally deliver drugs to enhance peripheral nerve regeneration and functional recovery in patients affected by spinal cord injuries.

Bermans J. Iskandar, MD
Research in this lab is conducted to improve the diagnosis and prognosis of pediatric congenital brain and spinal cord anomalies, especially involving the growth and regeneration of nerves in the developing brain, lowering risk and improving healing injuries.

John S. Kuo, MD, PhD
This research lab studies the cancer stem cell (CSC) sub-population of brain tumors working toward developing new therapies specifically targeting and eradicating CSCs to significantly improve patient survival and quality of life.

Joshua E. Medow, MD
The focus of this lab is on biomedical engineering and mathematical approaches to solving major medical issues, especially with critically ill patients.

Daniel K. Resnick, MD
The goals of this lab are understanding the pathology associated with spinal cord injury and developing novel treatments to promote functional recovery and alleviate neuropathic pain.

Raghu Vemuganti, PhD
The major goal of this lab is to understand the molecular mechanisms that contribute to neuronal death following stroke and traumatic brain injury with an emphasis to develop various RNAs as therapeutic targets to prevent inflammation and oxidative stress.

Justin Williams, PhD
The goals of this lab are developing durable and safe new devices for recording from, and stimulating, neural tissue. A brain-computer interface or other neural prosthetic communication device may benefit patients with motor disabilities.

RESEARCH EXCELLENCE

The productivity of our faculty in basic and clinical research is exceptional and ranks among the best in the country in the field of neurosurgery. Collectively, we have 10 research labs working on a host of projects to improve treatment for patients with brain, spine and peripheral nerve disorders, including malignant tumors, stroke and spinal cord injury.

Drs. Medow and Brooks are working to develop cutting-edge medical devices to ultimately improve patients’ quality of life. Dr. Justin Williams is a leader in the field of brain-computer interaction through his work in the Neural Interface Technology Research and Optimization (NITRO) Laboratory, a part of the Department of Biomedical Engineering. Dr. Kuo continues his award-winning work in basic tumor biology and Dr. Dempsey leads a nationally recognized laboratory in stroke research.

Dr. Vemuganti is a pioneer in basic research and understanding the molecular changes contributing to brain damage and/or recovery after stroke and traumatic brain injury. Dr. Baskaya with skull base and Dr. Hanna with peripheral nerve teach the latest surgical techniques to health care professions in the region. Dr. Iskandar is recognized as a leader in the field of epigenetics, being among the first to recognize the effects of metabolic changes being passed on from mother to child. I have been fortunate to participate in the development of a national spine registry that will provide information for guiding spine surgeons in Fall 2013, our department became one of 25 Regional Coordinating Centers for Stroke Research through Wisconsin Stroke Net (WSN), which is part of the National Institutes of Health (NIH). Drs. Dempsey and Ahmed are leading this initiative. Several doctors are collaborating and include, Drs. Niemann, Baskaya, Vemuganti, Sattin and Bradbury, among others. Our goal is to improve the lives of our patients through collaborative research across the stroke spectrum. There are currently several studies that look at the pathophysiology of a recurrent stroke.

Clinical research in neurosurgery looks at each aspect concerned with the prevention, diagnosis, treatment and rehabilitation of disorders of the central and peripheral nervous system and extra-cranial cerebrovascular system.

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The Department of Neurological Surgery is very active not only in stroke research but also in head trauma, spinal cord injury, brain tumor, nerve regeneration, speech function and epilepsy. Other studies focus on the development of novel treatment for spinal cord injury to promote functional recovery as well as to alleviate neuropathic pain.

Technicians prepare a patient for a carotid ultrasound as part of a clinical trial.

Daniel K. Resnick, MD
Professor and Vice Chairman for Academic Affairs
Residency Program Director, Department of Neurological Surgery
Professor, Department of Orthopedic and Rehabilitation Medicine
Co-Director, Spine Surgery Program
Past President, Congress of Neurological Surgery
LAB MISSION

The mission of the Vemuganti lab is to understand the molecular mechanisms that contribute to brain damage and/or recovery after stroke and traumatic brain injury (TBI). Our long-term goal is to identify new therapeutic leads to promote functional recovery after stroke and TBI. We particularly emphasize the role of RNAs. Our recent studies showed that inflammation and oxidative stress after stroke can be curtailed by modulating transcription factors and microRNAs. We are currently evaluating molecular therapies to control a protein called alpha-synuclein that is key to neurodegeneration after brain injury.

LAB NEWS AND ACTIVITIES

- The lab published a new review article entitled “Crosstalk between endoplasmic reticulum stress, oxidative stress, and autophagy: potential therapeutic targets for acute CNS injuries” in the Journal of Molecular Neurobiology. Dr. Venkat Nakka, former post-doctoral fellow, is the first author of this paper.

- TaeHee Kim (a graduate student in Dr. Vemuganti’s lab) received a pre-doctoral fellowship from the American Heart Association to study the role of microRNA-7 in controlling alpha-synuclein and secondary brain damage after stroke.

- The lab published a new manuscript entitled “Expression of transcribed ultraconserved regions of genome in rat cerebral cortex” in the journal Metabolic Brain Disease. Assistant Scientist Dr. Suresh Mehta is the first author of this paper.

- The lab published a new review article entitled “Effect of sex and age interactions on functional outcomes after stroke” in the journal CNS Neuroscience & Therapeutics. TaeHee Kim is the first author of this paper.

As of June 2015, the following are members of Dr. Vemuganti’s lab, left to right: Mary Lopez, Suresh Mehta, Justin Balog, TaeHee Kim and Raghu Vemuganti.
DR. VEMUGANTI NEWS AND ACTIVITIES

• Joined the editorial board of *Stroke*, the flagship journal of the American Stroke Association
• Served on the NIH Study Sections NST-2 (training grant proposals) and BDCN-K (member conflict proposals) and the VA Study Section NURC (neurobiology proposals)
• Is serving as an associate editor for the Elsevier journal *Neurochemistry International*
• Presented the lab’s research findings on stroke genomic biomarkers at the Eurostroke Conference in Vienna, Austria, May 2015
• Taught the noncoding RNA course at the Brain 15 (International Society for Cerebral Blood Flow and Metabolism meeting) in Vancouver, Canada, 2015
• Continues to serve on the NIH Study Section NST-2, which reviews the undergraduate and post-doctoral fellowship applications for the National Institute of Neurological Diseases and Stroke

NEW GRANTS

2015–2017  American Heart Association Innovative Research Grant; PI: Vemuganti
            “LncRNAs, epigenetics and post-stroke brain damage”

2015–2019  Veterans Administration Merit Review; PI: Vemuganti
            “Role of alpha-synuclein and microRNA-7 in post-stroke brain damage”

2016–2018  National Institute of Health R21; PI: Vemuganti
            “LncRNA FosDT mediates ischemic brain damage”

2015–2016  Mary Lopez obtained a pre-doctoral fellowship from the Cellular and Molecular Pathology graduate program at the UW School of Medicine and Public Health to study ischemic preconditioning.

2015–2016  TaeHee Kim obtained a pre-doctoral fellowship from the American Heart Association to study neurodegeneration after stroke.

For more information, please visit neurosurgery.wisc.edu/research/vemuganti