Dr. T.S. Park receives Distinguished Faculty Award

By Mersiha Menkovic

Dr. Park was awarded a Distinguished Faculty Award by the Washington University Alumni Association at the 2013 Founders Day celebration on November 2, 2013. The Distinguished Faculty Award is the most prestigious award for Washington University faculty in recognition of professional achievements.

Farewell to Dr. Jeff Leonard

As many of you may already know, Dr. Jeffrey Leonard has been named Chief of Pediatric Neurosurgery at Nationwide Children’s Hospital in Columbus, Ohio. While this is a tremendous opportunity for him we are sad to see him go. Jeff joined the department as a resident in 1995, completed his pediatric neurosurgery fellowship at St. Louis Children’s Hospital in 2003 and became a faculty member immediately following. Jeff has made significant contributions to the department during his time here. He is an outstanding surgeon and teacher of residents. He has established himself as a leader in treating patients with pediatric brain tumors and has built a tumor bank used by many scientists at the medical school. Jeff was instrumental in fostering a relationship with leaders at Mercy Hospital for several years which recently led to the development a pediatric neurosurgery consultation service there which has been extremely successful. Finally, he has been recognized as an outstanding educator of medical students having initiated innovative educational programs for MS 1-3’s.

Jeff starts his new position in April but will be back in St. Louis from time-to-time until his wife Julie and their children, Jake, a junior at Washington University, and Jordan, a senior at John Burroughs move later this summer.

We would like to thank Jeff for his many contributions to the department and wish him the best of luck in his new role. He will be truly missed.
Neurosurgeon Eric Leuthardt’s research often has been described as science fiction brought to life. But in his latest project, his experiences in the laboratory and the operating room have inspired him to write a futuristic thriller.

Leuthardt, MD, associate professor of neurosurgery and of biomedical engineering at Washington University School of Medicine in St. Louis, is working to develop brain implants known as neuroprosthetics that detect brain signals and relay them to a computer. He hopes to use the technology to restore movement, speech and other functions in people suffering from stroke.

On the literary front, Leuthardt, director of the Center for Innovation in Neuroscience and Technology, is publishing a novel — his first — that extrapolates from his knowledge of and experience with computers and the brain to create a techno-thriller set four decades in the future. The novel, “RedDevil 4,” envisions a world where brain implants permeate every level of personal and social interaction as cell-phones do today. One of the protagonists, Dr. Hagan Maerici, is a St. Louis neurosurgeon on the verge of creating the world’s first artificial intelligence. He becomes entangled in a series of brutal murders committed by prominent citizens with no discernable motive for their violent actions.

Maerici and a pair of detectives suspect the crimes represent some bizarre neurologic syndrome that could involve their neuroprosthetics. They must race to solve the mystery before others are killed.

Leuthardt, who treats patients at Barnes-Jewish Hospital, never has been involved in a murder case. But his research into interfaces that link the brain and computers has given him unique insights into some of the many social, ethical and legal challenges that may arise as this technology develops.

For example, in 2011, Leuthardt and his colleagues announced that temporary brain-computer implants could detect when participants were saying or thinking of a particular speech sound or phoneme.

“We want to take this further and see if we can not just detect when you’re saying dog, tree, tool or some other word, but also learn what the pure idea of that looks like in your mind,” he said at the time. “It’s exciting and a little scary to think of reading minds, but it has incredible potential for people who can’t communicate or are suffering from other disabilities.”

“RedDevil 4,” published by Tor/Forge, is available in bookstores and online.

Neurosurgeon Eric C. Leuthardt’s first novel was inspired by his research into brains and computers.
New Faculty Member — Gavin Dunn, M.D., Ph.D.

By Ralph G. Dacey, Jr., M.D.

Dr. Gavin Dunn joined the faculty of the Department of Neurological Surgery January of 2014.

Dr. Dunn will be joining the newly initiated Center for Human Immunology and Immunotherapy (CHiPS) which is an interdepartmental Center which has been formed in the past few months. He will be one of the initial recruits to the Center and will hold joint appointments in the Center and in the Department of Neurosurgery. His primary work in the Center and in the Department will be to develop immunologically based treatments for malignant gliomas (and possibly other brain tumors) in conjunction with scientists in the departments of Pathology and Immunology, Medicine, Surgery, and the Siteman Cancer Center.

Dr. Dunn grew up in Columbia, Missouri and attended Princeton University. He obtained the M.D. and Ph.D. degrees in May of 2006 from Washington University. His thesis was “The Interferon Dependent Cancer Immunotherapy Process”. While he was here he worked in the laboratory of Dr. Robert Schreiber.

He subsequently did his neurosurgery residency at Massachusetts General Hospital in Boston and was a post-doctoral research fellow in the laboratory of Dr. William Hahn at the Broad Institute of Harvard/MIT at the Dana Farber Cancer Institute. He is a Lieutenant Commander in the United States Navy Reserve Medical Corps.

New Department of Neurosurgery Staff

Melissa Beck, CRA – Dr. Ray
Ellen Carlson, RN – Dr. Dacey & Dr. Ray
Ravi Chacko – Leuthardt Lab
Yong Hee Chung – Yano Lab
Carly Gagnon, NP – Adult Neurosurgery
Christy Geraci, PNP – Pediatric Neurosurgery
Maya Green, MA – Dr. Santiago
Alicia Luckett, MAIII – Center for Advanced Medicine
Sheila Roberson, Patient Service Rep – Center for Advanced Medicine
Julie Schremmer, NP – Adult Neurosurgery
Kristen Vizcarra, RN – Dr. Santiago

WELCOME TO OUR TEAM!

Catherine Moran, Irish Rotator

Catherine Moran, M.B., B.Ch., is a clinical fellow working with Dr. Leuthardt both clinically and in his lab at the interface of the newest surgical interventions and human neuroscience. For Catherine, this has been a challenging and important introduction into a sphere of neurosurgery that she believes, in the future, will play an enormous role in shaping the way we look at brain pathology and treat it.

Catherine was born in London, raised in a small village in the center of Ireland, Glasson. She attended University College Dublin and graduated medicine in 2006. She later joined the neurosurgical team at Beaumont in 2008 after gaining membership into the Royal College of Surgeons in Ireland. Catherine worked as a senior house officer, followed by a registrar at Beaumont Hospital. She completed a medical doctorate on apoptotic gene processes in epilepsy—“The role of Bcl-2 protein, Bmf in seizure induced cell death”. In 2011, from the Royal College of Surgeons, Catherine gained entry into the Specialist Registrar scheme for neurosurgery and completed a year at Beaumont, then Cork University Hospital before arriving at Washington University.
Treating stroke is a race against time. To prevent brain damage and save lives, physicians have to diagnose and treat strokes as quickly as possible. Now, a new study suggests doctors can reduce risks by delaying a commonly performed follow-up surgery that clears fatty deposits from an artery in the neck.

Doctors at Washington University School of Medicine in St. Louis found that the surgery, which reduces risk of additional strokes, should be delayed if patients were recently treated with the clot-busting drug tPA.

“Patients undergoing this surgery a few days after tPA treatment were at higher risk for bleeding complications,” said author Greg Zipfel, MD, an associate professor of neurological surgery who treats patients at Barnes-Jewish Hospital. “We think delaying the procedure by at least one week after tPA treatment likely will make the procedure safer and improve patient outcomes.”

The study appears online in the journal Neurosurgery. Symptoms of stroke include dizziness, paralysis, confusion, loss of sight, numbness, weakness and trouble speaking. After symptoms start, doctors have 4.5 hours to confirm that a stroke is occurring and to give patients tPA to break up the blood clots causing the strokes. (Until recently, the time limit for tPA administration was three hours after stroke onset.)

After the stroke, physicians scan the carotid arteries, the two large blood vessels in the neck that provide much of the brain’s blood supply. If one of these arteries is more than 50 percent blocked with fatty deposits called plaque, doctors commonly recommend surgical removal of the plaque a few days after the stroke.

During this procedure, known as a carotid endarterectomy, surgeons open the diseased artery and remove the plaque. This helps reduce the chances that a fragment of the plaque will break free, block a small brain blood vessel and cause another stroke.

First author Ananth Vellimana, MD, a second-year neurosurgery resident at Barnes-Jewish Hospital, analyzed outcomes in 142 patients who underwent the procedure at the hospital from 1995 to 2007. Eleven patients received the procedure a few days after a stroke and tPA treatment; 131 had surgery after suffering a stroke or stroke-like symptoms but did not receive tPA treatment.

Two cases of brain bleeding occurred in the much smaller group of patients who had the surgery within a few days of tPA treatment, but only one case occurred in the larger group, which had not been treated with tPA.

“Treatment with tPA appears to affect the risk of brain bleeding after surgery, but the body clears tPA much too rapidly for it to be the direct cause of the problem,” Vellimana noted. “One possibility is that tPA’s suppression of blood clotting during stroke treatment may cause microhemorrhages in the brain. These small bleeds could become significantly bigger after an endarterectomy increases blood flow to the brain.”

Advanced imaging techniques may allow physicians to detect these microhemorrhages and better assess the risks of the surgery, according to Vellimana. If patients exhibit these small bleeds, doctors may delay the procedure further to give the blood vessels a chance to heal.

Treatment with tPA also could be activating a molecular chain reaction that temporarily increases the likelihood of bleeding in the brain. As an example, the researchers noted that tPA boosts production of a protein that increases the risk of bleeding.

“These two forms of treatment – tPA and endarterectomy – each have proven value in limiting or preventing brain damage from strokes,” said Zipfel. “The challenge now is determining how to time the use of these treatments to maximize benefit and minimize risk.”
The brain appears to synchronize the activity of different brain regions to make it possible for a person to pay attention or concentrate on a task, scientists at Washington University School of Medicine in St. Louis have learned.

Researchers think the process, roughly akin to tuning multiple walkie-talkies to the same frequency, may help establish clear channels for communication between brain areas that detect sensory stimuli.

“We think the brain not only puts regions that facilitate attention on alert but also makes sure those regions have open lines for calling each other,” said first author Amy Daitch, a graduate student researcher.

The results are available in the Proceedings of the National Academy of Sciences.

People who suffer from brain injuries or strokes often have problems paying attention and concentrating.

“Attention deficits in brain injury have been thought of as a loss of the resources needed to concentrate on a task,” said senior author Maurizio Corbetta, MD, the Norman J. Stupp Professor of Neurology. “However, this study shows that temporal alignment of responses in different brain areas is also a very important mechanism that contributes to attention and could be impaired by brain injury.”

Attention lets people ignore irrelevant sensory stimuli, like a driver disregarding a ringing cell phone, and pay attention to important stimuli, like a deer stepping onto the road in front of the car.

To analyze brain changes linked to attention, the scientists used grids of electrodes temporarily implanted onto the brains of patients with epilepsy. Co-senior author Eric Leuthardt, MD, associate professor of neurosurgery and of bioengineering, uses the grids to map for surgical removal of brain tissues that contribute to uncontrollable seizures.

With patient permission, the grids also can allow Leuthardt’s lab to study human brain activity at a level of detail unavailable via any other method. Normally, Corbetta and his colleagues investigate attention using various forms of magnetic resonance imaging (MRI), which can detect changes in brain activity that occur every 2 to 3 seconds. But with the grids in place, Corbetta and Leuthardt can study the changes that occur in milliseconds.

Before grid implantation, the scientists scanned the brains of seven epilepsy patients, using MRI to map regions known to contribute to attention.

With the grids in place, the researchers monitored brain cells as the patients watched for visual targets, directing their attention to different locations on a computer screen without moving their eyes. When patients saw the targets, they pressed a button to let the scientists know they had seen them.

“We analyzed brain oscillations that reflect fluctuations in excitability of a local brain region; in other words, how difficult or easy it is for a neuron to respond to an input,” Daitch said. “If areas of the brain involved in detecting a stimulus are at maximum excitability, you would be much more likely to notice the stimulus.”

Excitability regularly rises and falls in the cells that make up a given brain region. But these oscillations normally are not aligned between different brain regions.

The researchers’ results showed that as patients directed their attention, the brain regions most important for paying attention to visual stimuli adjusted their excitability cycles, causing them to start hitting the peaks of their cycles at the same time. In regions not involved in attention, the excitability cycles did not change.

“If the cycles of two brain regions are out of alignment, the chances that a signal from one region will get through to another region are reduced,” Corbetta said.

Daitch, Corbetta and Leuthardt are investigating whether knowing not just the location, but also the tempo of the task, allows participants to bring the excitability of their brain regions into alignment more rapidly.
Honors & Awards

Gregory J. Zipfel, M.D.

• Elected as Member to the American Academy of Neurological Surgeons

National & International Presentations (July - December 2013)


Dacey Jr., R.G. (2013, September). Neurosurgical Education, Innovation & Practice: External Challenges in an Era of Comprehensive Reform. Oral presentation at the Walter Reed Medical Hospital, Inova Neuroscience Institute as Visiting Professor. Falls Church, VA.


Murphy, RK. (2013, October). Detecting Subclinical Myelopathy using diffusion tensor imaging. Poster presentation at Congress of Neurological Surgeons Annual Meeting. San Francisco, CA.


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Publications cont.


Personal News

Drs. Tom Beaumont and Najla Kfoury were married on Saturday, October 19, 2013 at the Four Seasons in St. Louis, Missouri.

Drs. Jarod Roland and Lauren Tashima were married on Saturday, September 21, 2013 at V. Sattui Winery in Napa Valley, California.

“"If I Only Had a Brain” marathon relay team (Dr. Katie McCoy, Dr. Rory Murphy, Dr. W. Zack Ray and Rikki Takeyama) competed on Sunday, November 17, 2013 against 52 other teams. They finished in 3:24:49 and 14th overall.

Drs. Chad and Megan Washington welcomed their first child, son Collum Sennet Washington, in September 2013.
New Grants Awarded: July 1-December 31, 2013

Albert Kim
Voices Against Brain Cancer
“PROTEASOMAL CONTROL OF GliOBlastoma Cancer stem cell function”
07/01/13 – 06/30/14

Albert Kim
Pardee Foundation
“E3 Ubiquitin Ligases in GliOblastoma Cancer stem cell function using a patient-derived, molecularly”
12/01/13 – 11/30/14

Eric Leuthardt
BJHF Cancer Frontier Fund (PI: Tran)
“Using heat ablation to disrupt the blood brain barrier to enhance delivery of chemotherapy in the...”
07/01/13 – 06/30/14

Dave Limbrick
American Syringomyelia & Chiari Alliance
“Developing a Preoperative Chiari Severity Index to Stratify Prospective Clinical Studies for Chiari”
09/01/13 – 08/31/14

Rory Murphy
Spinal Cord Injuries Research Program – University of Missouri
“Assess the functional outcomes of adults with cervical spinal cord injury using diffusion MRI”
12/01/13 – 12/01/15

W. Zack Ray
NIH K23
“EVALUATION OF AXONAL INTEGRITY USING DIFFUSION TENSOR IMAGING”
09/01/13 – 08/31/18

W. Zack Ray
Acera Surgical Inc.
“EVALUATION OF Cerafix Dura Substitute in a Rabbit Duraplasty Model”
12/15/13 – 12/14/14

Hiroko Yano
McDonnell Center for Cellular and Molecular Neurobiology
“Identification of transcriptional abnormalities that drive neurodegeneration in Huntington’s disease”
07/01/13 – 06/30/14

Greg Zipfel
American Heart Association
“The Role of KATP Channels in Subarachnoid Hemorrhage-Induced Vasospasm”
07/01/13 – 06/30/15

Source: Toni Kozemski (Awards by PI)