UCSF Neurosurgery News

UCSF Department of Neurological Surgery

Volume 15

New Faculty Expand Neurosurgical Care

Over the past decade, hospital admissions and outpatient visits to UCSF have dramatically risen in response to increased access to and demand for high-quality specialty care. To meet the needs of our patients and community, the Department of Neurological Surgery continues to expand here in San Francisco, as well as to hospitals and clinics around the Bay Area.

This year, three top specialists are joining the Department to expand care for cerebrovascular disorders, brain tumors, and neurospinal disorders. We are very pleased to be welcoming back two of our former fellows, Adib Abla, MD, and Shawn Hervey-Jumper, MD, who have established themselves as world-class vascular and brain tumor surgeons, respectively. Also joining our team is Lee Tan, MD, whose dual training in neurosurgery and orthopedic spine surgery brings a unique and comprehensive perspective to surgical treatment for the spine.

In this issue of our newsletter, our new faculty members give us insight into their practice and treatment philosophies, as well as what attracted them to join UCSF. Each of them is committed to our goal of providing physicians in our community with a fast, high-quality consultation and referral process.

Mitchel S. Berger, MD

Berthold and Belle N. Guggenhime Professor and Chair

Director, Brain Tumor Center

Department of Neurological Surgery, UCSF

Vascular Neurosurgery Referrals

Neurosurgery Clinic: (415) 353-7500
Fax: (415) 353-2889

The UCSF Medical Center maintains a subarachnoid hemorrhage bed that is ready to receive patients with ruptured aneurysms immediately.

Brain Tumor Center Referrals

Neuro-Oncology Clinic: (415) 353-2996
Fax: (415) 353-2167
E-mail: NeuroOncNewPatientCoord@ucsf.edu

The UCSF Brain Tumor Center is a regional resource for physicians and allied health professionals. From surgical consults to clinical trial eligibility, we provide physicians with a fast, high-quality referral process.

Spine Center Referrals

UCSF Spine Center: (415) 353-2739 or 866-81-SPINE
Fax: (415) 353-2176

The UCSF Spine Center is a multidisciplinary program that provides comprehensive treatment for all pathologies affecting the spine and peripheral nerves. Neurosurgeons in the Spine Center are available for consultation on complex cases or referral.

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Adib Abla, MD

Specialty: Cerebrovascular Disorders

After earning his medical degree from the University of Pittsburgh, Adib Abla, MD, completed neurosurgical residency and a cerebrovascular and skull base fellowship at Barrow Neurological Institute, where he trained with Robert Spetzler, MD. He next completed a second fellowship in open vascular neurosurgery at UCSF under Michael Lawton, MD. After completing his training, he practiced as an attending vascular/endovascular neurosurgeon and the Director of Cerebrovascular Surgery at the University of Arkansas for Medical Sciences College of Medicine.

The Advantage of Surgical and Endovascular Expertise

Having the ability to perform both microsurgical and endovascular procedures gives me the opportunity to evaluate every patient from both aspects and decide what's going to give them the best outcome. I think the endovascular training gave me a few advantages because I have a better appreciation of the anatomy based on the angiograms and understand the aneurysm inside out. Looking at the vascular anatomy from the inside and then correlating it to the CTA or MRI scan and what you see from the outside really gives you a nice three-dimensional appreciation and allows you to maximize surgical outcome.

An endovascular procedure that allows the patient to go home the next day is a great option when we can offer it, but for some lesions it makes more sense to provide a more permanent solution with open surgery. So it ultimately has to be tailored to the type of lesion and its location, nuances of the pathology, as well as the age and preferences of the patient.

Favorite Procedure to Perform

A basilar tip aneurysm clipping. It is a rare procedure with high complexity and beautiful anatomy. When it needs to be done, it is one of the most beautiful operations, like an elaborate symphony with many steps, where everything has to go right.

Frontiers for Vascular Neurosurgery

Hypertensive intracranial hemorrhages in deep locations are generally not treated because surgery is risky and does not improve neurological symptoms or paralysis. But the thinking is changing. Now that we have found a benefit to ischemic stroke treatment, I think hemorrhagic stroke treatment is the next frontier. There is new research showing that patients may benefit from a minimally invasive evacuation that may allow them to exit the ICU faster. Their neurological improvement may not be better, but if the rates of feeding tube and tracheostomy are lower and they are able to swallow independently long term, that could make a difference in their quality of life. Right now there is no standard of care one way or the other, and I think randomized trials in the next five to ten years will help us determine if surgery can be helpful.

Another frontier exists in using our training in both vascular and endovascular neurosurgery to help patients with the most complex problems using hybrid therapies in hybrid operating rooms, where both treatments can be done in one setting for one patient.

Why to Seek Early Care

An aneurysm or AVM is not something to be ignored regardless of size because we don't know when they are going to rupture, so patients should talk to a specialist to really understand the risks and available treatment options.

The Best Part of Being at UCSF

The people and culture at UCSF are incredible. I have so much respect for everyone I'll be working with because they are at the cutting edge of what they do across the board. Physicians, nurses, staff, residents – everyone is top notch. It is also an opportunity to have a hand in a practice that is very high volume and allows one to make a real impact in patient care, but also in residency and fellowship training, and research. I see this as a chance to use what I've learned on a bigger scale with the opportunity to potentially help more patients.

Shawn Hervey-Jumper, MD

Specialty: Adult Brain Tumors

Shawn Hervey-Jumper, MD, earned his medical degree from Ohio State University College of Medicine, and completed neurosurgical residency at the University of Michigan Medical Center in Ann Arbor, MI. He performed a fellowship in neurosurgical oncology at UCSF under Mitchel Berger, MD, during which time he focused on brain mapping techniques and surgery for tumors in eloquent cortex. He then returned to the University of Michigan where he continued to specialize in surgery for brain tumors and established a laboratory to study neurocognitive mapping and strategies to promote neural plasticity and recovery.

The Best Part of the Job

Our patients are amazing. In the face of these devastating diagnoses, they are so grateful and working with them is an incredibly rewarding experience. Whether it's trying to preserve functional outcomes or extend survival or help keep someone with a new brain tumor healthy before a wedding next fall, the opportunity to work with each individual patient is absolutely the best part of what I do.

Living with Purpose

The standard for brain tumor research has been to extend survival, but we don't have many metrics on how to help patients improve their quality of life. It was during fellowship at UCSF that I really started to see what is important to our patients. Yes, they want to live, but they want to live for a purpose. We don't know very much about the recovery process that happens in the brain, how to predict who will have a better recovery after treatment, or how the timing of therapy affects that. I began studying neural plasticity and realized there are big knowledge gaps as it relates to brain tumors, so that has become a big focus of my research program.

Using a combination of imaging, molecular techniques, and genotyping, I study how an individual brain recovers based on genetic and imaging markers and hopefully we can use that understanding to determine who is at risk for poor recovery. If we can define those populations, we can come up with strategies to help recovery with therapeutic intent. The goal is to not only kill the tumor but to enrich the healthy brain.

A Map for Cognition

For the most part we are still mapping the brain in surgery the same way as we did in the early 1900s. This process works well for defining areas of motor function and language function. But we need better methods to map and understand an individual's higher cognitive functions like the ability to multitask, working memory, or multisensory processing. In my research I collaborate with experimental neuropsychologists and we have adopted a number of intraoperative, non-language cognitive tasks related to functions like selective attention, distractability, and executive processing that we are beginning to test in the operating room.

We increasingly know that if you have a brain tumor your probability of going back to work can be very low and not being able to work is also the primary reason quality of life declines. And even though many people with brain tumors have short survival times, there are many others who will survive 10 to 15 years with lasting deficits that may prevent them from living a fulfilling life. Genetics are starting to tell us who these people are and we can apply strategies to address these deficits. Sometimes it can be as simple as neurocognitive remediation to help with short-term memory, but having those tools can make a big difference.

The Best Part of Being at UCSF

The UCSF Brain Tumor Center really takes a team approach. When you have a team that works together toward a common goal you can do really good things, and I'm looking forward to working with such a dedicated group.

Lee Tan, MD

Specialty: Complex Spine Disorders

Lee Tan, MD, attended Indiana University School of Medicine and then completed his neurosurgical training at Rush University Medical Center in Chicago. Following his neurosurgical training, Tan completed the Adult and Pediatric Comprehensive Spine Fellowship in the Department of Orthopedic Surgery at Columbia University Medical Center. His clinical focus includes spinal deformities, cervical spine pathologies, and degenerative lumbar spine pathologies. He also has expertise in motion-preservation techniques, such as artificial disc replacement and laminoplasty.

The Spine as a Unique Organ System

I think most neurosurgery residents start out wanting to specialize in brain because it's cool and mysterious. But I actually think the decision-making in spine is more complex. The spine has 25 motion segments from the occiput to sacrum; each segment has six degrees of freedom with its own important biomechanical role. To maintain the normal physiological function of the spinal column, each motion segment must work harmoniously with the adjacent levels. Therefore, the spine surgeon must carefully consider the biomechanical impact of a particular procedure to the rest of the spine. An operation done at a single level can have a significant biomechanical impact on other levels and can alter the overall spinal alignment. The spine column also degenerates naturally, as part of normal aging, and during surgical planning the spine surgeon must consider what could happen to the patient years down the road and take the patient's age, pathology, symptomatology, and overall health status into account.

The Orthopedic Spine Surgery Lens

My orthopedic spine fellowship at Columbia University Medical Center under Drs. Larry Lenke, Dan Riew, and Ron Lehman was an extremely valuable experience. I had exposure to a wide range of complex spine disorders, especially in spinal deformity. It gave me a different perspective in evaluating and treating spinal disorders. I learned various tricks in optimizing the milieu for bone healing and learned to view bones as living structures that can remodel over time with load and stress. I also gained experience in motion preserving techniques such as cervical artificial disc replacement and laminoplasty, which can lead to superior outcomes in well-selected patients.

Minimally Invasive Surgery Expertise

I had extensive experience with minimally invasive spine surgery during my residency and fellowship training. In well-selected patients, minimally invasive techniques can lead to improved clinical outcome with less blood loss, less tissue trauma, less infection, and faster recovery. In elderly patients with various medical comorbidities, traditional open surgery may be too morbid for them to tolerate, and minimally invasive techniques may be a great option to address their spinal pathologies and to improve quality of life.

Future Challenges in Spine Surgery

Our goals for spine surgery have always been relieving pain, restoring function, and getting our patients back to their normal daily lives. We need to continue improving our understanding of various spinal disorders to optimize clinical outcome while minimizing complications. Technological advances will certainly have a significant impact on spine surgery in the future. Minimally invasive and motion-preserving techniques have already made huge strides over the last decade and they will continue to grow and mature. I think 3D printing, robotic-assisted surgery, navigation, and stem-cell therapy will be increasingly incorporated into the field and make positive impacts in spine surgery.

The Best Part of Being at UCSF

The UCSF Spine Center has a team of world-renowned spine experts with tremendous amounts of knowledge, experience, and expertise. The close collaboration between the neurosurgeons and orthopedic spine surgeons really brings spine care to the next level. I'm very excited to be part of such an amazing group and looking forward to helping patients achieve the best clinical outcomes possible.

Neurosurgery News & Notes

Nurse Practitioner Margaretta Page, philanthropist Marritje Greene, UCSF Medical Center CEO Mark Laret, Director of Neuro-Oncology Susan Chang, and philanthropists Randi Murray and Cathy Podell attend a performance of Hamilton to benefit the UCSF Gordon Murray Neuro-Oncology Caregiver Program.

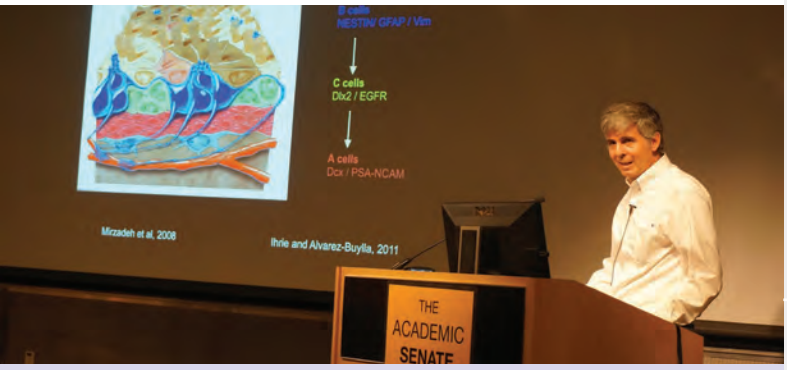
Hamilton Sings in Support of UCSF Brain Tumor Center

On March 16, 2017, a special performance of the critically acclaimed musical Hamilton benefitted the UCSF Gordon Murray Neuro-Oncology Caregiver Program. Organized by long-time supporters Randi Murray, Cathy Podell, and Marritje Greene, the event raised funds for a unique program that has become a model for other health care organizations around the country.

The Gordon Murray Neuro-Oncology Caregiver Program, named for Randi Murray's late husband, provides resources and an extra layer of support for the caregivers of patients at the UCSF Brain Tumor Center. Family members are often overwhelmed by the emotional toll and responsibility that comes with caring for a loved one with a brain tumor. By providing family members with the tools they need to succeed in that role and care for themselves, patients often have better outcomes and quality of life.

"The funds raised through this event have a direct impact on improving the lives of the patients and families we serve," said Susan Chang, MD, director of the Divison of Neuro-Oncology. "We are immensely grateful to everyone who came to support our work and especially to Randi, Cathy, and Marritje, whose tireless efforts have made this program a success."

Another memorable performance of Hamilton was held on March 12, 2017, and was organized by the nonprofit Champion Charities. Their largest event to date, "A Night at the Theatre" raised $500,000 for several programs at the UCSF Medical Center, including the UCSF Brain Tumor Center. The evening raised additional funds for Teach for America and the Basic Fund.



Arturo Alvarez-Buylla, PhD, was selected to receive the 60th Annual UCSF Faculty Research Lectureship in Basic Science for his highly original, creative, and rigorous research on adult neurogenesis and neuronal replacement.

Krystof Bankiewicz, MD, PhD, received the 2017 Golden OTIS International Trust Award. The oldest and largest consumer award in Poland, the Golden OTIS awards integrate patients, pharmacists, physicians, pharmaceutical companies, patient organizations, and the media to recognize pharmaceutical preparations as well as persons, associations, or media from Poland and abroad contributing to the development of health care.

Mitchel S. Berger, MD, received the 2017 Byron Cone Pevehouse Distinguished Service Award from the California Association of Neurological Surgeons. Berger was also the honored guest of the Young Neurosurgeons Reception at the 2017 meeting of the American Association of Neurological Surgeons/ Congress of Neurological Surgeons Joint Section on Tumors in Los Angeles.

Bjoern Schwer, MD, PhD, has been selected as a 2017 Kimmel Scholar by the Sidney Kimmel Foundation for his research, "Origins of brain cancer: Elucidating mechanisms that fuel genomic instability and tumorigenesis in neural stem/progenitor cells."

David O'Reilly, Joan O'Reilly and Praveen Mummaneni, MD

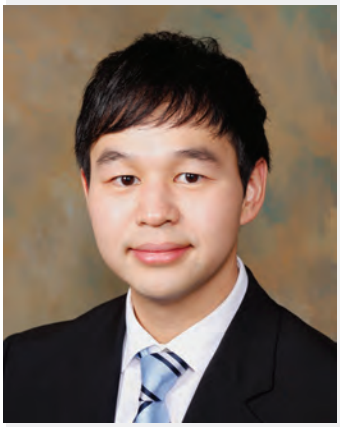
Praveen Mummaneni, MD, Appointed to Endowed Professorship

Praveen Mummaneni, MD, co-director of the UCSF Spine Center, has been named the Joan O'Reilly Professor in Spinal Surgery. This honor recognizes his distinguished career, his indefatigable dedication to his patients at UCSF, and his clinical research, which is improving outcomes for patients everywhere. The new endowed professorship was established through the generous support of philanthropists David and Joan O'Reilly.

Mummaneni was also recently elected Treasurer of the Congress of Neurological Surgeons and will serve on the Executive Committee from 2017 to 2020.

Doris Wang, MD, PhD, won the Journal of Neuro-oncology Award at the 2017 Annual Scientific Meeting of the American Association of Neurological Surgeons for her abstract "Seizure Outcome After Surgical Resection of Insular Glioma."

Jennifer Viner, CNRN, MS, NP, was among the five winners of UCSF's 2017 Caring Wisely Ideas Contest. Her proposal outlined a pathway for safe transitions in care that would reduce inpatient length of stay and omit ICU observation following craniotomy for simple brain tumors. After its initial success, Viner and her colleagues are now looking to expand the model to other neurosurgical patient populations.



Resident Research Awards

Neurosurgery resident Darryl Lau, MD, is the 2017 recipient of the Andrew T. Parsa Research Fellowship from the Neurosurgery Research & Education Foundation and the American Association of Neurological Surgeons/Congress of Neurological Surgeons Joint Section on Tumors. He will be studying the role of c-Met/ß1-integrin complex formation in brain metastases from primary breast tumors.

Neurosurgery resident Stephen Magill, MD, PhD, received a Ruth L. Kirschstein NRSA Post-Doctoral Fellowship from the National Cancer Institutes for his project to develop a molecular diagnostic and prognostic signature for meningioma. He will be performing DNA sequencing of meningioma samples and testing whether specific gene mutations, or combinations of gene mutations, can predict outcomes, including time to recurrence, progression-free survival, and overall survival.

Image courtesy of Voyager Therapeutics

Interim Results of Phase 1b Gene Therapy Trial for Advanced Parkinson's Disease

An ongoing clinical trial at UCSF for advanced Parkinson's disease is evaluating the use of gene therapy to increase the brain's production of amino acid decarboxylase (AADC), an enzyme that converts oral levodopa into dopamine. Oral levodopa is the most common medication to treat the symptoms of Parkinson's disease. Having a steady availability of AADC in the brain with this one-time treatment could allow patients to improve their sensitivity to oral levodopa, thereby reducing their dependence on the medication, with the potential to improve their motor symptoms and quality of life.

The trial uses real-time MRI to monitor infusion of the gene therapy vector into the putamen, overcoming the limitations of drug-delivery technology used in previous trials. For the 15 patients enrolled in the study, the UCSF team was able to successfully make adjustments in the position of the infusion catheter or increase the volume if the infusion was not covering a sufficient area of the putamen. The majority of patients were able to return home within two days of completing surgery.

The first five patients in the study (cohort 1) received a dose of 450 microliters, while the other 10 (five each in cohorts 2 and 3) received up to 900 microliters. After six months, PET scanning showed an increase in the conversion of oral levodopa to dopamine in both groups, but there was more dopamine in the brains of patients who received the higher volumes. Although follow-up is still ongoing, five subjects in cohort 1 and three in cohort 2 have completed 12-month follow-up evaluation. At 12 months, daily levodopa equivalents were reduced an average of 10% for cohort 1 and 35% for cohort 2. On-time without troublesome dyskinesias, as measured by motor diaries, increased by 1.6 hours in cohort 1 and 4.1 hours in cohort 2.

"This was a small phase 1b safety and tolerability trial in 15 patients, so while these results are encouraging, we have to be cautious in extrapolating them too broadly," says the study's principal investigator at UCSF, Paul Larson, MD. A second phase 1b study is planned to start later this year.

Interim results of the study were presented at the 2017 annual scientific meetings of the American Association of Neurological Surgeons and the American Academy of Neurology. The study is being sponsored by Voyager Therapeutics and is also being conducted at the University of Pittsburgh. Initial funding for the study was provided by the Michael J. Fox Foundation.

For more information, contact Marin Thompson at Marin.Thompson@ucsf.edu.

Larson PS, Bankiewicz KS, Bringas J, Martin AJ, Richardson RM, Van Laar A, Ravina B, Kells AP, Thompson ME, Christine CW. Real-time MRI-guided delivery of AAV2-AADC gene therapy for Parkinson's disease: infusion strategies and their impact on coverage of the putamen. Presented at the AANS Annual Meeting, Los Angeles, CA; April 24, 2017.

Christine CW, Bankiewicz KS, Van Laar A, Richardson RM, Ravina B, Kells A, Boot B, Martin A, Thompson ME, Larson PS. Intraputaminal AADC gene therapy for advanced Parkinson's disease: interim results of a phase 1b trial. Presented at the AAN Annual Meeting, Boston, MA; April 25, 2017.

Upcoming Continuing Medical Education Courses

To register, visit meded.ucsf.edu/cme

Neurosurgery Update 2017

August 3-5, 2017

Napa, CA

Pituitary Disorders: Advances in Diagnosis and Management

October 21, 2017

San Francisco, CA

UCSF Spinal Surgery Lab*

November 3-4, 2017

Las Vegas, NV

*Scholarships available for residents and fellows. Contact Lori Justice at lori.justice@ucsf.edu.

Residency Program Graduates

John D. Rolston, MD, PhD, earned his undergraduate degree in Computer Science from Columbia University, while spending summers conducting research at the National Institutes of Health (NIH). At the NIH, he worked in the electrophysiology lab of Dietmar Plenz, PhD, and the functional MRI lab of Jordan Grafman, PhD. Rolston then earned his PhD, studying brain-computer interfaces to treat epilepsy, in the labs of Steve Potter, PhD, at the Georgia Institute of Technology and Robert Gross, MD, PhD, at Emory University, work which was supported by an NIH F30 grant. He received his medical degree from Emory University in 2011.

During his neurosurgery residency at UCSF, Rolston concentrated in epilepsy and functional neurosurgery, working with Edward Chang, MD, Paul Larson, MD, and Phillip Starr, MD, PhD. His research year was spent in Chang's lab, where he studied the underlying physiology of electrical stimulation mapping of language using high-density electrocorticography, work that was supported by an NIH F32 grant. He also developed an active research interest in patient safety during his residency, for which he was awarded a fellowship by the Congress of Neurological Surgeons. As a result of this work, Rolston was chosen to edit the book *Quality Improvement in Neurosurgery.*

After graduation, Rolston will become the Director of Epilepsy Surgery and the Director of Stereotactic and Functional Neurosurgery at the University of Utah in Salt Lake City. He has been named an EDGE fellow at the University of Utah and his laboratory there will continue his research on brain-computer interfaces and electrocorticography.

Doris D. Wang, MD, PhD, received her undergraduate degree from Yale University in 2014, where she graduated magma cum laude with a degree in Molecular, Cellular, and Developmental Biology. During her undergraduate studies, she worked with Angelique Bordey, PhD, from Yale School of Medicine on electrophysiological characterization of adult neural stem cells in rodent brain, for which she received the Barry Goldwater Scholarship and the Ellsworth Prize in Natural Science.

She attended UCSF for the Medical Scientist Training Program, where she earned her PhD in Neuroscience in 2009 under the mentorship of Arnold Kriegstein, MD, PhD, and completed her MD training in 2011. Her dissertation research used a combination of molecular genetics and electrophysiology techniques to study the development of cortical circuits in rodent cortex. This work was supported by an American Epilepsy Foundation Predoctoral Fellowship Award and a Genetech Graduate Fellowship.

After joining UCSF's neurosurgery residency program, Wang continued to develop her interests in epilepsy and functional neurosurgery. She was awarded an NIH R25 grant to study human basal ganglia physiology under the mentorship of Philip Starr, MD, PhD. In addition, she has completed clinical projects with Edward Chang, MD, Michael Lawton, MD, Michael McDermott, MD, and Mitchel Berger, MD. Her research work during residency was recognized with the Stereotactic and Functional Resident Award from the Congress of Neurological Surgeons and the Journal of Neuro-Oncology award from the American Association of Neurological Surgeons.

After graduation, Wang will be completing a one-year clinical and research fellowship in epilepsy and functional neurosurgery at UCSF, during which time she will continue to explore her interest in stereotactic and functional neurosurgery and pursue her research interest in studying human electrophysiology in movement disorders.

Corinna Zygourakis, MD, attended the California Institute of Technology as an undergraduate, where she graduated with honors in Biology and English in 2006. She received the Axline and Lingle full-tuition merit scholarships, as well as the Jack E. Froehlich Award given to the top junior and the Mabel Beckman Commencement Prize to the top graduating female at Caltech.

Zygourakis then entered the joint Health Sciences & Technology program of Harvard Medical School and the Massachusetts Institute of Technology, from which she earned her medical degree in 2011. She completed a research thesis in cortical interneuron development, receiving cum laude honors and the Seidman Prize for outstanding senior thesis. In medical school, she was awarded the Howard Hughes Medical Institute Research Fellowship for Medical Students, as well as the Paul and Daisy Soros National Fellowship for New Americans.

During her residency at UCSF, Zygourakis developed a clinical interest in spinal surgery, particularly adult spinal deformity and spine tumors. She was recognized for providing outstanding clinical care to her patients with the Howard Naffziger Neurosurgery Resident Award in 2015. Her primary research focus is in cost and quality of neurosurgical care, and she received grants from UCSF Caring Wisely, the Center for Healthcare Value, and the Clinical and Translational Science Institute to fund her research on reducing surgical costs. This research was recognized with the UCSF Health "Great Save" Award from the CEO, the UCSF Sustainability Award from the Chancellor, and the UCSF Excellence and Innovation Award in Graduate Medical Education.

Upon graduation in 2017, Zygourakis will complete a one-year clinical fellowship in complex spine surgery at Johns Hopkins.

Residency Program Graduates' Selected Publications

Rolston JD, Englot DJ, Starr PA, Larson PS. An unexpectedly high rate of revisions and removals in deep brain stimulation surgery: Analysis of multiple databases. Parkinsonism Relat Disord 2016;33:72-77.

Rolston JD, Han SJ, Aghi MK. Nationwide shift from microscopic to endoscopic transsphenoidal pituitary surgery. Pituitary 2016;19(3):248-50.

Rolston JD, Englot DJ, Benet A, Li J, Cha S, Berger MS. Frontal operculum gliomas: language outcome following resection. J Neurosurg 2015;122(4):725-34.

Rolston JD, Han SJ, Lau CY, Berger MS, Parsa AT. Frequency and predictors of complications in neurological surgery: national trends from 2006 to 2011. J Neurosurg 2014;120(3):736-45.

Wang DD, de Hemptinne C, Miocinovic S, Qasim SE, Miller AM, Ostrem JL, Galifianakis NB, San Luciano M, Starr PA. Subthalamic local field potentials in Parkinson's disease and isolated dystonia: An evaluation of potential biomarkers. Neurobiol Dis 2016;89:213-22.

Wang DD, Raygor KP, Cage TA, Ward MM, Westcott S, Barbaro NM, Chang EF. Prospective comparison of long-term pain relief rates after first-time microvascular decompression and stereotactic radiosurgery for trigeminal neuralgia. J Neurosurg. 2017 Feb 24:1-10. [Epub ahead of print].

Wang DD, Knox R, Rolston JD, Englot DJ, Barkovich AJ, Tihan T, Auguste KI, Knowlton RC, Cornes SB, Chang EF. Surgical management of medically refractory epilepsy in patients with polymicrogyria. Epilepsia 2016;57(1):151-61.

Wang DD, Deans AE, Barkovich AJ, Tihan T, Barbaro NM, Garcia PA, Chang EF. Transmantle sign in focal cortical dysplasia: a unique radiological entity with excellent prognosis for seizure control. J Neurosurg 2013;118(2):337-44.

Zygourakis CC, Valencia V, Moriates C, Boscardin CK, Catschegn S, Rajkomar A, Bozic KJ, Soo Hoo K, Goldberg AN, Pitts L, Lawton MT, Dudley RA, Gonzales R. Association Between Surgeon Scorecard Use and Operating Room Costs. JAMA Surg 2017;152(3):284-291.

Zygourakis CC, Keefe M, Lee J, Barba J, McDermott MW, Mummaneni PV, Lawton MT. Comparison of Patient Outcomes in 3725 Overlapping vs 3633 Nonoverlapping Neurosurgical Procedures Using a Single Institution's Clinical and Administrative Database. Neurosurgery 2017;80(2):257-268.

Zygourakis CC, Yoon S, Valencia V, Boscardin C, Moriates C, Gonzales R, Lawton MT. Operating room waste: disposable supply utilization in neurosurgical procedures. J Neurosurg 2017;126(2):620-625.

Zygourakis CC, Liu CY, Wakam G, Moriates C, Boscardin C, Ames CP, Mummaneni PV, Ratliff J, Dudley RA, Gonzales R. Geographic and Hospital Variation in Cost of Lumbar Laminectomy and Lumbar Fusion for Degenerative Conditions. Neurosurgery. 2017 Mar 10. [Epub ahead of print].