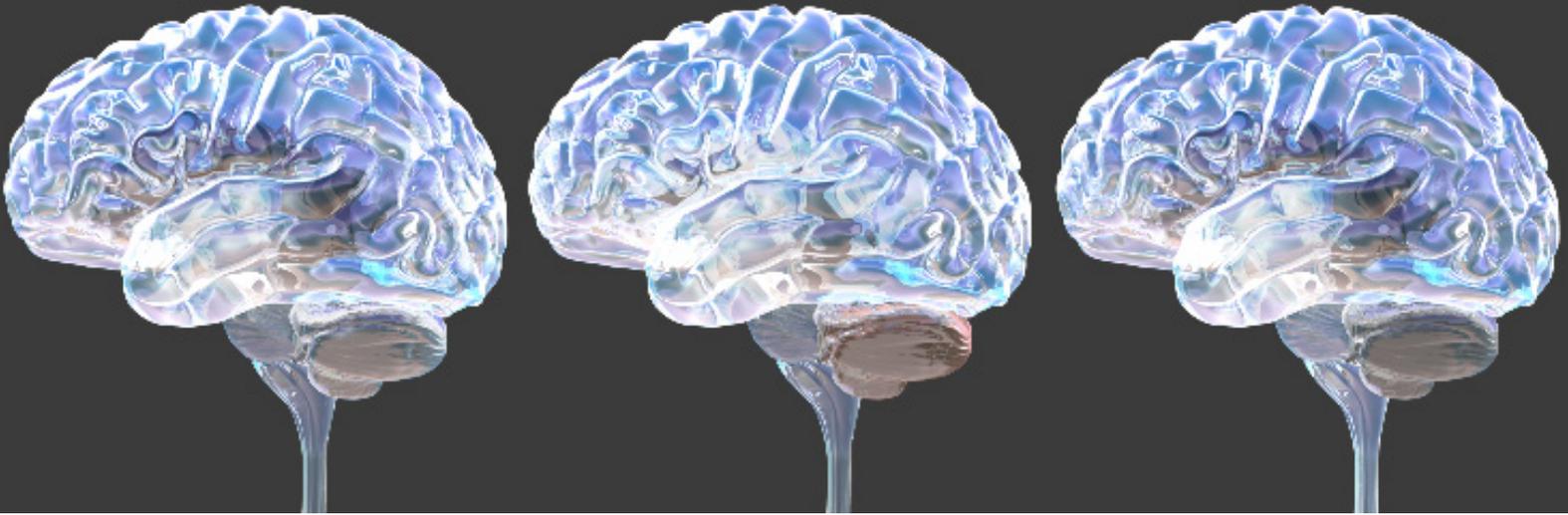


# NEUROSURGERY



## Cleveland Clinic Neurosurgery Alumni Connection

SPRING 2018



From the Desk of Michael Steinmetz, MD  
Chairman, Department of Neurosurgery

A successful end to 2017 has come to the Department of Neurosurgery. I took on this job with a number of goals in mind. Goal number one was to reinvigorate the sense of “department” among the neurosurgeons. This includes all neurosurgeons at Cleveland Clinic, not just those on main campus. I believe we are well on our way to accomplishing this goal. We continue to have fully attended and vibrant resident case management conferences, morbidity & mortality conferences, and Staff meetings/conferences. With the help of Lily Angelov, MD, we have created a more robust visiting professor series. Our social events following each visiting professor series are now attended by everyone’s significant other. I believe we are all acting as a cohesive unit!

Another goal of mine was to fully support the academic activities of our faculty and provide the environment, which permits pursuit of scholarly activities. In fact, it is now paramount to our resident group and emphasized in our recruitment of new residents. Our residents are now permitted two days off of clinical duty per month to pursue their research plan; they are paired with a research mentor and continue to have two years of dedicated time for research. Additionally, we now offer a basic science PhD following completion of the two years of research. I am excited that at the time of this writing, we will have our first resident entered into this program.

- continued on page 2

### upcoming events

The Department of Neurosurgery proudly presents:



#### **E. Antonio Chiocca, MD, PhD**

Harvey W. Cushing Professor of Neurosurgery  
Harvard Medical School

Neurosurgeon-in-Chief and Chairman,  
Department of Neurosurgery  
Co-Director, Institute for the Neurosciences  
Brigham and Women’s / Faulkner Hospital  
Surgical Director, Center for Neuro-oncology  
Dana-Farber Cancer Institute

#### **James Gardner Annual Visiting Professor Lecture Series**

#### **E. Antonio (Nino) Chiocca, MD, PhD**

**May 4, 2018; Bunts Auditorium**

**9:00 AM** Gardner Lecture I:  
Peripheral nerve surgery: a lost art in neurosurgery?

**1:00 PM** Gardner Lecture II:  
Gene- and viral-based immunotherapies for glioblastoma



#### **Resident Graduation Ceremony**

Saturday, June 9, 2018; Ritz-Carlton, Cleveland, OH

- continued

Drs. Lee Hwang and Brian Lee, both featured in this alumni newsletter, highlight the academic prowess of our current resident class. Both are outstanding people, physicians and surgeons. Moreover, both have and continue to be extremely academically productive. Lee is spending her two years of protected time performing brain tumor research at the NIH in Bethesda, Maryland. She has been successful in acquiring a grant to help support her project while she continues her clinical research interests. Bryan is a key member of our Spine Outcomes laboratory working on a number of projects. Both are prolific writers as evidenced by their multiple publications during their research time.

We have seen growth in our faculty. Recently, we successfully recruited Deb Benzil, MD, from practice in New York. She has taken on a Vice-Chairman role and has hit the ground running. She is working to advance tele-call and tele-neurosurgery across the region.

The Department of Neurosurgery continues to be the premier clinical and academic program in the country. We continue to strengthen and expand. Recently we interviewed a new group of potential residents who all seemed very excited about the state of our department, faculty and training program. I, as well as all involved in the department, are thrilled about the future of neurosurgery here at Cleveland Clinic!

## The Brain Network Approach for Epilepsy Surgery: Combining Network Modelling and Laser Ablation Simulation.



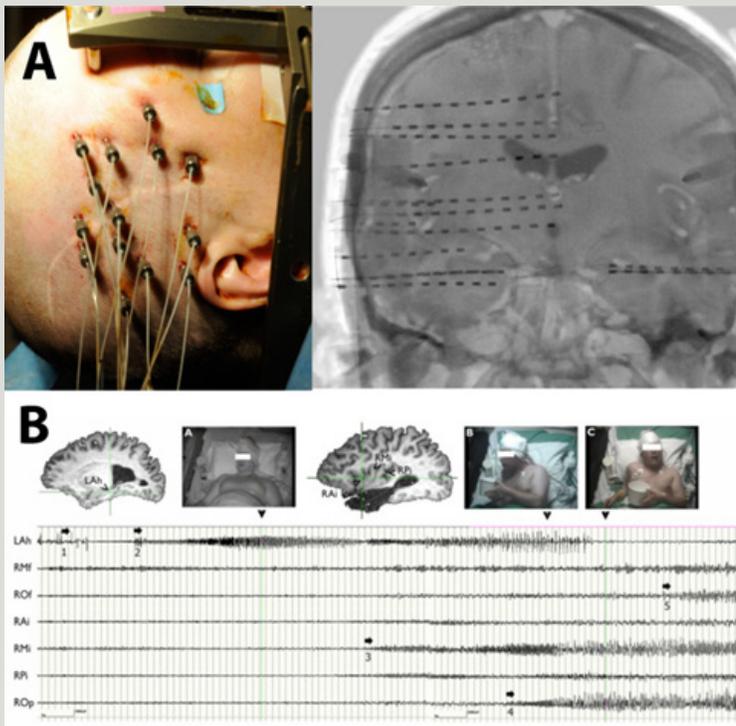
Jorge A. Gonzalez-Martinez, MD, PhD, FAANS

Seminal descriptions of neuronal networks in which neurons are the elementary units that transmit signals through synaptic networks were performed by Ramon y Cajal (1894). Since then, the concept of brain networks has occupied a prominent role in neurosciences. Our novel concept, which departs from the traditional focal epilepsy concept, hypothesizes that the epileptic activity is generated by a localized EZ and its propagation is organized through more widespread and complex brain networks (BN) (Fig.1), which are composed of different nodes with different roles and weights. Specifically, the clinical manifestations of neocortical epilepsies can be recognized as conditions involving large-scale networks, where the involved BN corresponds to that of a network of neuronal populations (nodes-showing “hyperexcitability” and “hypersynchronization” properties) distributed in distinct and distant brain structures. In addition, there are evidence, both at the computational model as well as the empirical level, for typical oscillatory patterns associated with inter-regional connectivity and network formation in the epileptic brain. The novel concept can bring explanations related to surgical failures due to focal resections

that don't take into account the complexity of the associated BNs. The great challenge for epileptologists is to identify the nodes involved in seizure genesis and early spread (EZ) and those involved only in late seizure propagation (propagation zone network-PZN). In this context, the surgical strategy must focus on treating the EZ and preservation of the PZN. The use of SEEG depth electrodes that could be placed in multiple lobes, both hemispheres and in deep structures of the brains (such as the hippocampus, insula, posterior mesial orbito-frontal area, and cingulate gyrus) allows the uncovering of possible EZs connected to large networks that are difficult to sample through cortical surface recordings using subdural grids. Recently, the clinical and research teams at The Cleveland Clinic Epilepsy Center (CCEC) have implemented and developed methods to identify these networks and adapt surgical strategies to fit the novel BN concept. At CCEC, around 400 epilepsy surgeries are performed every year, including a growing number of stereotactically implanted depth electrodes (SEEG), a method that was developed in France, and implemented and brought

to the United States by our group. SEEG is a minimally invasive method of invasive monitoring. As the hallmark of the SEEG method, the multiple depth electrode placements are precisely guided by pre-implantation anatomical-electro-clinical hypotheses, which are based on non-invasive data. Due to its extensive, three-dimensional and data driven explorations, SEEG provides a more complete, three-dimensional and dynamic mapping of the human brain and optimal characterization of BNs associated with seizures by unveiling the temporal organization of the epileptic activity in the stereotactic space (Fig. 1). In this context, each cortical and subcortical region mapped by specific electrode contacts can be considered nodes within large scale epileptic networks. Conceptualizing epilepsies as disturbed network interactions requires the development of multi-target and modal treatments acting on these networks. In this context, the use of laser ablation technology, guided by accurate SEEG-based brain network mapping is highly innovative and complementary to the clinical application of the network concept. Initially described in 2006 as a treatment for metastatic tumors, laser ablation under real-time MRI has had promising results in the treatment of multiple intracranial pathologies. The treatment of epileptogenic areas in lesional MRI cases such as in tuberous sclerosis, mesial temporal sclerosis, focal

cortical dysplasias, hamartoma, and post-stroke, have all been described in the literature. As a therapeutic complement to the SEEG method, stereotactically-guided laser technology permits the modulation of large-scale BNs by allowing the placement of multiple laser generated lesions in key components of SEEG mapped network. The use of focal laser technology in non-lesional epilepsy, was recently described by our group. SEEG guided laser technology offers the advantages associated with focal laser ablations coupled with BN mapping provided by SEEG. The minimally invasive features are attributed to the small openings (pin-holes) required to accommodate the laser probes, the relatively short ablation time associated with each treatment (average less than five minutes) and the ability to ablate multiple nodes within complex BNs. When compared against resective surgical modalities, laser ablation is a treatment modality that is efficient and safe, providing access to areas that would otherwise be contraindicated for surgical treatment using conventional resective therapies. The application of SEEG guided laser ablation can be further enhanced by virtual modelling (Virtual Brain) of epileptic networks and further simulation of restricted lesions located in strategic nodes in this complex epileptic network.



**Figure 1: BN mapping using the SEEG method.**

**Fig. A** shows images of the final implantation aspect of a bilateral frontal-temporal SEEG exploration, demonstrating the position of 14 depth electrodes (right). Note the precise parallel placement, with electrodes covering extensive bilateral brain areas.

**Fig. B** shows the SEEG anatomo-electro-clinical analysis of seizures, demonstrating the 3D temporal-spatial pattern of the BN activation that correlates with seizure semiology, with identification of the EZ in the left hippocampus and insula.

## Endoscopic Spine Surgery



Michael Steinmetz, MD

Percutaneous spine surgery has been performed for years. In the 1980's and 90's Chymopapain was injected into herniated lumbar discs under local anesthesia. Advocates noted ease of use and efficacy. The company however stopped production in 2003. Many other devices became available during and after that time, all providing access to the lumbar disc percutaneously. Many such techniques lacked efficacy, and moreover were high cost and thus low value. Most were used by non-surgeons and viewed to be "fringe" procedures.

Endoscopic procedures in the spine have been performed since the 1990's. These procedures have been performed percutaneously and also via more traditional spine approaches. Endoscopes have improved greatly over time. Newer HD cameras provide excellent, high fidelity, three-dimensional images via a tiny access corridor. Innovators such as Anthony Yeung, MD, have refined the endoscopic approach over decades. They have performed hundreds and likely thousands of procedures with excellent results. These procedures are now moving into the mainstream and are beginning to be performed at academic spine centers.

We have begun performing endoscopic lumbar decompression and fusions at the Cleveland Clinic. The procedure is performed percutaneously with the patient under local anesthesia. The disc is accessed through Kambin's triangle (Figure 1). The decompression is performed through an 8 mm cannula utilizing a 30-degree endoscope. Ideal indications lateral and foraminal recess pathology such as a contained paracentral disc herniation (Figure 2 and 3), foraminal stenosis or far lateral disc herniation. From a fusion standpoint, any indication for an interbody fusion is an indication for an endoscopic approach (Figure 4). In placing the cage, no bone is removed and blood loss is essentially zero (Figure 5 and 6). Although still early in our experience we have found the procedure to be effective and well tolerated. We have fully incorporated this technology in our minimally invasive spine portfolio and work on expanding its use in other lumbar spine pathologies.

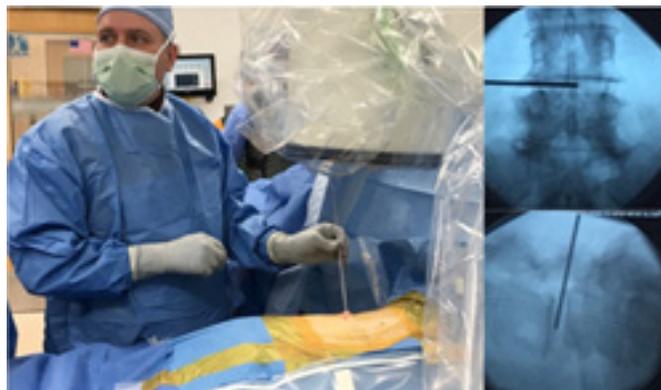


Figure 1. Percutaneous access of the disc via Kambin's triangle.

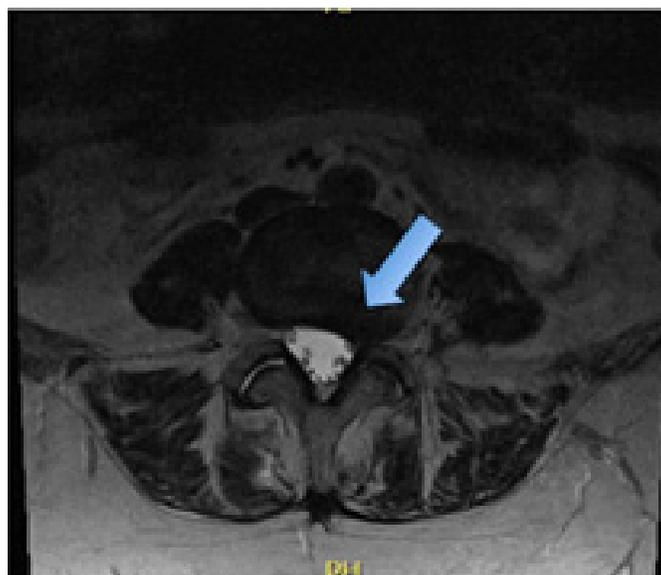
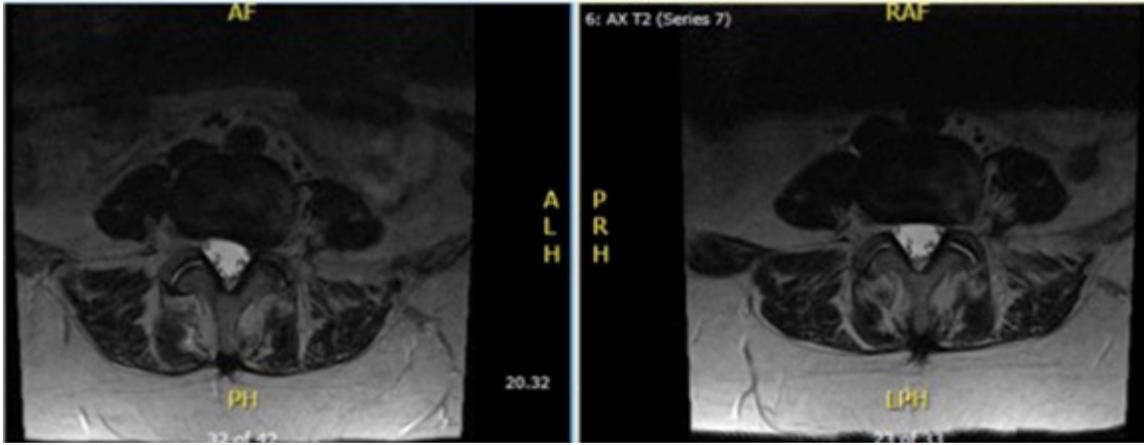
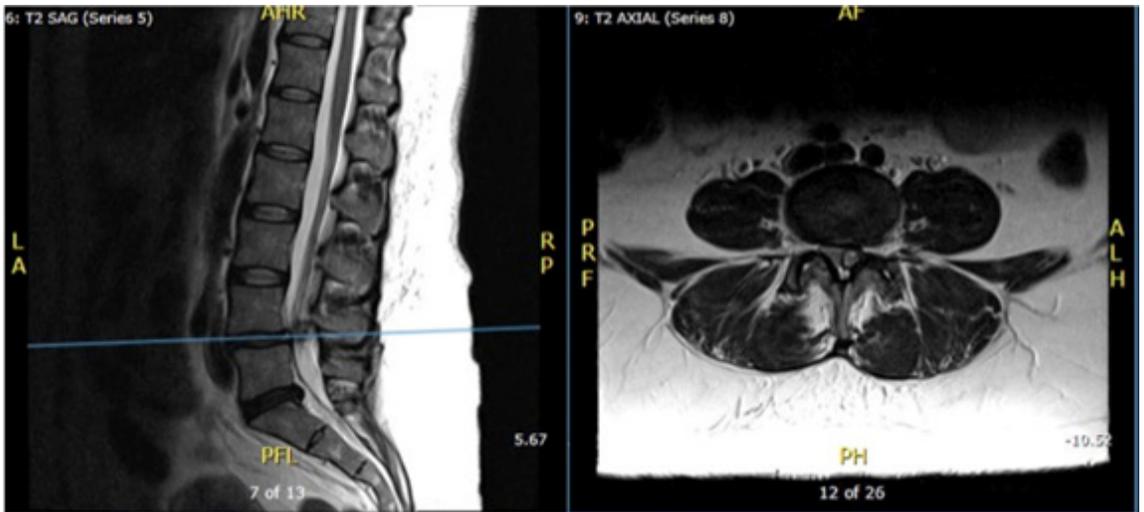


Figure 2. Ideal candidate for endoscopic discectomy.



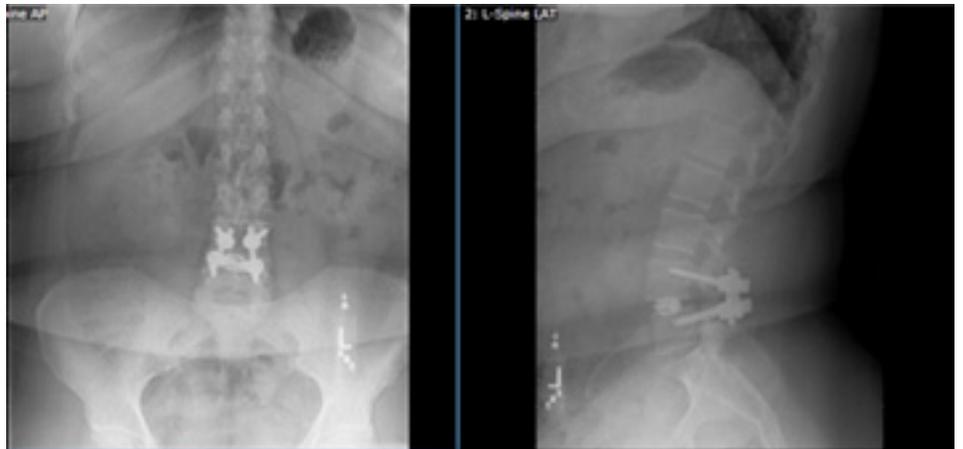
**Figure 3.** Preop (left) and postoperative MRI (right) of a 50 year old woman with left L5 radiculopathy. Conservative measures failed to provide long-term relief. There was temporary improvement with transforaminal steroid injection. The patient underwent a left L4/5 endoscopic discectomy under local anesthesia with relief of her leg pain.



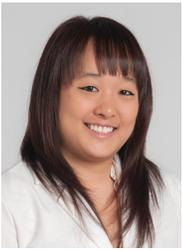
**Figure 4.** This 51 year old woman presented with severe left L5 radiculopathy and moderate back pain disability. Her MRI demonstrates a grade I spondylolisthesis, severe facet arthropathy and synovial cyst. Conservative, non-operative treatment failed to give long term improvement. Decompression and fusion was offered.



**Figure 5.** She underwent endoscopic interbody fusion under local anesthesia. An expanded interbody cage is shown.



**Figure 6.** Following cage placement, a mini open midline approach was utilized for facetectomy and cortical trajectory screw placement. She had relief of her leg pain and significant reduction in back pain.



## Cleveland Clinic Neurosurgical Residency Program's Academic Approach and Mission – Reflections from Drs. Lee Hwang and Bryan Lee

Lee Hwang, MD, PGY-5

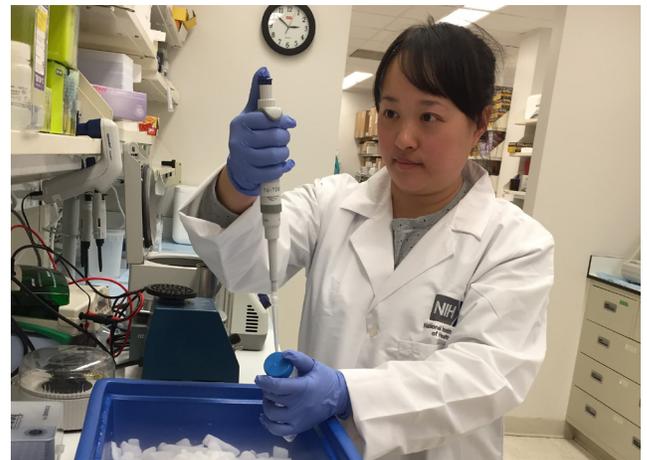
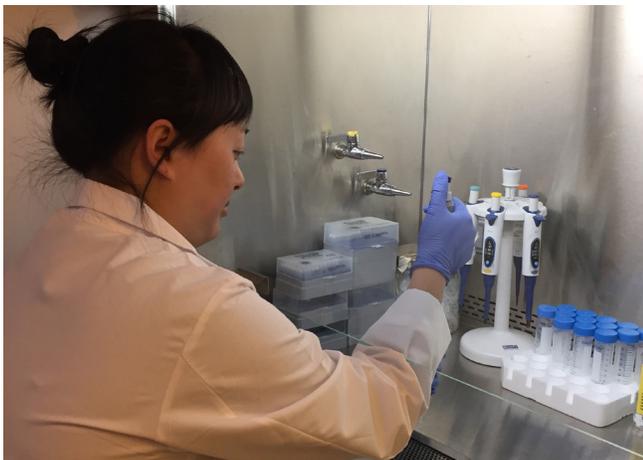
“Cleveland Clinic Neurosurgery: A Time and Place Like No Other.” These words resonate with neurosurgical residents who train at the Cleveland Clinic, as our former chairman, Dr. Benzel, reminds us each year at the graduation ceremony. Under the persistent leadership of our program director, Dr. Richard Schlenk, and our new chairman, Dr. Michael Steinmetz, our prestigious residency program is always undergoing change for the better. One of the prioritized goals for current and future residents is providing ample opportunities for basic science and clinical research during the PGY-5 and PGY-6 years. The academic curriculum during these two years is planned by the resident with input from staff mentors.

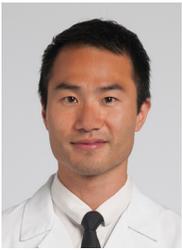
I am particularly appreciative of this academic initiative because of my background and unyielding interest in translational neuro-oncology research. After years of discussing my future goals and plans with my mentor, Dr. Michael Vogelbaum, I searched for a lab with a principal investigator who could enrich my knowledge and experience in not only conducting basic science research in glioblastoma but also implementing clinical trials. I interviewed with one of his colleagues, Dr. Mark Gilbert, at the Neuro-Oncology Branch of the National Institute of Health and immediately knew that his laboratory was the ideal environment for me during my research years. I am extremely privileged to be training at a program that allows us to pursue whatever paths our academic hearts desire. I have the opportunity to work with incredibly accomplished scientists and clinicians who can guide me in developing research projects and translating my work

from bench to bedside – for this, I am eternally grateful to the Cleveland Clinic neurosurgical residency program.

“The sky is the limit” when it comes to devising a plan for the two years of protected research time. As in my case, we are not physically limited to any one location. We are not restricted to any one particular sub-specialty in neurosurgery. As long as we have a strong interest and a committed plan, we can explore our academic interests in various clinical and scientific settings. In addition, our residency program now offers an opportunity to obtain a Ph.D. degree in Molecular Medicine through the Cleveland Clinic Lerner College of Medicine. This curriculum incorporates course work in basic sciences as well as a concentrated research experience during the PGY-5 and PGY-6 years.

The Cleveland Clinic neurosurgical residency program has always exemplified the optimal combination of clinical and academic competency. The comprehensive training of each resident provides exposure to the process of scientific thinking and translational research. Our ongoing commitment to sustaining a strong academic residency program is evident in the wide spectrum of research opportunities available to the residents. I am privileged and honored to contribute to a longstanding legacy of academic neurosurgeons who have trained at the Cleveland Clinic.





Bryan S. Lee, MD (PGY6)

“Thank you for signing up with us. We will have a great journey together.” This congratulatory message from Dr. Benzel when I matched at the Cleveland Clinic for Neurosurgery Residency in 2012 persistently resonates in my head as I am in the midst of my PGY-6 year. The excitement and exuberance for neurosurgical training

my classmates and I shared during the orientation have not dwindled, but rather matured to become knowledge and passion for education. Since the day we matched, my colleagues and I have gone through a true and long journey together. In the last six years, our program and the hospital have undergone major revisions: new buildings and additional hospitals have been built on the main campus and abroad; the mid-level providers have been completely incorporated into the resident service to facilitate and enhance the residents’ education and training; the routine didactic and academic conferences and lectures have become more consolidated and organized; we took over the Neurosurgery service at Metro, and our PGY-4’s serve as chiefs at the region’s largest level-I trauma center; Dr. Steinmetz became our chairman; some of our residents got married and became parents; and lastly, five classes of chief residents graduated to further pursue

their neurosurgical dreams all over the country. However, there are certain essential aspects of our program that have not, and will not ever change. Our family-like environment is continuously conducive to the residents’ building of lifelong friendships and relationships with one another. Not only do we become professional colleagues at work, but we also become personal friends who can rely on one another for any life matter.

My classmates and I are facing our incoming chief year, and recently interviewed a new group of residency applicants for the class of 2025. “These are the reasons why I am here, and why you should choose to be here too.” When I delivered the presentation talk to the interviewees, I found myself being able to share with the entire group the sense of confidence, comfort, and academic development and mentorship that our program collectively promotes. We all start as medical students, who transition into workhorses in the hospital battling daily with caring for the sickest patients, to finally become competent neurosurgeons who are well trained and prepared to provide optimal care for patients anywhere we settle, and academicians who are passionate about continuous medical education and training for the future generation of neurosurgeons for years to come. We chose this path, not because it was easy, but because it was meaningfully difficult.



- 1. CCF Neurosurgery residents and interviewees in October 2017
- 2. CCF Neurosurgery current resident and alumni at the Cleveland Spine Review (Bryan Lee, Saksith Smithason, Miguel Lopez) in July 2017
- 3. Alex Witek and Camille Crary’s wedding in May 2017. Residents with their significant others at the wedding to celebrate
- 4. The Neurosurgery resident group at the Chiefs’ Graduation Ceremony in June 2017
- 5. CCF Neurosurgery residents and friends gathering at AANS in April 2017



**Andrew T. Healy, MD**  
 CCF Neurosurgery Alumni 2016  
 Cleveland Clinic Alumni Association Specialty Director  
 Neurological Surgery  
 Member, Centennial Legacy Society

# join us

## Cleveland Clinic Neurosurgery Alumni Reception

This year at the AANS we have planned our annual alumni reception (passed hors d'oeuvres) at Dickie Brennan's Bourbon House in the Breton board room. We will begin at 5pm on Monday night, April 30. We look forward to catching up with all of the alumni available that evening. Please RSVP to [alumni@ccf.org](mailto:alumni@ccf.org) or call 216.218.5087. The database of current residents/fellows and all former residents, fellows, staff and friends is still being expanded upon, so if you know someone who did not receive an invite please spread the word and feel free to email me at [Andrew.Healy@cnsa.com](mailto:Andrew.Healy@cnsa.com). Hope to see you there!

## Stay Connected!

We encourage our alumni to stay connected with former colleagues, mentors, associates and friends. You can receive news updates about your training specialty and view events on the digital calendar including CME course information.

## CME Online

For CME information on all medical specialties, visit the Center for Continuing Education's website, [ccfcme.org](http://ccfcme.org), a leader in online CME with a worldwide outreach and record-setting CME numbers. On the site you can:

- Claim credit for CME activities
- View your transcript
- Reprint certificates
- Create an account in minutes! New profile: [ccfcme.org/newprofile](http://ccfcme.org/newprofile)
- Login: [ccfcme.org/cmelogin](http://ccfcme.org/cmelogin)

You can earn CME credit by reading articles from Cleveland Clinic Journal of Medicine, either online or in print. Visit <http://ccjm.org/> for a current issue of Cleveland Clinic Journal of Medicine and more information.

## Alumni Profile

Please click on <https://alumni.clevelandclinic.org/join> to update your alumni profile.

## Feedback

Feedback for our newsletter is always welcome, as are your suggestions for future content. We would like the Alumni Update column to feature updates about marriages, births, promotions, retirements, vacations, hobbies, etc that you would like to share. Photos are especially welcomed! Please send your announcements or photos to Christine Moore at [moorec2@ccf.org](mailto:moorec2@ccf.org).

Cleveland Clinic is a nonprofit, multispecialty academic medical center integrating clinical and hospital care with research and education for better patient care. More than 3,500 staff physicians and researchers in 140 medical specialties provide services through 27 clinical and special expertise institutes. Cleveland Clinic comprises a main campus, nine regional hospitals and more than 150 outpatient locations, with 18 family health centers and three health and wellness centers in northern Ohio, as well as medical facilities in Florida, Nevada, Toronto and Abu Dhabi. Cleveland Clinic is currently ranked as the No. 2 hospital in the country by U.S. News & World Report. [clevelandclinic.org](http://clevelandclinic.org)

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