

Young Neurosurgeons NEWS

EMPOWERING FUTURE LEADERS IN NEUROSURGERY

Young Neurosurgeons Committee



Summer/Fall 2018

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Editor: Jeremiah Johnson, MD

CHAIR'S MESSAGE

The Young Neurosurgeons Committee (YNC) has been off to a roaring start in 2018, highlighted by our activities at the 2018 American Association of Neurological Surgery (AANS) Annual Scientific Meeting in New Orleans in April/May.

In New Orleans, we held our first ever How to Apply to Residency program for medical students interested in neurosurgery. This course, directed by Mike Ivan, MD, had residents and faculty from a number of programs giving their best advice on how to get a neurosurgery residency spot. The medical student turnout was fantastic and we were able to provide one-on-one coaching for students in attendance. We hope to make this a staple at future conferences, so look out for your next opportunity! Next year, we will plan to record the course so that students who cannot attend are able to get access to the material. We are also providing support to the AANS as it refines its existing career advising platforms for residents and young faculty, such as the Transition to Practice course.

We held our spring YNC meeting in New Orleans and, for the first time in recent memory, we held a brief reception immediately following the meeting. This gave guests an opportunity to meet with us and learn about the committee. We hope that this and future events help to make it easier for young neurosurgeons to find ways to get involved in our initiatives. More highlights from the meeting, including reports from the annual Top Gun Competition, the YNC Luncheon and the outstanding Young Neurosurgeons' Research Forum are in this newsletter.

Outside of our annual meeting, the Weill Cornell AANS Medical Student chapter, led by Ryan Radwanski, organized an amazing Neurosurgery Medical Student Bootcamp, supported by AANS Board Member Susan Pannullo, MD, FAANS. This course provided hands-on training to prepare medical students for their neurosurgery sub-I rotations. Based on that successful model, we are exploring options to have the Weill Cornell team work with the Neurosurgery Research and Education Foundation (NREF), the AANS and the Society of Neurological Surgeons to expand access to this offering next year.

Our nomination system for the Young Neurosurgeons Committee recently opened, and we hope you have found the new MyAANS.org interface intuitive and simple to use. We look forward to seeing some new faces on the committee this fall – maybe even some of our former medical student members who are starting to work through the ranks!

Overall, we hope that you find that whether you are a medical student, resident or young attending, you feel comfortable knowing that there are many ways to get involved with the committee. We welcome your feedback, so please feel free to reach out to us!

Sincerely,

Edjah Kweku-Ebura Nduom, MD
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SECRETARY'S MESSAGE

Welcome to the Summer 2018 Young Neurosurgeon's Committee newsletter!

In this issue, we highlight YNC news from the recent 2018 AANS Annual Scientific Meeting in New Orleans and provide updates on issues important to young neurosurgeons. We are excited to publish with the remarkable experience of William Copeland, MD, the 2018 YNC Public Service Citation winner and recent graduate from the Mayo Clinic, who practices neurosurgery full time in rural east Africa.

Other highlights from this issue include lessons learned in neurosurgery residency, where graduating neurosurgery residents give advice from their experiences to younger colleagues. The series on matching in neurosurgery continues with an excellent piece containing detailed advice for international medical graduates looking to match in a U.S. neurosurgery training program, and we highlight the University of Pittsburgh's AANS medical student chapter's introduction to neurosurgery course. New to the newsletter is an update regarding issues relevant to young neurosurgeons from the 2018 CSNS meeting as well as division updates from the AANS meeting.

Please give us feedback of anything you would like to see in the newsletter or submit article ideas via email to jjohnson.neuro@gmail.com or Twitter direct message @youngneuros.

Best regards,



Jeremiah Johnson, MD
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YNC HIGHLIGHTS

Congratulations to

- Top Gun Individual Winner Ryan Austerman, MD, and
- Team competition winner Houston Methodist!



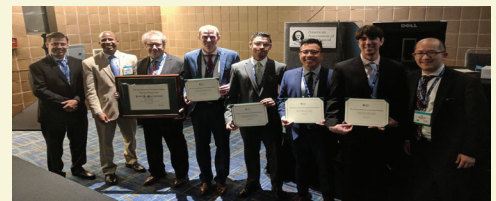
Thanks to all the students, residents and faculty who made the YNC sponsored How to Apply to Residency course a great success at AANS 2018!



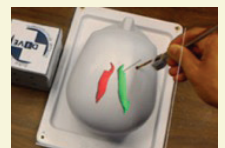
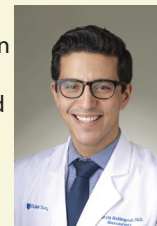
The YNC would like to thank our tremendous guest speakers that helped make YNC events at AANS 2018 a great success: Fred Meyer, MD, FAANS (Osler Lecture at the Young Neurosurgeons Research Forum); Dan Barrow, MD, FAANS (CV Section-YNL Luncheon); Michael Lawton, MD, FAANS (YNL Luncheon); and Fred Lang, MD, FAANS (Tumor Section Reception).



Congratulations to the 2018 YNC Research Forum Award Winners!



Congratulations to the 2018 AANS Neurosurgery Technology Development Grant recipient Shervin Rahimpour, MD, a Duke University Neurosurgery PGY 5, for his project Augmented Reality Assisted Placement of External Ventricular Drain.



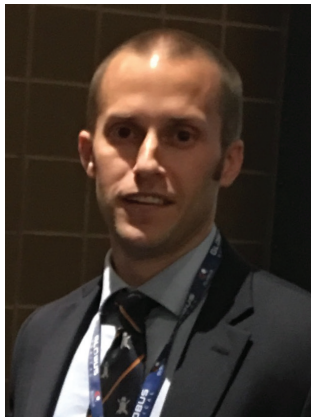
An Interview with the Young Neurosurgeons Committee 2018 Public Service Citation Recipient, William R. Copeland III, MD

After completing his neurosurgery residency at Mayo clinic in Rochester, Minnesota in 2016, Dr. Copeland took an unorthodox first job as a neurosurgeon at Tenwek Hospital in Kenya. Christopher S. Graffeo, MD, interviews Dr. Copeland (WC) about his remarkable experience as a practicing neurosurgeon in rural Kenya.

Christopher S. Graffeo, MD

Let's start with your history — what were your earliest experiences with public service, and through what circuitous route did they lead you to your current mission in Kenya?

WC: As a high school student, I participated in service trips to Mexico and Jamaica. These weren't medical in nature, but helped me to begin to understand the large number



Dr. Copeland, MD

of people living in poverty in the world. Then, during college and medical school, I went on several medical trips to Haiti, where I witnessed extreme disparities in access to medical care and began to realize that I could use my eventual medical skills to serve people in similarly impoverished conditions. Those early experiences in service fostered my desire to serve others — particularly those whose circumstances are so much less fortunate than my own.

Yours is perhaps the most unique postgraduate trajectory of any young neurosurgeon we know — what compelled you to take such an untraveled road?

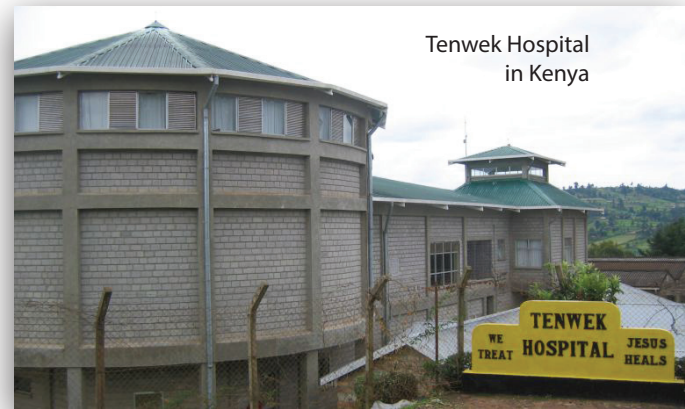
WC: Well, despite my early experiences in service and my desire to use my medical skills to serve those less fortunate, it was not my original plan to move to rural Kenya after residency. I was in the middle of applying for fellowships and exploring job opportunities, when during my fifth year of residency I chose to do a one-month rotation at Tenwek Hospital, where I am now. It was quite literally a life-changing experience for me. I returned to the U.S. with a sobering realization of the immense neurosurgical need in East Africa and for the first time had experienced how my particular skillset as a neurosurgeon could make an impact in a developing country. I try to model my life after Jesus, who spent his time serving the poor and the sick. Serving at Tenwek became the way that I felt I could best accomplish that. I could not help but keep thinking that if I turned down a job in the U.S., I would easily be replaced by the next person. But who was going to go to Africa?

What specifically compelled you to service in Africa, as opposed to under-resourced environments in the States or other developing nations closer to home? And in that same regard, how have your experiences compared to your expectations, good and bad alike?

WC: There are absolutely underserved populations in the U.S., as well as within many developing nations, but the need I had encountered in Kenya was staggering. The more I learned about the lack of access to neurosurgical care in East Africa, the more compelled I was to go there specifically. In addition, Tenwek is a training institution that offered the opportunity to teach surgical residents how to provide emergency neurosurgical care. After graduating, these surgeons disperse to other areas of Kenya and beyond, exponentially multiplying our efforts at Tenwek.

As far as expectations, I anticipated that the operative conditions would limit the quality and extent of operations I could offer more than they have. For instance, we've been able to find disposables like gelfoam, surgical, bonewax and surgical patties, all available within Kenya, at an affordable price. Another example is equipment, like electric drills, microsurgical instruments, spine implants and even an operating microscope — items that are otherwise prohibitively expensive in our setting, but which we have been able

to obtain through the generous donations of many individuals and corporations. It has taken the better part of these last two years, and no doubt the conditions might still seem striking to a visiting surgeon from the U.S., but we are now able to provide high quality surgery for patients across a broad range of pathologies.



Tenwek Hospital in Kenya

Outside of the operating room, I've found that progress occurs more slowly. I'd hoped to have implemented a number of nursing protocols and management algorithms by now as well as a more organized approach to patient data collection for research purposes. But the limitations of the hospital infrastructure, combined with the ever-present, more urgent patient needs, have made these plans challenging to enact. Likewise, I expected that my requests of the hospital for additional personnel or equipment would be met favorably, but resources are limited. Many surgical groups have similarly pressing needs and the hospital suffers from an overall lack of financial surplus — all of which have hindered more substantial growth.

You must have had a very unique transition from residency to practice — what was that like? Were there challenges you didn't anticipate?

WC: I think it's fair to say the transition was expedited. There wasn't much time to grow into the role of an independently practicing surgeon. People started lining up from day one with a variety of advanced diseases. That has probably been the biggest challenge I underestimated. Due to a multitude of factors, patients here typically present at a later stage in their disease, so tumors are larger and deficits are more pronounced. Additionally, the severity of injury from trauma is higher. As a result, most days

(Continued on next page)

Public Service Citation Recipient (Continued)

I'm put in the position of triaging multiple urgent cases, forced to answer questions like, "Is the open infected myelomeningocele or the spine fracture with an incomplete spinal cord injury more urgent? What about the patient scheduled for today with the olfactory groove meningioma who is losing vision – do I bump her to next week? Which other patients will that affect?" Those aren't decisions I had to make in the U.S., and I'm often left questioning whether or not I made the right choice.

You've been at this for almost two years — now that you've really settled into things, what are your daily and weekly routines? Are there any aspects of your life as a neurosurgeon in Kenya that would be a big surprise to American trainees?

WC: The neurosurgery service is anchored by myself and a full-time neurosurgical clinical officer, the Kenyan equivalent of a physician assistant. Most months there is an assigned resident from the general surgery program and occasionally an interested medical student will request to rotate as well. The in-patient census is usually 10-15 patients and formal teaching rounds are held Monday, Wednesday and Friday at 0700. Monday is our main clinic day, when we see 30-40 patients, and every day we have additional consults from clinic, casualty (our ED) or other hospital services.

Operations are scheduled for Tuesday through Friday. Neurosurgery has a dedicated room with two full-time nurses who assist with all cases. The average weekly volume is 8-10 scheduled cases, with emergent operations added on regularly. Cases include adult and pediatric patients, with overall volume split relatively evenly between trauma, hydrocephalus/spina bifida, degenerative and infectious spine disease and intracranial pathology, which is predominantly benign tumors and vascular disorders. We have a variety of modern equipment, including Stryker electric drills, a Zeiss NC4 microscope, Storz flexible endoscope, several sets of spinal implants, aneurysm clips and more.

Technically, I am always on-call, although the more routine emergency cases that come in overnight (e.g. EDH, depressed skull fracture) are often operated on by the general surgical residents and reviewed with me the following morning. We have an electronic medical record and PACS system, with on-site imaging capabilities, including X-ray, ultrasound, fluoroscopy and CT. MRI is easily obtainable in the region.

One thing that might surprise people is that, despite being the only neurosurgeon at Tenwek, my proximity to the hospital (a

90-second walk from my house to the ICU) allows me to check in with my wife and kids during the day, sometimes even eating three meals at home with them. I cherish this convenience, as it's one advantage that I certainly wouldn't have practicing in the States.

In many ways, the salient comparison for a year or two spent operating in a different environment after residency is a fellowship. With that in mind, if you can imagine a young neurosurgeon who has a strong passion for service, how would you advise him or her regarding the advantages and disadvantages of prioritizing international work over a more traditional fellowship pathway?

WC: I think it requires an honest reflection on one's career goals. If your desire is to create a practice niche or pursue an academic position, while serving internationally on occasion, then the importance of a fellowship shouldn't be understated. If, on the other hand, you want to champion advocacy for global neurosurgery or you envision yourself in a more general practice with the flexibility to engage internationally more frequently, then I would strongly recommend considering an experience in a developing country after residency. For me, while it has lacked the benefit of mentorship that a fellowship offers, it has accelerated my development as a surgeon and has certainly given me a level of understanding of global neurosurgery that I otherwise would not have obtained.

Obviously, everything you are doing is an inspiration to all of us — what can young neurosurgeons do to help empower you and your mission?

WC: Well, for one thing, I appreciate having the opportunity to share about the work going on at Tenwek. I hope it will add to the growing awareness of the global neurosurgical need and serve to encourage others to get involved.

As at most hospitals in the developing world, there is a need for funding and equipment at Tenwek. If anyone wishes to donate directly to the neurosurgical work being done here, they can do so online by visiting friendsoftenwek.org/neurosurgery and clicking on the link at the right side of the page. Also, neurosurgeons specifically interested in volunteering at a Christian mission hospital like Tenwek can contact me directly or apply online at samaritanspurse.org/medical/volunteer-application/.

How would you advise a young neurosurgeon interested in serving internationally, either during their



training or early in his or her career? Are there particularly good methods to explore opportunities and volunteer during residency, with an eye towards a more substantial service commitment later in one's career?

WC: I think the inclination when considering international service is often to put it off, anticipating there will be a more opportune time, but more often than not that time never comes. So I'd encourage anyone with an interest in serving in a developing country to make it a priority and just go. I can all but guarantee you; it will be a professionally stimulating experience and one you'll find personally rewarding as well. The Foundation for International Education in Neurological Surgery (FIENS) is a great way to explore volunteer opportunities and sign up to serve. Additionally, visit globalneurosurgery.org to join a network of neurosurgeons committed to addressing the global neurosurgical need.

What comes next for you? AANS 2018 was your first trip back to the States since you started practicing at Tenwek, but we heard rumors that you'll be back for another visit soon?

WC: It's true. My family and I will be returning to the U.S. in July, though we have made the decision to live and work at Tenwek indefinitely. We anticipate being stateside for the better part of a year as we make preparations to return to Kenya full-time. I will be joining a practice for the year and plan to sit for the ABNS Oral Board Exam in the fall. We also have several orientations and some activities aimed at raising further support for our work in Kenya, but plan to be back at Tenwek in the summer of 2019.

Last question — during your first trip home in almost two years, what were you the most excited to eat?

WC: Ha! That's easy. I was on the hunt for some good Mexican food, especially queso. Love that stuff. ●

Christopher S. Graffeo, MD
Neurosurgery Resident
Mayo Clinic



If I Had to Do it Over Again: Lessons Learned from Neurosurgery Residency

In this issue of the YNC newsletter, we asked members of the Young Neurosurgeon's Committee who are chief residents or newly graduated neurosurgery attendings to reflect on their training and share a few important lessons they learned during their training with younger residents.

Residency Program: University of Utah

"The most important piece of advice that was given to me throughout residency was from my chief resident, Valerie Coon, when I was an intern. It only really clicked for me when I was giving the same advice to my juniors as a chief resident. There will be times when you will be conflicted during training, whether it be clinically, socially, professionally, with your fellow residents, care team or attendings. If you ever feel truly stuck about what to do, pause, take a step back, breathe and do what you believe is in the best interest of that patient you are caring for. You won't always be right (I wasn't), but you'll always be able to sleep at night. A simple tenet, but it got me through the marathon of residency."



Walavan Sivakumar, MD
Assistant Professor of Neurosurgery and Neuroscience, John Wayne Cancer Institute

Residency Program: University of California San Francisco (UCSF)

Advice from new UCSF faculty Lee Tan, MD, and UCSF 2018 graduate Joseph Osorio, MD, PhD, via an interview with YNC member Stephen Magill, MD, PhD (SM).

SM: *What are your thoughts as you look back over residency from an attending/chief resident perspective?*

"Neurosurgery residency training is one of the most intense and memorable experience in one's life. You will build life-long bonds and friendships, so work hard, help each other and enjoy the ride."

"Residency is both a journey and a marathon, so enjoy the process because it does take

quite a bit of effort, but in the end it's all worth it! It's actually no different than your career. Smile along the way and have fun."

SM: *What have you learned that you wished you had known as an intern/junior resident?*

"Keys to success in residency: be a good person by being honest, having a good work ethic and being a team player; be a good doctor who genuinely cares about the well-being of patients, has solid critical care knowledge and knows how to work up and manage medical issues; be a good surgeon and do as many cases as possible, learn from mistakes and strive for technical excellence; be a good teacher and pay it forward, teach juniors and medical students and involve them in cases as much as possible; and publish to hone your writing skills and be able to critically evaluate papers."

"The patient is always number one. When encountering challenges along the way, as long as you keep the patient as the top priority, you should end up with the right answer. That goes from clinical decision-making, down to answering pages from the same nurse with the same question, which is frustrating when you are very tired."

SM: *What advice would you give current junior residents to improve their education/experience/level of success during residency?*

"Be prepared for each case, read as much as you can, follow up on the patients you operated on, make a PowerPoint for each interesting case you are involved in with history, pre-/post-op images, as well as follow up so that you can refer back to it later for presentations, chapters, papers, etc."

"Every day, as you're developing into the surgeon you are going to become, begin chipping away at the surgery steps that are being taught to you — they are not simply the critical portion of the case. When you're first starting out, the importance is entirely on the basics. The importance that you place on pinning, positioning and draping is not only important to the attending, but it serves a purpose. The minute they realize that you understand that — and can mimic their exact steps — is the minute they start to trust you with



by Stephen Magill, MD, PhD, UCSF

more responsibility. With trust comes opportunity. Take notes on how every attending does those things."

Residency Program: University of Alabama Birmingham

Early on in residency, I viewed my role as taking care of the service patients. I waited to be invited to the OR. Some of my colleagues found ways to the OR constantly, no matter if they were carrying the pager or not. My anxiety about being available for pages and emergencies kept me from engaging in the operating room, and I think I had some catching up to do as a more senior resident. If I had to do it over again, I would make an effort to get into the OR early, even when unassigned, no matter how short the visit.

In my first several years, I felt too overwhelmed with clinical duties to launch research projects of my own and often inherited the half-done work of others. I struggled to get a foothold, jumping in midway and often to projects that I wasn't inherently excited about. I think I would have been more productive if I had worked to build my own projects.

At my first several national meetings, I didn't completely understand the programming and how best to take advantage of the educational and networking opportunities. If I had the chance to do it again, I would have made plans to meet up with senior faculty from my program at the meeting, especially at events like the opening reception, and taken advantage of the chance for them to introduce and guide me.



Kimberly P. Kicielski, MD, MSPH, Graduate 2018

Residency Program: Barrow Neurological Institute

Advice I would give to juniors and interns would be to develop good surgical routines and habits early. For example, it was only later on, as a senior, that I started keeping a detailed excel database of all of my surgical cases with categories descriptive of the patient demographics, diagnosis, procedure and type of case (i.e. craniotomy for tumor, craniotomy for trauma, degenerative spine, spine trauma, etc.). I found that this was an easy way to stay organized, keep track of how many cases I had done in certain categories, identify deficiencies in my surgical training so I could seek out more opportunities and update my ACGME case log at the end of

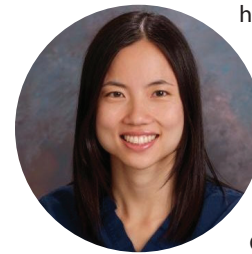
the week. Furthermore, when looking for jobs, you will have easy access to your case numbers for the interview process.

I also made a column labeled “learning points” for each case. While every case you do may not have a new or specific learning point, many cases will. This may be positioning reminders for a case you have not done before, anatomical notes for unique approaches or remembering what size screws are appropriate for various parts of the spine. If you have not done a certain case for several months, it is a good way to reference back and see what notes about positioning or approach you made the last time. If there was ever a complication, take-

back or “near-miss,” I would also include notes in this column about what I could have done differently to avoid the issue in the future. Overall, I think it’s a great way to continually self-assess, review your own progress and improve your education as a surgeon throughout residency.

Additionally, this method of organization makes it easy to highlight good cases for conference presentations or resident teaching. If you start doing this as an intern or junior, by the time you are a chief, you will have your own personal archive of hundreds of cases that you can look back on not only for educational purposes, but also to write case series on a specific pathology

or a technical note on a particular type of procedure. If anyone is interested, I’d be happy to share what my personal case log looks like.



This is also a good habit to continue as an attending, as it will be useful when logging cases for the oral boards.●

Tsinsue Chen, MD
Neurosurgery
Residency
Graduate 2018

MEDICAL STUDENTS MATCHING IN NEUROSURGERY

Matching in Neurosurgery as an International Applicant: Insights from International Medical Graduate Neurosurgery Residents

Luis E. Savastano, MD, & Badhi Junior Daou, MD

Matching in a neurosurgical training program in the U.S. as an international medical graduate (IMG) is extremely challenging, but it is certainly possible. The bar to overcome is high, but success will make the effort worthwhile. Although there is no special formula to secure a position, the following are some insights and tips from IMGs who recently matched:

- Preparations for a successful neurosurgery residency match in the U.S. begin long before the actual application process. Early planning is critical and should start as early as the first or second year of medical school. This will allow you to prepare for the United States Medical Licensing Exam (USMLE) alongside your medical school curricula and schedule rotations in the U.S. as a medical student.
- Almost invariably and even in the most favorable situations, getting into a residency program will require two or more years of hard work after finishing med school. Aim to put in one to three years following medical school; however, do not widen the gap further.
- Stellar scores on the USMLE (>265) can help somewhat, but a below average score will hurt you a lot. Even if you were at the top of your medical school class in your home country, a poor USMLE score is a high hill to overcome. These are the same tests that U.S. students take and are therefore useful in comparing medical education and ability to learn across the board.
- With the exception of a handful of well-known international medical schools that are considered to be “OK” (although not equivalent to top U.S. med schools), medical schools abroad are considered roughly equivalent to one another. Almost all IMGs matching in neurosurgery in the U.S. are from these lesser-known schools (don’t get discouraged if you are not from Oxford!).
- If your English is not great, start there and work hard to improve.
- IMGs generally need to demonstrate

high productivity in research (basic science or clinical) to match. Yet, keep in mind that research time will be meaningless unless you have authored (ideally as first author) peer-reviewed papers in international journals. Sadly, given the time constraints in reviewing hundreds of highly accomplished applicants to each residency program, a high total number of papers published is flashier than high-quality science condensed in a single manuscript (try to author as many papers as possible), but publication quality is also considered to a varying degree.

- Completing neurosurgery residency in one’s home country is a double-edged sword. In the eyes of faculty committee members who interview applicants, you may have greater knowledge and surgical skills compared to the rest of the crew, but you are older and more tired and it is questionable that you will have the stamina to go through the rigors of North American residency training. The committee is primarily interested in a candidate’s eagerness to learn and willingness to work as a team

player in their program; how much you already know about neurosurgery is not the highest priority. If you are at the inflexion point of starting residency in your country with the idea of then translocating to the U.S., strongly consider spending that time and energy to enhance your qualifications to get into the American system.

- All clinical and research experience counts, but you will get more (much, much, more) bang for your buck if you do that in the U.S. Again, if you have the option, do it in the U.S.!
- The importance of U.S. clinical experience and letters of recommendation from well-known U.S. neurosurgeons cannot be understated. These are absolutely critical to your success as a residency candidate. Having U.S. clinical experience is crucial for IMGs, not only in demonstrating that the applicant can understand the standardized procedures, protocols and general culture in the United States, but also in building a network of professional connections.
- Hands-on clinical experience or sub-internships will count most when your residency application is reviewed. Observerships are not as highly valued, but if it is the only available option, observership still provides a good chance to interact with faculty members and observe their practice. Once on a U.S. rotation, interact with as many faculty members and residents as possible without being a nuisance. The goal is to impress everyone you interact with, so you are remembered positively. Talk to people in the field and ask for help. This includes residents and faculty members. In addition, talk to faculty at your medical school and inquire about possible connections to U.S. neurosurgeons. Their insights and information can be useful in setting up U.S. rotations.
- Sub-internships, or time spent in different medical or surgical specialties, are not helpful for the neurosurgery match.

- If you have great board scores, fantastic research supported by many papers and you are a pleasant and hard working person, a strong letter of recommendation (and phone calls) from your U.S. neurosurgical mentor is the push you need to break through and enter into a residency program. If you need to work exclusively for one or two years for a U.S. neurosurgeon to get him or her to vouch for you, just do it — it's time well spent. Almost all successful IMGs have the enthusiastic support of a U.S. mentor.
- Recommendation letters are highly regarded in neurosurgery. Getting a remarkable letter of recommendation from a faculty member with whom you have worked with closely, or a program director or chair, can set you apart from other applicants. Aim to get at least three letters of recommendation from neurosurgeons practicing in the U.S.
- Unfortunately, letters of recommendation from your home country have minimal value unless they are from a surgeon or scientist the program director knows well and respects. (However, these letters from your home program will help you to find a research position or a clinical rotation.)
- If your application lacks research and U.S. clinical experience, it would be wise to invest some time after medical school in research and/or some form of clinical experience prior to applying for residency. Clinical or basic science research are both extremely useful and will help to enhance your CV and distinguish you from other applicants. Work hard on research and do not miss any opportunity to publish.
- When it's time to apply for a residency position, the rule is to apply broadly. Apply to as many neurosurgery programs as possible. Applying simultaneously to other specialties is discouraged and can show lack of commitment to the field.
- Attend all possible interviews and resident dinners. Interview days at each program include several interviews with different faculty and

researchers. Every interview counts and is important. Be nice, friendly and honest. Wear a smile on your face. Emphasize your familiarity with the U.S. system. Spend time with current residents and interact with them positively at all times.

- Work on your interviewing skills and practice answering common questions, especially if English is not your first language. The actual interview is probably the most important step in the whole application process, because it allows the faculty to evaluate your fitness for the program. Be humble and grateful for the opportunity. Introduce yourself and say "thank you" to everybody, including administrative staff.
- Second looks are often encouraged and should be considered at programs that are high on your rank list. This allows the program to get to know you further, demonstrates that you are interested and can potentially improve your standing in the program.
- If you don't match, try to understand why (be honest with yourself) and work to correct your deficiencies in order to be a stronger candidate for the next cycle. If at all possible, try to get a non-categorical U.S. neurosurgical position (many good hospitals have this option) or a research position with a well-established U.S. neurosurgeon. Spending another year (or two) working within the U.S. neurosurgery community will boost your chances to match if your mentor vouches for you in the next cycle (and your chances are the highest wherever you are spending that extra time). Many successful applicants have completed this extra year. Perseverance will pay off! ●



Luis E. Savastano M.D. & Badhi Junior Daou M.D., Neurosurgery Residents. University of Michigan

AANS MEDICAL STUDENT CHAPTERS

How We Did It: The PITT Medical Student Chapter Course

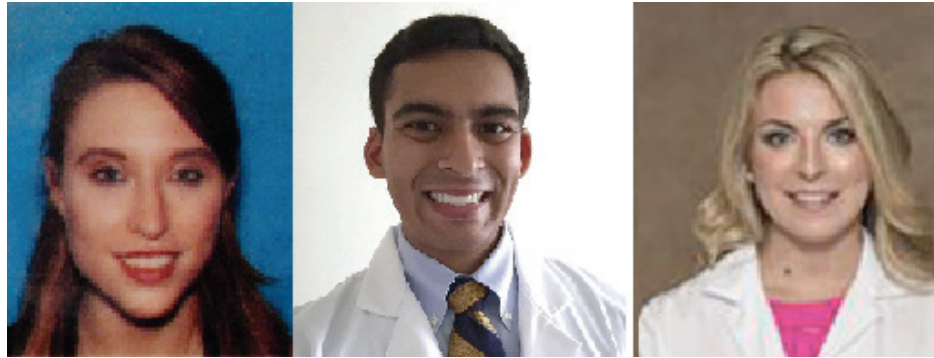
Michael McDowell, MD

The neurosurgical field has watched as the number and quality of applicants for residency positions has steadily increased. With over 300 applicants annually with resumes boasting numerous publications and an average Step 1 score of 249 among matched applicants, many of us have wondered if we could have even matched in the present environment. This increase in candidate strength is likely a good thing for the future of our specialty, but with the competition rising I have also perceived a simultaneous increase in the anxiety of those considering applying. The traditional approach of keeping an open mind through the third year of medical school is still possible, but frequently leaves neurosurgery hopefuls scrambling to become competitive. A group of students from the University of Pittsburgh chapter of the AANS neurosurgical interest group sought to tackle this challenge in a novel way.

At University of Pittsburgh Medical School, students have the option to select from “mini-electives” during the pre-clinical semesters, which cover a variety of topics, such as medical Spanish, public health topics and clinical skills training. These courses run periodically through the semester at times that typically do not conflict with coursework. With the support of Raymond Sekula, MD, FAANS, as the designated course director, students petitioned the medical school for financial and academic support in creating a new elective titled Brain and Blade: The World of Neurosurgery. This course focused specifically on providing an hour of lecture-based discussion by a neurosurgeon, followed by an hour of relevant hands on experience. We focused on the “breadth,

not depth” approach and sought to expose students to as wide an array of niches within the field as possible. This approach included

holding sessions by surgeons involved in private practice, academic neurosurgery with a funded research laboratory, radiosurgery, spine surgery, endoscopic surgery and comprehensive cerebrovascular neurosurgery. Residents also led a session on common neurosurgical procedures, such as



Former student course directors Alexandra Sansosti (Left) and Ronak Jani (Center). Current medical student course director Rachel Jacobs (Right).

the placement of EVDs and the performance of lumbar punctures. I am pleased to report that we have completed our second year of this course and have been overbooked each year. Successful enrollment has allowed us to expand the number of sessions to eight two-hour sessions this year. We intend to add sessions focused on minimally invasive neurosurgery and functional neurosurgery in the next course.

We surveyed students before and after the completion of last year’s course. Most students expressed a moderate interest in neurosurgery prior to the course. Subsequently, the students reported, almost entirely, a high or low interest in neurosurgery as a field. Students also reported a higher opinion of the field on average as well as a better understanding of the scope of our profession. Increasing student interest in neurosurgery and providing extensive access to both residents and attendings has already allowed several students to expand their involvement in our department through clinical and research activities. While it certainly is not the aim of our course to discourage students from applying to the field, we nonetheless feel that those who came to this conclusion are better off having taken the course and coming to the decision to explore other specialties earlier than they otherwise may have. It is also beneficial for physicians of all specialties to have a basic knowledge of what neurosurgery encompasses, as



Resident-led demonstration of EVD placement.

(Continued on next page)

How We Did It (Continued)



Attending- and resident-led instruction of students on neck dissection and carotid endarterectomy.

this may better allow them to identify the appropriate patients for neurosurgical consultation and referral.

The efforts that led to the success of this course was the utilization of pre-existing resources and aggressive recruitment of both attending and resident physicians. We capitalized on the availability of opportunities, such as the existing set of Gamma Knife Radiosurgery case portfolio from prior treatments as templates for student practice. We arranged to utilize neurosurgery conference spaces in lieu of reserving classroom spaces that would have put us in competition for timeslots with other courses on campus. Most importantly, the timing of our lectures was designed to begin at a time when the first year anatomy course had completed dissections, but prior to the removal of the cadavers. This allowed for numerous prosecutions with exposed anatomy, but with essentially intact critical structures for surgical demonstrations, such as anterior cervical approaches, carotid endarterectomies and EVD



Student's carotid closure using 6-prolene .

placement. By recruiting residents as teachers while simultaneously providing an opportunity to practice surgical skills, we were also able to enlist the assistance of medical device companies to provide the appropriate tools and instrumentation under the auspices of a resident education event. Combining resident education and resident-led teaching of students, we sought to foster frank conversations regarding the field and to develop mentoring relationships amongst the participants. We hope that this course will serve as an example and an encouragement for other programs to partner with their student organizations to educate and recruit the next generation of residents into the field. ●

Michael McDowell, MD
Resident Physician
Department of Neurological
Surgery
University of Pittsburgh

Update for Young Neurosurgeons from the CSNS Spring 2018 Meeting

Michael Karsy, MD, PhD, MSc and
Anand Veeravagu, MD

The Council of State Neurosurgical Societies (CSNS) represents the official socioeconomic arm of AANS/CNS and includes a national organization of state neurosurgical societies. The CSNS Young Neurosurgeons Section aims to empower residents to participate in shaping policy and increase awareness of socioeconomic issues. Furthermore, the CSNS sponsors neurosurgery resident fellows who are vital to the mission of the CSNS and who participate in the composition of resolutions and are eligible to become voting members.

The Spring 2018 CSNS meeting concluded with an exciting number of updates and new resolutions regarding the socioeconomic interests of neurosurgical residents. Resolutions at the CSNS meeting are formal declarations of issues of interest to neurosurgeons, which are deliberated and voted upon by the CSNS delegation. After debate and final approval during the CSNS meeting, resolutions are submitted to the parent AANS/CNS organizations for voting and approval. The impact of resolutions can be far-reaching, including the formation of study groups evaluating a specific issue, a formalized public statement regarding a specific issue or simply bringing attention of an issue to a large public audience. Highlights and issues relevant to young neurosurgeons from the 2018 CSNS meeting are as follows:

•An issue important to young neurosurgeons, CSNS Resolution XI – originally passed in spring 2017 – was amended. This resolution brought attention to the concept of the “disruptive physician”, a term to describe physicians who frequently create a hostile work environment that interrupts patient care (Resolution VI-2016-S “The ‘Disruptive Physician’ Label and Its Impact on Neurosurgery”). A number of situations, however, have occurred where physicians disagreeing with the hospital administration or patient care decisions were labeled as “disruptive” with potentially damaging career implications. After adoption by the AANS/CNS, a neurosurgery-sponsored American Medical Association resolution (Resolution – 012: “Promoting the AMA Model Medical Staff Code of Conduct and Its Application to Employed Physicians”) has been adopted and added to the AMA Model Medical Staff Code of Conduct. In response to neurosurgeons via

the CSNS bringing forth the importance of this topic, a national policy has been adopted to protect surgeons at every level of training and type of practice.

•Several resolutions during the spring 2018 meeting discussed the generation of additional resources to educate residents regarding socioeconomic issues, especially during a transition period. These include transitions from residency to employment and different types of practice environments. Some of the listed topics of interest included medico-legal and malpractice knowledge for residents, coding and reimbursement, contract negotiation as well as regulatory changes in healthcare. Additional written and online material will be forthcoming to supplement resources the CSNS has already generated, including online material at neurosurgicalatlas.com, courses and lectures at the AANS/CNS national meetings and lecture videos hosted on the CNS website.

•Preliminary findings from a number of research projects in collaboration with the CSNS were discussed. Agarwal et al. presented results involving the national attrition of neurosurgical residents. After evaluating 140 residents who changed careers over the past decade, a total attrition rate of 11.2 percent was identified with higher rates shown in females, residents within PGY1-3 years and residents who completed medical training at private universities. Residents who changed careers were most likely to switch into anesthesiology, radiology or neurology. Menger et al. presented results involving the attitudes of reservist military neurosurgeons in the U.S. Despite substantial challenges in lost time and income from their practices, this group shows a high level of job satisfaction in taking care of military members. Azad et al. reported results of a bioinformatics analysis of opioid use in patients newly diagnosed with lower back pain. Patients had an increased likelihood for receiving an opioid prescription if they were initially treated by primary care medical doctors, rather than mid-level health

practitioners (e.g. physician assistants) or specialists.

•CSNS lectures from A. Leland Albright, MD, FAANS(L), and John R. Adler, Jr., MD, FAANS, were moving and inspiring. Dr. Albright discussed his recent experience spending five years where he taught two pediatric neurosurgery fellows, 15 residents from the University of Nairobi and helped in the surgical treatment of more than 5,000 cases. Dr. Albright delivered an impassioned lecture discussing the challenges of neurosurgery in sub-Saharan Africa and encouraged residents to be involved in global neurosurgery. Dr. Adler equally fostered residents to pursue careers in neurosurgery and entrepreneurship, while discussing his experience in launching Cyberknife, Cureus.com and new radiosurgery technologies. He argued that neurosurgeons are inherent leaders who ask questions, do not accept the status quo and aim to impact medicine on a global scale. He implored residents to pursue entrepreneurship, which can be defined in a number of ways, including the formation of a company, leading local or state medical organizations or advocating for improvements in patient care at an individual hospital.

The CSNS aims to empower residents and increase awareness of socioeconomic issues. For those interested in getting further involved on projects, presenting resolutions to improve neurosurgery on a national level or to submit comments/inquiries, visit the CSNS website (<https://csnsonline.org/>) or email Anand Veeravagu, MD (anandv2@stanford.edu). ●



Michael Karsy, MD, PhD, MSc
Neurosurgery Resident
University of Utah



Anand Veeravagu, MD
Assistant Professor
Stanford University

AANS 2018 Meeting Division Updates

EDUCATION COMMITTEE

The CME / MOC committee - This committee will be renamed "Practice Management" and ABNS is changing the MOC for neurosurgeons who are grandfathered in and CME submissions will become annual.

MEDICAL STUDENTS – MIKE IVAN

The Medical Student Practical Course at the 2018 AANS Annual Scientific Meeting was well-attended. It is hoped that the course will return next year for AANS 2019. The YNC is broadening the scope of the Medical Student Chapter Quadrant Coordinator responsibilities and members can expect to

see more social media about chapters and medical students.

AFFILIATED ORGANIZATIONS REPORT – ANDREW CARLSON

The AANS affiliated organizations represent a diverse group of organizations with which the YNC interacts. These organizations are particularly relevant to socioeconomic, policy and practice based topics.

THE COUNCIL OF STATE NEUROSURGICAL SOCIETIES (CSNS)

See CSNS 2018 highlight article.

wants to encourage young neurosurgeons to develop habits of routine giving, particularly among leadership. PAC has been actively fundraising; however, neurosurgeons as a whole are behind other colleagues in terms of participation. Getting started early builds a spirit of giving back to these organizations that advocate for our needs in a nonpartisan way. The PAC is orchestrating a competition for residency programs to see which can raise the most money and it will be based on overall donation amounts and percentage of participation.

THINKFIRST

ThinkFirst is an organization focused on brain injury prevention, with local chapters all over the country. They can often play an important role in providing injury prevention resources for trauma programs at hospitals. They can provide an important (and required) injury prevention curriculum for level one and two trauma centers.

COUNCIL OF STATE NEUROSURGEONS (CSNS) YOUNG NEUROSURGEONS SECTION

The CSNS is focused on socioeconomic issues that affect neurosurgeons and is a pathway for relatively rapid action to occur in areas of need that involve reimbursement, billing and other important socioeconomic issues. The Young Neurosurgeons Representational Section (YNRS) continues to sponsor a reception with neurosurgical leaders from around the country. Past speakers included Bob Carter, MD, PhD, FAANS; Richard Ellenbogen, MD, FAANS; and John Adler, MD, FAANS, at this meeting. The next YNRS Reception will be 10/6/2018 @ 4:30pm in Houston. Thanks to all the volunteer YNC members who attend and participate in these meetings and organizations to represent our voice in organized neurosurgery. ●

THE JOINT GUIDELINES COMMITTEE

This committee has been renamed the "Joint Guidelines Review Committee" and has been busy with numerous guidelines completed, including acute ischemic stroke guidelines, thoracolumbar trauma guidelines, hydrocephalus and spina bifida, vestibular schwannoma and brain metastases. Multiple additional guidelines are coming soon or are up for review.

THE POLITICAL ACTION COMMITTEE (PAC)

The committee has been meeting its fundraising goals, but



Section Updates

All of the sections are looking to increase medical student involvement. Joining the section is a quick process that can be completed online and membership is free! Visit the section website for specific information.

Walavan Sivakumar, MD

Cerebrovascular Section: The CV section has been active with the CAST accreditation process for cerebrovascular fellowships, now moving forward with the support of the American Board of Neurological Surgeons (ABNS), American Board of Radiology (ABR) and American Board of Psychiatry and Neurology (ABPN). The inaugural AANS/CNS Cerebrovascular Section/Young Neurosurgeons Committee Honored Guest Luncheon, with this year's speaker Daniel Barrow, MD, FAANS, Professor and Chairman of Neurosurgery at Emory, was a great success.

Website: <http://www.cvsection.org/>

History Section: The History Section is welcoming young neurosurgeons to get involved in the section by sending new ideas, helping with the annual history video and planning the next meeting.

Website: <http://www.aans.org/en/Membership/AANSCNS-Sections/History-Section>

Pain Section: There will be a Pain Section meeting to be held in conjunction with the Spine Section meeting in 2019, highlighting neuromodulation as a treatment for back pain. The Pain Section has been very active in the AMA opioid task force and is intimately involved in developing state-specific mandated opioid CMEs. The Pain Section continues to offer The Oakley Fellowship, which supports a two- to three-month traveling experience to learn neurosurgical pain techniques

and/or refine their use. Eligible applicants are residents PGY4 or later or neurosurgeons within two years of finishing residency.

Website: <http://painsection.org/>

Pediatrics Section: Information regarding research awards for fellows and early career faculty members can be found on the Section website. The AANS/CNS Section on Pediatric Neurological Surgery will host their annual meeting December 6-9 in Nashville.

Website: <http://pedsneurosurgery.org/>

Spine and Peripheral Nerve: The Spine Section will host their annual meeting March 14-17, 2019, in Miami (Technical Innovation for Restoring Patient Function). They will continue to utilize the fast-abstract concept. Join us in Miami!]

Website: <http://www.spinection.org/>

Stereotactic and Functional: The ASSFN is forming a young neurosurgeon's subcommittee within the section and looking for interested members.

Website: <http://www.assfn.org/>

Neurotrauma Section: The section continues to offer the Codman Resident Neurotrauma Research Award. The section is working with the National Neurotrauma Society on NIH grants aimed at preventing pediatric head trauma. The next AANS/CNS

National Neurotrauma Symposium will be held in conjunction with the International Neurotrauma Society in August 2018 in Toronto. The thoracolumbar trauma guidelines will have been completed and will be published in Neurosurgery in the coming months. Available fellowship information in Neurotrauma and Critical Care Fellowships is posted on the website.

Website: <http://www.neurotraumasection.org/>

Tumor Section: The Young Neurosurgeon Reception at the 2018 AANS Annual Scientific Meeting went extremely well, with honored guest and chairman of neurosurgery at MD Anderson Cancer Center, Frederick Lang, MD, FAANS, who shared his 5 "Fs" of True Success. Information regarding all of the upcoming meetings and funding sources for research grants and fellowships, including the Andrew Parsa Fellowship, is posted on the website.

Website: <http://www.tumorsection.org/>

Women in Neurosurgery (WINS): The first WINS-sponsored annual retreat in Snowbird, Utah in July 2017 went extremely well. The Shelly D. Timmons Honor Your Mentor Fund has recently been established through NREF to support leadership development for all young neurosurgeons.

Website: <http://www.neurosurgerywins.org/>



SPINE SUMMIT 2019

March 14-17, 2019
Miami Beach, Florida
Join us at the iconic Fontainebleau Hotel!

The 36th Annual Meeting of the Section on Disorders of the Spine and Peripheral Nerves
Technical Innovation for Restoring Patient Function

 Congress of Neurological Surgeons

 American Association of Neurological Surgeons

Book Reviews

Yu & Forhani's Skull Base Cancer Imaging

By Eugene Yu & Reza Forghani

This new text by neuroradiologists Eugene Yu, MD, and Reza Forghani, MD, PhD, fills an important gap for any skull base trainee by providing a clear, concise and useful reference focused on practical imaging pearls for approaching skull base lesions. The text is organized into eight chapters focused on different anatomic, skull base regions. Each chapter provides a review of relevant embryology and basic anatomy complimented by anatomic drawings and well-annotated basic CT and MR imaging. Thereafter, each chapter features a wide range of anatomically-relevant pathologies, highlighting the imaging features of each disease entity and provides commentary on various imaging staging systems and treatment algorithms. This text will provide a very useful adjunct to operative planning for residents, fellows and attending interested in the treatment of skull base tumors.

-Raj Mukherjee, MD

Rhoton's Atlas of Head, Neck, and Brain: 2D and 3D Images

By Maria Peris-Celda, Francisco Martinez-Soriano & Albert L. Rhoton, Jr.

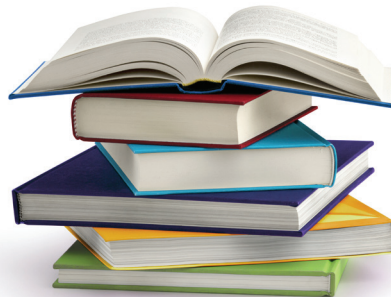
This outstanding anatomic text provides 624 well-annotated figures throughout 28 chapters, covering the depth and breadth of head and neck anatomy. This seminal work by Albert L. Rhoton Jr., MD, FAANS(L), and his colleagues features an additional 3-D version of each figure in an online imaging database. Topics include the adult and fetal skull, superficial and deep dissections of the face and neck, the internal structure of the eyeball, cranial nerves and fiber dissection of the brain. With minimal text in the vein of Rohen's Color Atlas of Anatomy, this book provides an outstanding reference for any head and neck surgeon or neurosurgeon in training or in practice.

-Raj Mukherjee, MD

Neurosurgical Emergencies

By Christopher M. Loftus

This third edition of a reference is useful for neurosurgeons in all stages of their career, ranging from new trainees to seasoned practitioners. While covering expected topics, such as the pathophysiology and management of coma to multimodality brain monitoring, the text also delves into a wide range of additional subjects, including surgical management of ischemic stroke, cerebral and spinal infections and shunt malfunctions. The text is well-



written, easy to read and supplemented with pertinent images and tables; there is even a chapter dedicated to cervical spinal stenosis and a discussion regarding the controversial timing of surgery for these patients. One specific limitation to this text is that the applicable surgical procedures and management descriptions are limited. Generally speaking, this text serves best as an overview of neurosurgical emergencies and indications for management decisions, with some exception. Fine details regarding surgical and medical management will need to be obtained elsewhere.

-Jon Pace, MD

Flow Diversion of Cerebral Aneurysms

Min S. Park, Philipp Taussky, Felipe C. Albuquerque & Cameron G. McDougall

Flow diversion (FD) has now come of age and it is only appropriate that it is accompanied by a definitive text. Rather than a chapter or section in a larger textbook that generally discusses aneurysms, this tome takes a deep dive into the many nuances of flow diversion treatment. The book is particularly unique in that it truly discusses flow diversion as a class of treatment, rather than just focusing on the Pipeline Embolization Device, with which most of us in the U.S. are familiar. In dedicated chapters, it specifically discusses the FRED, Surpass and Silk devices as well. The best chapters, however, are the first two that review the history of the development of FD and the extensive basic and translational studies that drove the field, written by pioneers of the flow diversion concept. Finally, as FD is still a developing and hot field, the book closes with a discussion of some of the recent basic research that is being done that may make its way into the next generation of flow diverters, including biodegradable polymers, stent modifications, etc. These are concepts that are alluded to in some talks at national meetings, but this text discusses them in extensive detail, in an easily readable format and well-organized manner. This is a book well worth owning or reading for any young neurosurgeon interested in neuroendovascular surgery.

-Visish Srinivasan, MD

Neurosurgery Rounds: Questions and Answers: 2nd Edition

Mark Shaya

This book provides a ton of information in question and answer format. It accomplishes its purpose of preparing medical students and residents for difficult questions encountered during rounds and while operating by presenting commonly encountered questions with detailed answers. The wealth of information is in a pocket-sized format, which allows the reader to take it anywhere.

Compared to the prior edition, this book includes expanded chapters with more detail. The short, but informative, answers allow for a quick read during busy call days at the hospital. Additionally, this book boasts an impressive number of detailed images and cases that are accompanied by relevant questions. However, this book should not be used alone or as an introductory text to the material. This text is more of a refresher for those that have seen the material prior and wish to review or assess their knowledge.

-Joshua Spear, MD

Neurotrauma and Critical Care of the Spine

Jack Jallo & Alexander Vaccaro

This second edition clinical text is a comprehensive, yet accessible, book for all persons caring for spine-injured patients. It masterfully presents the current state of injury management with an eye towards future therapies and gives the reader a critical historical context of how it came to be. In short, it provides the what(s), the how(s) and, most importantly, the why(s) of current practice. Notable highlights include: a focus on ongoing trials for protective and regenerative therapies; athletic injuries and guidelines for return-to-play; and an approach to the challenging task of managing patients that have sustained both brain and spinal injuries. Certainly, the honest picture of life and recovery after spinal cord injury is one of the necessary takeaways for neurosurgeon readers as we educate and shepherd our patients through this period. A caution: as with any clinical text, the readers may find themselves cross-referencing repeated information across chapters that touch on similar topics. This does not take away from the fact that, serving as a quick guide or as a reference for deeper study, this text is a keeper.

-Rima Rindler, MD & Faiz U Ahmad, MD



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News from the Neurosurgery Research & Education Foundation (NREF)

Established by the American Association of Neurological Surgeons (AANS) in 1980, the Neurosurgery Research & Education Foundation (NREF) has a direct impact on patients, researchers, clinicians and especially young neurosurgeons. NREF has hosted educational courses and awarded research grants to countless young neurosurgeons and neurosurgical residents.

Grants & Fellowships

Applications for the following NREF Grants & Fellowships are being accepted as of August 1, 2018, and are available through the NREF Online Grant Portal:

- 2019-20 Post-residency Clinical Fellowship Grant (PRCF)
- 2020-21 William P. Van Wagenen Fellowship (VW)

The complete Grant Application Schedule is available on the Grants & Awards section of the NREF website. If you have any questions, contact Kathleen McMichael at 847.378.0535 or via email at kam@nref.org.

An award from the NREF can have an extraordinary impact on a neurosurgeon's career. Candidates are encouraged to pursue this amazing professional opportunity.

Young Neurosurgeons Circle of Giving

Donations to the NREF have a direct impact on patients, educators, researchers, clinicians and, in particular, young neurosurgeons. Your support makes continued funding possible for cutting-edge courses and merit-based grants.

The Young Neurosurgeons Circle of Giving was created in 2016 to welcome neurosurgical residents into the culture of philanthropy, with the goal of eventual membership in the NREF's premier recognition society, the Cushing Circle of Giving. Membership is open to residents who demonstrate a commitment to advancing neurosurgery with a cash contribution of 00 (\$USD) or more.



NREF

NEUROSURGERY RESEARCH & EDUCATION FOUNDATION

Payment plans are available. Gifts can be made as a one-time contribution, in regular monthly or annual installments, or as part of a tiered plan spanning the course of residency. A \$500 donation amounts to less than \$10 per month over five years.

Visit the **NREF Young Neurosurgeons webpage** to learn how to be recognized in this Circle of Giving.

How to Give

It has never been easier to support the NREF with our variety of donation options:

- **Apple Pay** - Text "NREF" to 312.313.NREF (6733) to receive a link. Simply click on the link, log in and pay using either a credit card or Apple Pay.
- **Shop and Give** - Throughout the year, proceeds from selected purchases made through AmazonSmile and iGive.com benefit the NREF.
- **Social Media** - Host a birthday fundraiser from your Facebook page to benefit the NREF and all proceeds will count toward your membership in the Young Neurosurgeons Circle of Giving.
- **Matching Gifts** - If your employer has a matching gift program, obtain the proper forms from your personnel office to begin the matching gift process.

To target your donation to the fund of your choice, visit our secure Donate page. Together, we are making a difference in patients' lives.

Upcoming NREF sponsored resident courses:

- **Senior Residents' Course on MIS and Emerging Spinal Technologies**
August 23-25, 2018 in Phoenix
- **Skull Base for Senior Residents**
September 13-16, 2018 in Memphis, Tenn.
- **Fellows Course in Endovascular Techniques**
September 21-23, 2018 in Memphis, Tenn.
- **Endovascular and Vascular Techniques for Residents**
October 11-14, 2018 in Memphis, Tenn.
- **Spinal Deformity for Residents**
Feb. 22-24, 2019 in Phoenix

Neurosurgery residency program directors and residency coordinators are notified of course opportunities approximately 15 weeks in advance of each course. Residents are nominated to attend these complimentary educational opportunities by program directors, based on specified course criteria.

Thanks to Nitin Agarwal, MD, Neurosurgery Resident, University of Pittsburgh, for his assistance with this article. ●



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Association of
Neurological
Surgeons

AMERICAN ASSOCIATION OF NEUROLOGICAL SURGEONS

AANS 2019

LIVE EDUCATION

2019 AANS ANNUAL SCIENTIFIC MEETING

April 13-17
San Diego

THE BENZEL SYMPOSIUM

State-of-the-art
in Complex
Spine Surgery

A Scientific
Tribute and Global
Celebration:

Edward C. Benzel,
MD, FAANS

April 11-12
San Diego

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Managing Coding
and Reimbursement
Challenges

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San Diego

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Aug. 22-24
Rosemont, Ill.

Sept. 19-21
Austin, Texas

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Phoenix

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ADVANCED PRACTICE PROVIDER

From Cranial to Spine:
An Overview of
Neurosurgical
Topics for the APP

Aug. 28-31
Orlando, Fla.

To learn more about AANS 2019, go to:

www.aans.org/AANS2019

To view online educational opportunities and
register for AANS Live Courses, visit:

www.aans.org/Education