Message from the President

The American Association of Stereotactic and Functional Neurosurgery (ASSFN), serves as an affiliate joint section of the AANS and CNS and remains deeply involved in a variety of educational, organizational and advocacy activities, on behalf of North American functional neurosurgeons and our patients. It gives me enormous pride and pleasure to be the current president of the ASSFN.

The ASSFN is actively planning for the upcoming Biennial Meeting in 2018. The meeting will be held in Denver, June 3-6, under the guidance of our past-president, Aviva Abosch, MD, PhD, FAANS. There will be a stellar scientific program and many exciting presentations in our rapidly-evolving field. This summer, the World Society for Stereotactic and Functional Neurosurgery (WSSFN), our sister organization, will hold its Biennial Meeting in Berlin, June 26-29.

Members of the ASSFN/Stereotactic & Functional Section continue to lead the way in promoting scientific and clinical research. Our field is uniquely poised for continued growth with the increased interest in neuromodulation. In particular, there are ongoing advances in increasing the number of viable indications. For example, there is work being performed to enhance memory and to treat a broad range of neuropsychiatric indications, such as major depression, post-traumatic stress disorder (PTSD), substance abuse, traumatic brain injury (TBI) and others. In addition, there is a great deal of active work on the next generation of neuro-modulatory devices. Among the areas being actively studied are much higher numbers of electrodes, closed-loop stimulation and increased miniaturization.

In addition, there is new excitement in the field as private entrepreneurs are increasingly interested in developing brain-machine interfaces. The injection of significant new funds into the field presents both opportunities and challenges. On the one hand, there is the potential for significant new advances. On the other hand, we have to be thoughtful, both individually and collectively, in ensuring that any new neuro-modulatory approaches meet the highest scientific, moral and ethical standards. As neurosurgeons, we are the gate-keepers to the brain. As such, we have a special responsibility to guard that most sacred aspect of humanity, our minds, with all that entails.

This is a conversation that will be ongoing for many years, but I would urge the members to start thinking about the possibility of more viable, high bandwidth, brain-machine interfaces and the individual and societal implications of such devices. It will be important to have a coherent set of guiding principles going forward. Otherwise, we risk being overtaken by the technology, without a clear scientific, medical or societal mandate.

I look forward to seeing you all at the upcoming meetings.

Sincerely yours,

Emad N. Eskandar, MD, MBA, FAANS
Massachusetts General Hospital
Harvard Medical School
In the sections below, we summarize newsworthy developments of clinical and scientific relevance to the stereotactic and functional (S&F) neurosurgery community. Included in this list are new products, milestones and industry trials, as well as notable research developments from our neurosurgical colleagues. Of particular note is the large number of grants funded by the National Institutes of Health (NIH) BRAIN Initiative awarded to S&F neurosurgeons recently. Special thanks go to Chuck Mikell, MD, (Stonybrook, N.Y.) for compiling the information.

**Movement Disorders**

- For the first time since Medtronic deep brain stimulation (DBS) was approved by the Food & Drug Administration (FDA), a second DBS system has become available. The Infinity™ DBS system, manufactured by St. Jude (itself recently acquired by Abbott), was approved by the FDA last fall. This system has a number of novel features, including the capacity for current steering with a segmented electrode, a constant-current setting and an iOS-based wireless programmer.
- Aysegul Gunduz, PhD, and Kelly Douglas Foote, MD, FAANS, both at the University of Florida, were funded by an NIH BRAIN Initiative grant to pilot closed-loop DBS for essential tremor.
- Philip A. Starr, MD, PhD, FAANS, (University of California, San Francisco) was funded by the NIH BRAIN Initiative to develop stimulation paradigms based on individually recorded biomarkers using a closed-loop device in patients with Parkinson’s disease treated with DBS.
- Harrison Walker, MD, (University of Alabama) was funded by the NIH BRAIN Initiative to develop programming strategies for DBS for Parkinson’s disease using EEG biomarkers.
- Robert Mark Richardson, MD, PhD, FAANS, (University of Pittsburgh) has been funded by the NIH BRAIN Initiative to study subthalamic neurons and cortical structures during DBS surgery to better understand which circuits support speech in the subthalamic nucleus.

**Epilepsy**

- NeuroPace reported seven-year follow-up data for their initial 185 patients treated with responsive neurostimulation (RNS) at the American Epilepsy Society meeting in December. Seizure frequency decreased on average by 72 percent. Also of note, the 1,000th RNS patient was recently implanted.
- Medtronic has opened a large, multicenter open-label trial of laser ablation for mesial temporal lobe epilepsy, the Stereotactic Laser Ablation for Temporal Lobe Epilepsy (SLATE) trial. SLATE is designed to test the hypothesis that laser ablation effectively reduces seizure frequency in patients with medically refractory epilepsy. The investigators are also testing neuropsychological outcomes, which they have included as secondary endpoints.
- Robert E. Gross, MD, PhD, FAANS, (Emory University) was funded by the NIH BRAIN Initiative to develop a novel multi-electrode technique in non-human primates and, eventually, to pilot it in patients for the treatment of epilepsy.
- Nitin Tandon, MD, FAANS, (University of Texas, Houston) and Nathan Earl Crone, MD, (Johns Hopkins University) were funded by the NIH BRAIN Initiative to do paired stimulation-recording experiments in epilepsy patients with intracranial electrodes to develop a unified cognitive model of speech.

**Pain**

- As a response to high-density stimulation, Medtronic introduced the Evolve™ programming workflow to combine both high- and low-density options for spinal cord stimulation.
- The two-year follow-up of the pivotal trial for the Nevro device was published, demonstrating superiority over traditional SCS for treatment of both back and leg pain (Kapural et al., Neurosurgery, 2016).
- The FDA approved the Stimwave and SPRINT devices for peripheral nerve stimulation. Stimwave uses wireless communication, and SPRINT uses a wearable stimulator that does not require surgical implantation. Both use percutaneous electrodes that can be implanted via needles.
- Dorsal root ganglion and spinal cord stimulation were compared for treatment of chronic regional pain syndrome in the ACCRATE trial. DRG appeared to have a higher rate of treatment success and fewer positional effects with stimulation (Deer et al., Pain, 2016).
- 24-month follow-up of the SCS-LUMINA study (funded by Boston Scientific) was published. The Illumina 3-D platform uses a three-dimensional “anatomically guided” programming approach. The trial showed a 71 percent responder rate in back pain patients (Veizi et al., Pain Med, 2017).
- Boston Scientific acquired Cosman, the largest manufacturer of radiofrequency ablation equipment.

**Psychiatric**

- Two groups were funded in the most recent round of NIH BRAIN initiative grants to develop new approaches for DBS for obsessive-compulsive disorder. Darin Dougherty, MD, PhD, and Emad N. Eskandar, MD, FAANS, (Massachusetts General Hospital) will be developing a closed-loop cortical-subcortical stimulation technique. Wayne Goodman, MD,
(Baylor University) is developing a closed-loop sensing approach designed to maximize symptom reduction and minimize side effects.

- One-year follow-up has now been reported on an initial cohort of sixteen patients who underwent DBS for anorexia in Toronto, Canada. Overall body mass index (BMI) improved significantly from 13 at study entry to 17 at the 12-month follow-up (Lipsman et al., *Lancet Psychiatry*, 2017).

### New Directions

- Philip Troyk, PhD, at the Illinois Institute of Technology, plans to develop an intracortical visual prosthetic in human volunteers to test perception and usefulness of the perceived vision in a project funded by the NIH BRAIN Initiative.

- Andres Guelman Machado, MD, PhD, and Kenneth Baker, PhD, (Cleveland Clinic) were funded by the NIH BRAIN Initiative to develop a closed-loop cerebellar stimulator in patients to augment stroke recovery, with the aim of regaining hand and arm strength.

- A phase II study of DBS for Alzheimer’s disease using six-month periods of sham and real stimulation failed to show a benefit for cognitive function in an intention-to-treat analysis, but there was a trend towards benefit in older patients (Lozano et al., *Journal of Alzheimer’s Disease*, 2016).

- Richard Anderson, PhD, at CalTech, has been funded by the NIH BRAIN Initiative to develop a cortical prosthetic for tetraplegic individuals based on online control using sensory feedback.

- Nader Pouratian, MD, PhD, FAANS, at UCLA, received a NIH BRAIN Initiative grant to study basal ganglia-cortex interactions that support the balance between action generation and suppression.

- Charlie Schroeder, PhD and Sameer Sheth, MD, PhD, FAANS and their team at Columbia University were funded by the NIH BRAIN Initiative to use intracranial recordings in epilepsy patients to study the audio-visual integration required for optimal speech perception.

- Edward F. Chang, MD, FAANS, (UCSF) will use high-density cortical recordings in epilepsy patients to study the interaction between sensory and motor areas regulating speech production.

- The zombie apocalypse inches closer: A group at Yale has shown that optogenetic stimulation of the central amygdala drives predatory behavior in mice. They also identified separate pathways for chasing prey and biting prey. (Han et al., *Nature Neurosci*, 2017).

### CNS 2016 Stereotactic and Functional Neurosurgery Resident Award

The Congress of Neurological Surgeons (CNS) 2016 Stereotactic and Functional Neurosurgery Resident Award was presented to Aaron E. Bond, MD, PhD, for his project entitled “A randomized, sham-controlled trial of transcranial MR-guided focused ultrasound thalamotomy trial for the treatment of tremor-dominant Parkinson’s disease.” The study’s senior author was William Jeffery Elias, MD, FAANS, professor of neurosurgery at the University of Virginia.

The authors presented the results of a randomized, sham controlled, pilot study of MR-guided focused ultrasound (FUS) thalamotomy for the treatment of unilateral tremor dominant Parkinson’s disease. Twenty-seven patients were enrolled from two U.S. centers (University of Virginia and Swedish Hospital). There was more tremor improvement at three months following FUS thalamotomy than from sham procedures, and the difference between groups using intent to treat analysis, the primary efficacy outcome, was significant (p=0.025). Unified Parkinson Disease Rating Scale (UPDRS) motor scores in the medicated state, however, did not reach statistical significance between active and sham treatment. Notable placebo effect was observed in both metrics. The most common thalamotomy-related adverse events were finger paresthesias, ataxia and orofacial paresthesias. Two patients (10 percent) had mild hemiparesis that showed improvement during the study.

Dr. Bond received his PhD from the University of Southern California (USC) in 1999. Following a successful career in industry, he returned to USC for medical school and completed his MD in 2011. Dr. Bond is currently a PGY6 in the Department of Neurosurgery at the University of Virginia. Following graduation, he intends on subspecializing in functional neurosurgery and will pursue his research interests in laser interstitial thermal therapy, focused ultrasound and convection enhanced delivery at Semmes Murphey Clinic and the University of Tennessee, Department of Neurosurgery.
CPT Update

• **Focused Ultrasound Thalamotomy.** The Coding and Reimbursement Committee (CRC) has been contacted regarding coding for Focused Ultrasound Thalamotomy for Essential Tremor. The CRC is working with the AANS/CNS Section on Stereotactic and Functional Neurosurgery to review a possible Category III tracking code.

• **MRI-guided laser interstitial thermal therapy (LITT) ablation.** The CRC held a conference call on Nov. 28, 2016, with Stereotactic and Functional and Tumor Section leaders to consider a CPT Code Proposal for a Category III code for MRI-guided laser ablation (LITT) drafted by Donald M. Whiting, MD, FAANS. Section leaders decided to conduct a survey to determine details about the way in which the code is currently reported and to gain insight into whether physician work and clinical issues are different when the technology is used for treating different conditions.

### Vagus Nerve Stimulation (VNS) Treatment for Epilepsy

On July 27, 2016, the AANS, CNS and American Epilepsy Society (AES) sent a letter to Total Health Care (THC) regarding overly restrictive criteria for coverage of Vagus Nerve Stimulation (VNS) treatment for epilepsy. The letter was coordinated by Jason M. Schwab, MD, FAANS, and the AANS/CNS Stereotactic and Functional Neurosurgery Section. On Sept. 21, 2016, THC staff said Medical Director Robyn J. Arrington, MD, chief medical officer, had referred the issue to the THC Utilization Management Committee for review.

Donald M. Whiting, MD, FAANS
Alleghany Health Network
SATURDAY, APRIL 22

8 a.m.-5 p.m.
003 Stereotactic and Functional Neurosurgery: Hands-on Workshop

Director: Steven G. Ojemann, MD, FAANS
Assistant Director: Jason M. Schwalb, MD, FAANS
Faculty: Aviva Abosch, MD, PhD, FAANS; Kathryn Lois Holloway, MD, FAANS; Willard S. Kasoff, MD; Darlene A. Lobel, MD, FAANS; Francisco A. Ponce, MD, FAANS; Damianos E. Sakas, MD; Yeo Tseng Tsai, MD

This Practical Clinic is directed to neurosurgeons in practice or in training, who desire to improve their skills and knowledge of stereotactic and functional neurosurgery. The program will focus on advanced stereotactic techniques used for implantation of deep brain stimulators and for functional ablation of brain structures in the treatment of movement disorders and psychiatric disorders. The goals of the program will be accomplished through a didactic program, followed by a hands-on laboratory program in which participants will use a wide range of stereotactic devices (frame, frameless), electrode drives and imaging techniques for radiological control. This is followed by a microelectrode-mapping training session, using microelectrode-recording equipment, as well as computer simulations.

1-5 p.m.
011 Comprehensive Interventional Facial Pain Management

Director: Jonathan P. Miller, MD, FAANS
Assistant Director: Ashwin Viswanathan, MD, FAANS
Faculty: Kim J. Burchiel, MD, FAANS; Bruce E. Pollock, MD, FAANS; Joshua M. Rosenow, MD, FAANS; Raymond Francis Sekula Jr., MD, FAANS

This practical course provides comprehensive instruction in the neurosurgical management of various facial pain syndromes, including trigeminal neuralgia, trigeminal neuropathic pain, deafferentation pain/anesthesia dolorosa and nociceptive facial pain. Participants learn multiple interventions, including open and percutaneous surgical techniques, radiosurgical treatment and neuromodulation approaches.

1-5 p.m.
013 Brain Mapping and Awake Mapping Techniques

Director: Gerald A. Grant, MD, FAANS
Assistant Director: Guy M. McKhann II, MD, FAANS
Faculty: Nicholas M. Barbaro, MD, FAANS; Gene H. Barnett, MD, FAANS; Hugues Duffau, MD; Konstantinos N. Fountas, MD, PhD, IFAANS; Jorge Alvaro Gonzalez-Martinez, MD, PhD, FAANS; Nader Sanai, MD, FAANS; Ugur Ture, MD, IFAANS; Fernando L. Vale, MD, FAANS

This course will provide an in-depth review of techniques and technologies that can be applied to identifying and working within eloquent areas of the brain and performing successful resections of neoplasms and epilepsy foci in adult and pediatric patients. The selection of surgical approaches based on non-invasive monitoring for surgery of epilepsies and brain tumors will be discussed.
SUNDAY, APRIL 23

7:30 a.m.-11:30 a.m.
025 Laser Thermocoagulation — How, When and Why

Director: Veronica L. Chiang, MD, FAANS
Assistant Director: Michael Schulder, MD, FAANS
Faculty: Jonathan R. Jagid, MD, FAANS; Stephen B. Tatter, MD, PhD, FAANS; Jon T. Willie, MD, PhD

MRI-guided Laser Thermal Ablation (MgLTA) is a developing technology with evolving indications. It is currently mostly involved in the treatment of tumors and epilepsy but with possible indications in vascular and spine. It is important for neurosurgeons to understand the advantages, limitations and costs of this new technology and what needs to be studied to further develop this technology appropriately. Most courses currently available for neurosurgeons to learn about MgLTA are industry sponsored. This Practical Clinic will allow neurosurgeons using the technology to more openly discuss their experiences using their various systems and how these systems may be advantageous and/or limit their practices.

7:30 a.m.-11:30 a.m.
026 Deep Brain Stimulation: Update and New Directions

Director: Aviva Abosch, MD, PhD, FAANS
Assistant Director: Sameer A. Sheth, MD, PhD
Faculty: Ellen L. Air, MD, PhD, FAANS; Casey Harrison Halpern, MD; Paul A. House, MD, FAANS; Michael G. Kaplitt, MD, PhD, FAANS; Brian H. Kopell, MD, FAANS; Paul S. Larson, MD, FAANS; Nader Pouratian, MD, PhD, FAANS; Joshua M. Rosenow, MD, FAANS; Donald M. Whiting, MD, FAANS

Practical aspects of surgery for the treatment of Parkinson’s disease, tremor and dystonia will be presented. Emphasis will be on anatomical and physiological targeting strategies, intraoperative decision-making, troubleshooting, complication avoidance and management. Cases and intraoperative scenarios will be presented for interactive discussion between the audience and faculty.

MONDAY, APRIL 24

7-9 a.m.
120 Emerging Indications in Neuromodulation Surgery

Director: Andre Guelman Machado, MD, PhD
Panelists: Kelly Douglas Foote, MD, FAANS; Andres M. Lozano, MD, PhD, FAANS

The objective of this course is to discuss the culture of safety implementation in performing these minimally invasive surgeries, as well as complication avoidance with stereotactic and functional neurosurgery. This seminar also highlights the different techniques available to manage these complications.

7-9 a.m.

109 Resective Strategies for Epilepsy

Moderator: Gerald A. Grant, MD, FAANS
Panelists: Brent Randle O’Neill, MD, FAANS; David W. Roberts, MD, FAANS; Michael David Sather, MD, FAANS; Nitin Tandon, MD, FAANS

This seminar will examine the preoperative evaluation for surgery, as well as emphasize the changing description of the epileptogenic focus and how this may alter new surgical therapies.
TUESDAY, APRIL 25

AANS/CNS Section on Pain

John Loeser Lecture
Konstantin V. Slavin, MD, FAANS

Konstantin V. Slavin, MD, FAANS, is professor, chief of stereotactic and functional neurosurgery section and fellowship director for stereotactic and functional neurosurgery in the department of neurosurgery at the University of Illinois at Chicago (UIC).

Dr. Slavin graduated from medical school in Baku, the Soviet Union, and completed his neurosurgery residency in Moscow. He completed his second neurosurgery residency at UIC and a fellowship in functional and stereotactic neurosurgery at Oregon Health Sciences University.

He is an immediate past president of the American Society for Stereotactic and Functional Neurosurgery (ASSFN) and vice secretary/treasurer of the World Society for Stereotactic and Functional Neurosurgery (WSSFN). He is also the director (ex-officio) and past secretary of the North American Neuromodulation Society (NANS) and director-at-large of the International Neuromodulation Society (INS).

Dr. Slavin is published in many books and peer-reviewed journals and is an associate editor or editorial board member for a number of publications, including *Neuromodulation, Neurosurgery, Stereotactic and Functional Neurosurgery, Surgical Neurology International* and others.

7-9 a.m.

207 New Innovations in Epilepsy Surgery

**Moderator:** Nicholas M. Barbaro, MD, FAANS

**Panelists:** P. David Adelson, MD, FAANS; Sarat P. Chandra II, MD; Robert E. Gross, MD, PhD, FAANS; Karl Lothar Schaller, MD, PhD, IFAANS; Johan JL van Loon, MD, PhD, IFAANS

This seminar will focus on the surgical approaches to epilepsy that do not involve removal of tissue. Various electrical stimulation techniques will be discussed, as well as procedures currently under investigation, such as radiosurgery and cerebral cooling. More traditional non-resective techniques, such as corpus callosotomy and multiple sub-pial transection, will also be included in this comprehensive discussion. Neurosurgical leaders in the respective fields will present the latest information on these topics.

7-9 a.m.

216 Functional Mapping of the Cerebral Cortex: Advantages and Limitations

**Moderator:** Richard W. Byrne, MD, FAANS

**Panelists:** Warren W. Boling, MD, FAANS; Edward F. Chang, MD; Isabelle M. Germano, MD, FAANS; Daniel L. Silbergeld, MD, FAANS

All aspects and methods of functional mapping for neurosurgery will be discussed, including removal of brain tumors, vascular lesions and epilepsy for awake and asleep patients.
WEDNESDAY, APRIL 26

7-9 a.m.
302 Surgical Treatment of Parkinson’s Disease
Moderator: Julie G. Pilitsis, MD, PhD, FAANS
Panelists: Ellen L. Air, MD, PhD, FAANS; Paul A. House, MD, FAANS; Jonathan R. Jagid, MD, FAANS
Participants will discuss current surgical targets for Parkinson’s disease, including a variety of technical approaches and complications.

7-9 a.m.
307 Neurosurgical Management of Intractable Pain
Moderator: Konstantin V. Slavin, MD, FAANS
Panelists: Amr El Shawarby, MD; Ahmed M. Raslan, MD
This seminar will review indications, techniques and outcomes of contemporary neurosurgical procedures for the treatment of intractable pain. Attention will be directed toward practical applications of therapies that can be used in a general neurosurgical practice.

7-9 a.m.
308 Stem Cell Therapeutics in Neurosurgery
Moderator: Nathan R. Selden, MD, PhD, FAANS
Panelists: John A. Boockvar, MD, FAANS; Nicholas M. Boulis, MD, FAANS; Peter B. Dirks, MD; Ann M. Parr, MD, PhD, FAANS; Gary K. Steinberg, MD, PhD, FAANS
Stem-cell transplantation offers a new potentially revolutionary approach to currently untreatable central nervous system diseases. Speakers will report on the scientific underpinnings, delivery mechanisms and early use of stem-cell CNS transplantation to treat human disease, as well as pragmatic and societal challenges to progress.
See You in 2018!

The American Society for Stereotactic and Functional Neurosurgery

ASSFN Biennial Meeting 2018

Denver, Colorado
June 2-5, 2018