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Connect with SNACC via Social Media!
President’s Message
The Neurologic Stress Test: Can Neuroanesthesiology Change Medicine?

George A. Mashour, MD, PhD
SNACC President

We see a neuroscientific miracle on a routine basis. A neurosurgical patient has emerged from a general anesthetic after a craniotomy, responds to commands in a way that suggests the recovery of consciousness, but manifests asymmetrical responses. We note the asymmetry and recognize that it neurologically maps to the site of the surgical insult, suggesting a focal and structural lesion – and then something remarkable happens. With time, the lesion reveals itself to be more functional than structural and the responses become symmetrical. The resolution of a focal neurological deficit on a pharmacological time scale has significant implications. It suggests that subanesthetic levels of general anesthetics can strip away neurological reserve and unmask vulnerabilities that would normally be subclinical. This unmasking has been studied formally in neuroanesthesiology (Thal et al., Anesthesiology, 1996, 85:21-5; Lin et al., Anesthesiology, 2016, 124:598-607), but not extensively. I would argue however, that this routine clinical phenomenon represents the potential for a major contribution to medicine.

Between the periods of 1993-1995 and 2008-2010, the number of cardiac stress tests in the U.S. rose (for better or worse) from around 1.6 million to 3.8 million on an annual basis (Ladapo, Ann Intern Med, 2014, 161:482-90). Millions of individuals each year, for various indications, undergo a routine procedure in which a physical or pharmacological challenge strips away cardiac reserve to unmask vulnerabilities that would normally be subclinical. Sound familiar? Let’s now imagine a future scenario in which a male in his fifties who reports some episodes of memory loss to his primary care physician. He is ultimately referred to a hospital-based clinic to receive a subanesthetic infusion of propofol while completing standardized cognitive and motor testing. His scores are compared to a normative database, he is close to the mean performance for his age, and he leaves reassured. Alternatively, it could be found that his performance degrades rapidly with exposure to propofol in a way that is several standard deviations below the norm and he is referred for neuroimaging and regular follow-up.

This science fiction could actually be the basis for some exciting translational science, in which we, as a subspecialty, capitalize on a routine clinical observation to advance neuroscience and general clinical care. In fact, such a research program would be grounded in the “three pillars” of neuroanesthesiology I have previously described (SNACC Newsletter, Winter, 2016). First, the observations motivating this idea are grounded in clinical neuroanesthesia (Pillar 1) and could be studied more extensively. Second, understanding precisely how subanesthetic doses of general anesthetics compromise neurological reserve relates to the fundamental neuroscience of anesthesiology (Pillar 2). Third, this research program focuses on neurological outcomes of non-neurosurgical patients (Pillar 3) and, indeed, extends beyond the operating room altogether.

This is but one “big hair audacious goal” (to co-opt a term from the business world) to which SNACC and neuroanesthesiology could aspire. Let’s start to unmask our potential by generating more of them.
Editor’s Corner

Reza Gorji, MD
SNACC Newsletter Editor

Fenghua Li, MD
Associate Editor

Welcome to another edition of the SNACC Newsletter. I hope you enjoy the articles presented in this spring issue.

Please remember that contributions for publications are welcomed and encouraged, especially from SNACC members. I am especially interested in any neuroanesthesia news that details events related to many of our members. Contributions from residents and fellows are particularly appreciated and sought after.

By Reza Gorji, MD

John F. Bebawy, MD, SNACC member and chair of the SNACC Education Committee, Associate Professor at Northwestern University Feinberg School of Medicine, has been selected to join the Physician Board at the American Health Council. He will be sharing his knowledge and expertise in Neuroanesthesia, Anesthesiology, and Neurological Surgery. CLICK HERE for the link in Globe Newswire.

Elizabeth M. Frost, MB, ChB, DRCOG, longtime SNACC member, was featured recently in the Association of University Anesthesiologists (AUA) Winter 2016 newsletter. CLICK HERE for the article on page 17 of the AUA Winter 2016 Newsletter

Members in the News

By Reza Gorji, MD

John F. Bebawy, MD, SNACC member and chair of the SNACC Education Committee, Associate Professor at Northwestern University Feinberg School of Medicine, has been selected to join the Physician Board at the American Health Council. He will be sharing his knowledge and expertise in Neuroanesthesia, Anesthesiology, and Neurological Surgery. CLICK HERE for the link in Globe Newswire.

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CALL FOR ABSTRACTS!

Abstracts are now being accepted for the SNACC 45th Annual Meeting
October 19-20 2017
Westin Boston Waterfront • Boston, Massachusetts

Abstracts will be accepted through Monday, April 24, 2017 at 3:00 pm EDT

Welcome New SNACC Members

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SNACC NEWS

SNACC NEWS

Spring 2017
An Interview with Deepak Sharma, MBBS, MD

In this edition of the newsletter, we have the pleasure of highlighting the University of Washington (Seattle) Division of Neuroanesthesiology and Perioperative Neuroscience, led by one of our own longtime SNACC members, Deepak Sharma, MD. Dr. Sharma is the Division Chief of Neuroanesthesiology & Perioperative Neurosciences and the Virginia and Prentice Endowed Professor of Anesthesiology and Pain Medicine.

By Reza Gorji, MD
SNACC Newsletter Editor

Reza Gorji: How long has the anesthesiology program been in existence? How about the neuro fellowship?

Deepak Sharma: The Department of Anesthesiology at the University of Washington, Seattle, was founded in 1960 with Dr. John J. Bonica as the First Chair. The Neuroanesthesiology Fellowship Program was first started in 1988 by Dr. Arthur M. Lam, who was then the Chief of Neuroanesthesiology at Harborview Medical Center. I took on the role of Fellowship Director in 2011. The department has trained about 35 neuroanesthesiology fellows so far.

Reza Gorji: How many candidates do you select/year? What is the ideal fellowship candidate for the program?

Deepak Sharma: We select two, sometimes three, candidates every academic year. The ideal fellowship candidate is someone who has a keen interest in neuroscience in anesthesiology with a commitment to pursue a career in academic neuroanesthesia. Our program aims to train future leaders of neuroanesthesiology and perioperative neurosciences and hence, the ideal candidate for us is someone with strong clinical skills and a keen interest in academic neuroanesthesia (preferably with some proven record). The interest/focus on academic aspects of neuroscience may be very broad ranging from clinical/basic research to education or other scholarly activities, such as healthcare quality and safety. However, we recognize the importance of training the next generation of clinical neuroanesthesiologists and also welcoming candidates with primarily a clinical interest in neuroanesthesiology. We receive a large number of applications every year. The majority of candidates applying to our program are keen on learning advanced neuromonitoring (specifically transcranial doppler ultrasonography, jugular oximetry and evoked potential providing anesthesia for neurosurgery. Our program provides the fellows excellent clinical training by exposing them to an extensive range of cases ranging from complex cerebrovascular disease (treated by open surgery, as well as, by interventional neuroradiology), functional neurosurgery, skull base surgery, major spine surgery, neurotrauma to a variety of minimally invasive advanced neurological procedures (transphenoidal pituitary surgery, robotic/laser guided ablation of seizures foci, minimally invasive spine surgery). The fellows also rotate through the Neurointensive Care Unit. We believe that it is critical for neuroanesthesiologists to acquire additional clinical neuroscience skills beyond providing anesthesia care. Therefore, the fellows undergo rotations to learn advanced neuromonitoring, specifically transcranial doppler ultrasonography, jugular oximetry and evoked potential

Recent Graduates of UW’s Neuroanesthesiology Fellowship
Top row (left to right) - Drs. Nelson Nicolas Algarra (Assistant Professor UF, Gainesville); Vijay Ramaiah (Resident, URMC, Rochester); Sabry Khalil (Faculty, Ochsner Health System, New Orleans)
Bottom row (left to right) - Drs. Rachel Kutteruf (Swedish Medical Center, Seattle); Jeffrey Fujii (Swedish Medical Center, Seattle); Umeshkumar Ashiraman (Instructor, Washington University, St. Louis)
monitoring. They also receive training in basic neuroimaging under the supervision of our neuroradiology colleagues. Besides the clinical skills, we strongly emphasize academic activity, fellows participate in journal clubs, case discussions and quality improvement activities. They are required to complete at least one research project during the fellowship and are expected to present an abstract at the SNACC Annual Meeting. We are fortunate to have several faculty who are able to provide research supervision and guidance on a variety of topics. Our Fellowship Program is a faculty-fellowship model where the fellows get some opportunity to function as faculty, supervising residents and nurse anesthetists for non-neurosurgical cases in the early part of the fellowship and neurosurgical cases toward the end of the fellowship. This is a valuable experience that allows them to function in a more responsible role, as well as, to learn to supervise and teach residents. Most importantly, we provide committed mentorship and career guidance to our fellows and assist them in finding post fellowship placements that fit best with their career goals. We maintain long-term connections with the graduates of our program and continue to work with them as they advance in their careers.

**Reza Gorji:** What are the research activities of the fellows?

**Deepak Sharma:** The fellows are required to actively lead at least one research project under the guidance of a faculty from the division. We are fortunate to have faculty with expertise in a variety of areas; hence, the fellows have the option of working on a range of topics including, but not limited to, traumatic brain injury, acute ischemic stroke, quality and safety in neuroanesthesia, cerebrovascular physiology and others. We encourage the fellows to come up with original study ideas and assist them in framing research questions. They are expected to conduct systematic literature searches, present their research plan and write an IRB application. Subsequent research activities depend on the type of project and may involve prospective enrollment of subjects or retrospective chart review/data abstraction. We provide statistical assistance to the fellows in performing data analysis and they present periodic updates on the project to get feedback from faculty. Finally, they submit abstracts and manuscripts under faculty guidance. We recognize that one year is a limited time for successfully completion of an ambitious project. Our goal is for the fellows to learn the research process, research methodology and attributes of responsible conduct of research. For the candidates applying for more than one year of fellowship, there are advanced opportunities to be involved in research.

**Reza Gorji:** Where do the fellows typically go after training completion?

**Deepak Sharma:** Our fellows have diverse placements after completion of the fellowship. Several of them work in academic departments and are actively involved in research. Many of them have assumed clinical leadership roles in their respective departments/institutions. Some have advanced in their careers as educators and serve as education leaders in their departments. Many have started neuroanesthesiology fellowship programs in their departments. Some of our fellows are also into private practice, where the demand for qualified neuroanesthesiologists seems to be steadily growing. Importantly, no matter where the fellows go after completion of training, they are all SNACC members and regularly attend the SNACC meetings. Many of them are actively involved in various SNACC committees.
By Miles Berger, MD, PhD
Duke University

Dr. William L. Young was a leading neuroanesthesiologist and scientist at UCSF who received multiple honors for his research. Dr. Young was a strong believer that there should be no limits to scientific investigation, and that anesthesiology science should be defined by the topics studied by anesthesiologists, rather than be limited to the study of anesthetic drugs. Bill embodied this philosophy via his study of the biology of cerebral aneurysms and AVMs, and his transdisciplinary collaborations with neurosurgeons and basic scientists. As a neuroanesthesiologist, he believed that understanding and treating neurovascular disorders such as AVMs and aneurysms was as much a clinical and scientific quest for him as for his neurosurgical colleagues.

I had the privilege of meeting and talking with Bill Young several times in 2008-2009, when I was a fourth year UCSF medical student applying to research track anesthesiology residency programs. During these discussions, he told me about his philosophy, as described above. As an MD/PhD student whose graduate work had unexpectedly veered from behavioral neuroscience to pancreatic development, I couldn’t help but agree wholeheartedly with his vision. Yet, one of the remarkable things about him, is that despite all of his career success, his words and tone were remarkably soft-spoken and understated compared to his powerful vision for anesthesiologist-scientists.

It is thus a great honor to receive the inaugural William L. Young Neuroscience Research Award from SNACC. Our research team at Duke studies the biology of postoperative cognitive dysfunction and delirium, using an interdisciplinary translational approach combining cognitive testing and delirium screening, CSF biochemical and cellular studies, EEG analysis, functional MRI imaging and genetic analyses. In particular, we are interested in understanding how neuro-inflammation alters neurocognitive function after surgery, and the role of specific neuro-inflammatory processes in altering brain network connectivity and cognitive processes in patients with POCD and delirium.

Of course, the study of POCD and delirium at Duke has a long and proud history, and this research has thus benefitted from consistent mentorship and solid support from Drs. Joseph P. Mathew and Mark F. Newman (our current and prior department chairs, who are also both world leaders in POCD and delirium research). Our work has also benefitted from strong support from the Duke neuroanesthesiology division chiefs (previously Dr. David McDonagh, currently Dr. Dhanesh Gupta), my neuro-anesthesiology colleague Dr. Michael “Luke” James, our vice chair of research Dr. David S. Warner, and the multidisciplinary input.
of Dr. Jeff Browndyke (a neuropsychologist and fMRI researcher), Drs. Niccolo Terrando (a laboratory-based POCD scientist) and Daniel T. Laskowitz (a neurologist and neuroscientist), and Drs. Marty Woldorff and Roberto Cabeza (both cognitive neuroscientists). Finally, this work has been made possible by the strong support of many of my anesthesiologist colleagues who have assisted in carrying out these studies, and the tireless efforts of our clinical research staff.

Emerging evidence suggests that POCD and delirium are caused by surgery and pre-existing patient factors as much as, if not more than, by anesthetic exposure. Nonetheless, we believe that it is our role as anesthesiologist-scientists to better understand the underlying biology of, and to develop treatments for, POCD and delirium. I would like to think that Bill Young would agree with this view. I also hope that in taking a transdisciplinary approach to studying POCD and delirium, we are in our own small way carrying forward the scientific approach and spirit that Bill embodied.

I am deeply grateful to all of the SNACC members who have donated to and helped to create the William Young Research Award Fund, and I encourage all SNACC members to donate to this cause again this year. To have lost Bill Young is a major scientific, clinical and personal loss for us, our field and our patients. However, by donating to the William Young Award Fund, we can help to launch the scientific careers of a new generation of “Young” neuroanesthesiologist-scientists who will carry Bill’s scientific spirit and philosophy far into the future. Sapere Aude!

References:


Presented below and going forward, the newsletter will be presenting educational material related to neuroscience, neuroanesthesia and critical care. We hope this proves educational to SNACC members. If you want to contribute materials to this section please email rgorji@gmail.com. Please make the subject line read: Neuromonitoring Case.

**What is the difference between rEEG and qEEG?**

**What is the gold standard of rEEG recording?**

Presenters: Reza Gorji, MD and Fenghua Li, MD

Answer is on page 10
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SNACC 45th Annual Meeting
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The Westin Boston Waterfront • Boston, MA

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2017 NACCS GBI and SNACC Annual Scientific Meeting
May 18-19, 2017
London, UK
CLICK HERE to register.

Education Corner Answer
from page 8
rEEG or raw EEG refers to cortical electrical signals that are unmodified. They are recorded from scalp channels. This is similar to EEG recorded in EEG laboratories where patients are referred for diagnosis. qEEG is quantitative EEG. qEEG analyzes a brief span of rEEG using Fourier transformation. Fourier transformation takes a signal and decomposes it into the various frequencies that make it. The signal is a function of time. An example that may be easier to understand is a musical chord which gets “transformed” into its individual pitches or frequencies. In neurophysiology, the signals are dissected into various sine waves. If these waves are put back together, the original rEEG would be recreated. The Fourier transformation is done so as to gain additional information from various frequencies and the power each has.

- qEEG is easier to interpret by people without expertise in electroencephalography. rEEG is more pure, in that it easily identifies seizure activity and burst suppression patterns.
- The gold standard for EEG monitoring is a 16-channel recording.
- An example of raw EEG followed by quantitative (processed) EEG.

SNACC Newsletter Schedule

PUBLICATION AND SUBMISSION DATES
Summer Issue
May 15, 2017 - Copy Deadline
Published June 15, 2017
Fall and Pre-Meeting Issue
August 15, 2017 - Copy Deadline
Published September 15, 2017
Winter Issue
November 15, 2017 - Copy Deadline
Published December 15, 2017
Spring Issue
March 15, 2018 - Copy Deadline
Published April 15, 2018

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SNACC 46th Annual Meeting
October 11-12, 2018
San Francisco, CA

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