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Neuromonitoring in the Hospital of the Future

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Intro
Over the past few decades, the anesthesia community has led the way in monitoring advancements leading to improvements in patient management and safety. However, there are still errors being made at the bedside and we are still plagued by isolated monitors that do not act within a coordinated system.

For the past five years, we have been part of the U.S. Army’s Hospital of the Future program and have been investigating ways to address some of the remaining problems with a focus on “systems of monitors.” We are working with a wide group of collaborators to help develop the Integrated Clinical Environment (ICE) standard that is being promoted by Dr. Julian Goldman and the Medical Device Plug-and-Play organization (www.MDPnP.org). This article describes some of the problems we are addressing and our approach to solving them. We are focusing our particular developments in neuromonitoring as we believe the unique requirements of this area provide the most challenging environment to carry out such a development. Much of what we are doing requires a collaborative effort, and we welcome participants.

Problems to Overcome for the Hospital of the Future
The problems we are addressing are as follows:
- **Medical device connectivity:** we need monitors to connect easily to provide a central integrated source for monitored information that can be integrated with other information.
- **Alarms:** we need multi-parametric “smart alarms” that operate with a higher specificity than those we currently use.
- **Continuity:** we would like to have continuous data from the time of injury through to the ICU.
- **Use of information:** we would like to configure our monitoring workstations with the tools and applications that adapt our system to the patient and the particular needs of the clinician.
- **Learning content:** we would like to capture the short-lived learning opportunities that exist in surgery and critical care and serve up brief, highly targeted learning modules to take advantage of these opportunities.
- **Consistency of care:** we would like to provide guidance where necessary to even out the imbalances in training or experience to increase the consistency of care.
- **Regulatory:** we need to develop such a system to ensure high quality and patient safety and to remain within regulatory expectations.

The Goal
Our work, funded by both NIH and the Army, has been to define a series of hardware and software components that can be selected and connected to create an “interoperable environment” for medical devices as well as software-based “application modules.” The inputs and outputs of each component are defined, openly available and based on published standards, where applicable. Once defined, the modules could be created by any company or institution and will permit the creation of an interoperable environment in a variety of settings.

A computer analogy is helpful in defining our end point. When purchasing accessories for your computer, you rarely have to worry whether they will connect… whether it’s a printer, scanner, camera or mobile phone. The same with software. For example, most photo processing software doesn’t care where you got the images because there is a common format for images (actually several that are easily interchanged). Similarly, in neuromonitoring, we would like all monitors to provide their data in a common format and we would like to use that data as input to independently produced software modules (e.g., multi-parametric alarms, an index of autoregulation, etc.)… very similar to how computers work. That’s the goal.

Approach to the Problem
The logical approach to this problem is to develop standards from which manufacturers could develop medical devices and other system components such that they interoperate - as in the computer analogy. Two standards stand out in their applicability to this problem: ISO/IEEE 11073, which addresses medical device connectivity and ASTM F-2761, which addresses the formation of a patient-centric, integrated clinical environment (ICE). Unfortunately, the problem is far from solved. The IEEE standard has been around for a decade or more but has seen limited adoption (and some sections are already obsolete), and the ASTM standard is in its infancy. Standards work, though necessary, is tedious, often thankless, and by nature a slow process. Thus, it will be a while before both of these standards are either updated or complete.
So how can we make progress apart from the standards work? We are working on a “bottom up” approach in parallel to the standards work. Standards development can be considered a “top down” approach since they must consider all users, applications and scenarios. They are highly consensus-based and take time. Our “bottom up” approach narrows the target to one application area (neuromonitoring) in which we develop a comprehensive, interoperable, information environment. The idea is to follow the spirit of the existing standards (adopting them where possible) and feedback what is learned to these organizations to help with the standards. We (and many others) have learned the “devil is in the details” when it comes to connecting medical devices into a coordinated system. These valuable details are often lost when standards are developed without this type of experience.

Medical Device Connectivity

Our first goal is to get devices connected so that they are speaking the same language and sending data that is identified in a common way (e.g., ventricular ICP is identified consistently by all devices). Our assumption is that we will be waiting a long time for manufacturers to adopt any uniform communications standards, so we are developing an adapter that converts the device protocol to ISO/IEEE 11073 [Figure 1]. We are also developing software that will receive the data as well as educational aids for understanding the standard.

Using a common protocol for all devices provides two advantages:

- Developers of the “receiving software” need only develop one “device driver”… that of ISO/IEEE 11073 and from then on, the system can communicate with any device that adopts this protocol, without having prior knowledge of the device. This results in “plug-and-play” an essential feature of an integrated monitoring system.

- Data is now received in a standard format and using a common terminology. For example, brain tissue oxygen would always be called “PbtO2” (or whatever is finally decided upon). The big advantage of standardizing a nomenclature is that software can be developed independently of this system that can use this data (without having to collect the data itself). Similarly, PhotoShop on a computer can use pictures from your digital camera because a common nomenclature is used for the files.

In neurocritical care we have seen several systems that collect data from monitors and then use it for various display and analysis applications (ICM+, ICUpilot, BedMaster, CNS Monitor, and others). These companies had to write the same device interfaces when what they were really focusing on were the data analysis or integration techniques. The availability of a common protocol (and adapters for those devices not adopting it) will allow such companies to focus on their areas of expertise and not be burdened with writing device drivers.
Collecting data from other sources [Figure 2] is generally easier since there are standards that exist. Images are transferred using the DICOM standard, and patient demographics and other information in the medical record is communicated via HL7. We have labeled this “component” of the system a Gateway and it corresponds to the “Network Controller” in the ICE standard terminology.

**Integrated Clinical Environment**

Once we have this patient-centric data set, the approach is to write core software (the Supervisor in Figure 3) that builds an “information architecture” around the patient. The Supervisor is written such that applications and tools can be “plugged-in” to the system and use the data collected. Thus, an “Alarm Manager” could let the user develop multi-parametric alarm strategies that would alarm with more precision than at present with every monitor acting in isolation. It would help to avoid “alarm fatigue” caused by too many false alarms and contribute to a safer environment. Knowing the status of a device (which the device adapters can provide) can help with other types of alarms such as making sure the ventilator is turned on following bypass or taking of X-rays (a rare but still occurring error that can be fatal). Other plug-ins could be decision support modules as well as practice guidelines. We call this section the Supervisor to follow the terminology in the Integrated Clinical Environment.

Many interesting functions can be carried out with an architecture as described. One, which we are investigating with NIH funding, is the linking of instructional content to guidelines or care paths. We are using an open source guideline format called Protesus in our Supervisor. We are also creating modular instructional content using a standard format called SCORM (Sharable Content Reference Model). We are using metadata on the guideline steps to link that step, with the help of a knowledge base (ontology), to reference material that you might need to carry out that step. Figure 4 shows a step in a guideline for therapeutic hypothermia where the temperature data from cooling can be superimposed on an ideal temperature profile. The buttons at the bottom are dynamically linked to content based on the keywords of that step. Since cooling is to take place, instructions are available for setting up the cooling unit. A feature such as this evens out the disparities in the training and experience of personnel and contributes to a higher consistency of care.

As mentioned before, a significant advantage with developing a modular, standards-based approach is that separate companies (or individuals) can create products for the “uses” of the information without having to worry about collecting the information. This is like developing an app for an iPhone to manage the pictures in the phone without having to build the phone itself (seems simple, but medical informatics is a bit behind the rest of technology). There are obviously some quality, safety and regulatory hurdles we may have to overcome, and we are addressing these issues in our work.

Figure 3: The right hand section illustrates the Supervisor software that permits “plug-ins” to configure the system to the needs of the clinician. Some standards (green rounded rectangles) have yet to be identified.

Figure 4: A guideline step and the instructional content linked to it
The Power of an Annotated Database

Once a continuous, comprehensive and time-synchronized data set can be collected from each patient, it can be annotated as to clinical features. The power of such a database is seen in the MIT-Beth Israel Hospital Arrhythmia Database started in the mid-’70s. The database consisted of a large number of highly annotated ECGs, and after a few years of existence became the de facto standard to which developers of arrhythmia algorithms tested their detection methods. It ushered in a quality metric for these algorithms that is now required by regulatory agencies. This database has become a national resource.

In a like manner, such a database for neurocritical care (and neuroanesthesia) could greatly aid in the validation of new metrics (alarms, detection methods, autoregulation indices, etc.). The regulatory requirements for “plug-in metrics” are, at most, uncharted, but the more proactive we can be in developing quality modules, the better.

Such a database would also be a significant research and teaching tool. There are efforts under way to collect a database such as this from Urban Ungerstedt (using ICUpilot), from Cambridge (using ICM+), and via the BrainIT group in Europe. These are commendable efforts, all with similar vision. A plea would be to adopt a common nomenclature and collection parameters (where it makes sense) or to be able to transfer the data to a standard format.

Barriers

There have been some significant barriers to adopting a unified information architecture, and one has certainly been from industry where their closed systems mean you buy everything from one vendor. This may be changing as vendors seem to be moving more toward the development of open architecture… possibly from customer demand.

The FDA is another barrier in that there is no pathway through the device approval process for such things as medical device plug-and-play. This is where vendors tests their product to a standard protocol (such as ISO/IEEE 11073) as opposed to testing every possible device connection as our company currently has to do with its multimodal data collection system.

Progress

This information architecture or similar one can address many of the problems facing clinical monitoring today. The development needs to be done in a collaborative fashion and with a wide enough consensus such that it will be adopted. Efforts are being made on several fronts such as the work on Common Data Elements project at NINDS and the database activities mentioned previously. What is needed is an effort to coordinate these activities toward a common goal.

ARE YOU


If the answer to any of these is YES!

Then SNACC needs you.

Please volunteer for the communications committee. We have needs for people with ideas and skills to bring our web page and general IT interface with members and the world into the modern era. Send me an e-mail if interested.

Andrew Kolke, M.D., M.B.A. - Vice President for Communications - andrew.kolke@uphs.upenn.edu
One benefit of SNACC membership is access to the SNACC PBLD Blog in the members’ only section of the website. The current conversation is noted below; please login to the website (http://snacc.org/blog.php) to join the conversation by submitting questions and/or comments (you will need your member username and password to access; please contact the administrative office at snacc@snacc.org if you need this information). You may also access closed blogs in the archives area of the PBLD blog webpage.

Traumatic Spinal Cord Injury - 2010-08-05
Moderator - John F. Bebawy, MD

PART I of III:

An otherwise healthy 17 year-old female is involved in an MVA, sustaining an L1 vertebral body fracture. She is paraparetic in her lower extremities by exam (head CT normal), alert and cooperative, and scheduled for an urgent lateral/posterior thoracolumbar fusion. The cervical spine was not radiologically cleared for fractures, though the patient has no point tenderness over the neck. A cervical collar is in place, which limits the mouth opening significantly. The patient will be positioned in the right lateral decubitus position for the first part of the surgery, and SSEP/TcMEP/EMG neuromonitoring will be used.

1) How will you secure the airway? Oral or nasal? Awake or asleep? Why? If awake, how will you apply topical anesthesia to the airway and what sedation will you use?

2) What agents will you use to induce this patient? Muscle relaxant? What agents will you use to maintain anesthesia? Why? Muscle relaxant?

The patient is induced and a central line and radial arterial line are placed. The arterial line is placed in the left radial artery, and the blood pressure cuff is placed on the right arm. Evoked potential stimulating and recording electrodes are placed and sensory and motor baselines are established. SSEP montages (C3-C4, Fz-C3/4, Fz-inion) are recorded for both the upper and lower extremities (median and posterior tibial nerves, respectively), and TcMEPs are recorded from all four limbs.

3) Is there a preferred side for the arterial catheter? The blood pressure cuff? The pulse oximeter? Is there any benefit to evoked potential monitoring of the upper extremities in this case?
Join Us in San Diego!

On behalf of the Officers and Board of Directors of SNACC, I invite you to attend the 38th Annual SNACC Meeting on October 14-15, 2010 in San Diego, California. ‘Excited about the program’ is an understatement because, in a year that has brought exciting change with the launch of a new name, logo, newsletter format, and website, this promises to be one of the best SNACC meetings to date.

The meeting will be packed with old favorites and new sessions. Friday will remain the official day of the SNACC Annual Meeting but, in addition, we are offering 3 workshops on Thursday afternoon prior to the Dinner Symposium.

Due to the overwhelming success of last year’s Neuromonitoring Workshop (which sold out weeks before the meeting), this year Antoun Koht and Tod Sloan have organized two state-of-the-art Neurophysiologic Monitoring workshops (Basic and Advanced Level offerings). As before, there will be a modest fee to participate.

New this year is a Mentoring Workshop planned by Deborah Culley and the Committee on Scientific Affairs. This Workshop, which will feature a “speed mentoring” format, is directed toward Fellows and new faculty and boasts a cast of luminaries in academic anesthesiology as speakers and mentors. This Workshop will be free to those registering for the SNACC Annual Meeting (or for a fee for those wishing to attend just this Workshop). However, space in the Workshop will be limited and potential participants are required to apply by submitting a current CV and a 250-word statement of career interests and goals to snacc@snacc.org.

Martin Smith has organized our annual Pre-Meeting Dinner Symposium on “Translating Clinical Research into Clinical Practice: Opportunities and Barriers”. This is intended to be a candid and practical look at clinical research from newer as well as established physician investigators. You’ll get insight into how and why some people and projects succeed and what you can do to improve your chances of getting clinical research projects up and going. As always, this Dinner Symposium will be complimentary for SNACC members. Advanced registration by September 20th is required, however, and space is limited so please register early.

The main event is our Annual Meeting on Friday. This exciting program was organized by Ansgar Brambrink and includes sessions on Applied Neuroscience - Functional Brain Surgery; Neurocritical Care – Current Controversies in the Per operative ICU Management of Neurosurgical Patients (hosted jointly by SNACC and the Neurocritical Care Society); a Journal Club (presented by the original authors) highlighting some of the year’s most interesting articles in applied neuroscience, neuroanesthesia, and neurocritical care; the Michenfelder New Investigator Award oral presentation; and two moderated poster sessions showcasing the current research in our field.

The meeting on Friday also includes the Annual Business Luncheon and Award Presentations, opportunities to visit with exhibitors, and a concluding Wine and Cheese Reception.

Please mark your calendars now because this is one Annual SNACC meeting you don’t want to miss! You can find more information about the Annual Meeting at our website: www.snacc.org. I look forward to seeing you in beautiful San Diego in October.

Sincerely,
Gregory Crosby, M.D.
SNACC President
Pre-Meeting Workshops* - Thursday, October 14

Concurrent Workshop Sessions

Sapphire Ballroom D  2:00 – 5:15 p.m.  SNACC Mentoring Workshop
(this session is limited to 25 participants)
Co-Moderators: Adrian W. Gelb, M.B.,B.Ch., F.R.C.P.C., D.A.; Deborah J. Culley, M.D.
Mentors: William Armstead, Ph.D.; Ansgar M. Brambrink, M.D., Ph.D.; Gregory J. Crosby, M.D.;
Karen B. Domino, M.D., M.P.H.; Kristin R. Engelhard, M.D., Ph.D.; Adrian W. Gelb, M.B.,B.Ch;
Cor J. Kalkman, M.D., Ph.D.; Arthur Lam, M.D.; William L. Lanier, Jr., M.D.; Piyush M. Patel, M.D.;
Steven L. Shafer, M.D.; Martin Smith, M.B.B.S., F.R.C.A; Sulpicio G. Soriano, M.D.; Michael M. Todd, M.D., M.B.A., Ph.D.; Monica S. Vavilala, M.D.; Christian P.
Werner, M.D.; William L. Young, M.D.; Zhiyi Zuo, M.D., Ph.D.

2:00–2:30 p.m.  Mentorship for Clinical Research
Steven L. Shafer, M.D., Columbia University Medical Center, New York, NY

2:30-3:00 p.m.  Philosophy and Application of Academic Mentoring
William L. Lanier, Jr., M.D., Mayo Clinic College of Medicine, Rochester, MN

3:00-4:00 p.m.  Speed Mentoring with the Academically “Rich and Famous”
This will be an interactive session where junior faculty members (Assistant Professor level or below) will have the opportunity to interact with multiple accomplished academically active neuroanesthesiologists for individual 5-minute sessions.

4:15-5:15 p.m.  Networking Hour
Junior faculty members have the opportunity to interact with peers and mentors.

* Opportunities for Q&A will be provided throughout the workshop and at the conclusion of each presentation.
Pre-Meeting Workshops* - Thursday, October 14

**Sapphire Ballroom M** 2:00 – 5:15 p.m.  
**Neurophysiologic Monitoring Workshop – Basic Level**  
(this session is limited to 30 participants)  
Co-Directors: Antoun Koht, M.D.; Tod B. Sloan, M.D., M.B.A., Ph.D.  
Workshop Faculty: Linda Aglio, M.D.; Marc J. Bloom, M.D., Ph.D.; Laura B. Hemmer, M.D.; Thomas N. Pajewski, M.D., Ph.D.; Gerhard E. Schneider, M.D.; Christoph N. Seubert, M.D., Ph.D.; J. Richard Toleikis, Ph.D.; Kenneth J. Van Dyke, M.D.  
2:00-4:00 p.m.  
Workshop Stations  
(30 minutes at each of the 4 stations):  
1) SEP, 2) MEP, 3) EMG/Pedicle Screws/EEG, and 4) BAEP  
4:15-5:15 p.m.  
Interactive Session and Q&A

**Sapphire Ballroom I** 2:00 – 5:15 p.m.  
**Neurophysiologic Monitoring Workshop – Advanced Level**  
(this session is limited to 20 participants)  
Co-Directors: Antoun Koht, M.D.; Tod B. Sloan, M.D., M.B.A., Ph.D.  
Workshop Faculty: Leslie Jameson, M.D.; Daniel J. Janik, M.D.; Antoun Koht, M.D.; Tod B. Sloan, M.D., M.B.A., Ph.D.  
2:00–2:30 p.m.  
Anesthesia & Intraoperative Monitoring  
(Lecture/Discussion)  
2:30-3:00 p.m.  
Intraoperative Monitoring for the Head  
(Lecture/Discussion)  
3:00-3:30 p.m.  
Intraoperative Monitoring for the Spine  
(Lecture/Discussion)  
3:45-4:45 p.m.  
Interactive Session  
4:45-5:15 p.m.  
Questions & Answers

This Neurophysiologic Monitoring Workshop CME activity is supported by an educational grant from Cadwell.  
Cadwell provided 3 EP machines

* Opportunities for Q&A will be provided throughout the workshop and at the conclusion of each presentation.
Pre-Meeting Dinner Symposium** - Thursday, October 14

6:00-9:00 p.m.

Dinner Symposium:
Translating Clinical Research into Clinical Practice: Opportunities and Barriers
Panel Chair: Adrian W. Gelb, M.B.B.Ch., F.R.C.P.C.
Panel lecture/discussion regarding how excellent clinical research impacts on the everyday practice of neuroanesthesia and neurointensive care and to identify future opportunities and barriers.

6:00-6:30 p.m. Reception
6:30-7:30 p.m. Dinner
7:30-9:00 p.m. Symposium: Translating Clinical Research into Clinical Practice: Opportunities and Barriers
7:30 - 7:35 p.m. Welcome and Introduction (Martin Smith, M.B.B.S., F.R.C.A.)
7:35 - 8:30 p.m. Presentations
8:30 – 9:00 p.m. Panel Discussion

Moderator
Adrian W. Gelb, M.B.B.Ch., D.A., F.R.C.P.C., Professor & Vice Chair, Department of Anesthesia & Perioperative Care, University of California San Francisco, San Francisco, CA

Speakers
A Beginner’s Perspective: How to Get Started
M. Luke James, M.D., Assistant Professor, Department of Anesthesiology, Duke University, Durham, NC

The Calculus of Faculty Research: Choosing an Investment, Expecting Returns
Mark F. Newman, M.D., Professor and Chair, Department of Anesthesiology, Duke University, Durham, NC

Conducting Excellent Clinical Research: Think Big, Act Small
Michael M. Todd, M.D., Professor and Chair, Department of Anesthesia, University of Iowa Carver College of Medicine, Iowa City, IA

Establishing a Balanced Funding Portfolio; Past Performance is Not a Guarantee of Future Returns
William L. Young, M.D., James P. Livingston Professor and Vice-Chair, Research, Dept. of Anesthesia and Perioperative Care, Professor of Neurological Surgery and Neurology, University of California San Francisco, San Francisco, CA

Additional Panel Members
Deborah J. Culley, M.D., Assistant Professor, Harvard Medical School, Department of Anesthesiology, Perioperative Pain and Medicine, Brigham and Women’s Hospital, Boston, MA
Cor J. Kalkman, M.D., Ph.D., Professor of Anesthesiology / Research Chair, Department of Anesthesiology, UMC Utrecht, Utrecht, Netherlands

** Seating is limited; registration must be made by deadline date – onsite registration for this session is not available. This pre-meeting dinner symposium is provided complimentary to pre-registered members; a registration fee for non-members is required.
SNACC 38th Annual Meeting Program Schedule - Friday, October 15

Sapphire Ballroom OPKL  7:00 - 7:45 a.m.  Breakfast and Registration

Sapphire Ballroom OPKL  7:55 - 8:00 a.m.  Welcome Address
Gregory J. Crosby, M.D., SNACC President, Harvard Medical School, Brigham and Women’s Hospital, Boston, MA

Sapphire Ballroom OPKL  8:00 - 10:15 a.m.  Symposium on Applied Neuroscience: Functional Brain Surgery
Moderator: Ansgar M. Brambrink, M.D., Ph.D., Oregon Health & Science University, Portland, OR

8:00 - 8:25 a.m.  Scientific Background and Current Techniques
Kim J. Burchiel, M.D., Oregon Health and Sciences University, Portland, OR

8:25 - 8:50 a.m.  From The Laboratory to the Bedside: Pathomechanism-Based Therapy of Parkinson Disease
Jerrold L. Vitek, M.D., Ph.D., University of Minnesota, Minneapolis, MN

8:50 - 9:15 a.m.  Future Therapeutic Opportunities and Approaches
Jamie M. Henderson, M.D., Stanford University Medical Center, Stanford, CA

9:15 - 9:40 a.m.  Challenges for the Anesthesiologist
Karen B. Domino, M.D., M.P.H., University of Washington, Seattle, WA

9:40 - 10:15 a.m.  Discussion with the Panelists
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| Sapphire OPKL     | 10:15 - 10:45 a.m. | Poster Session Announcement  
Laszlo Vutskits, M.D., Ph.D., University of Geneva Medical School, Geneva, Switzerland |
| Sapphire H        | Coffee Break  |                                                                     |
| Sapphire CGH      | 10:45 a.m. - Noon | Poster Session 1: Walk-around with Moderators                        |
| Sapphire D        | Noon - 1:15 p.m. | Business Lunch and Award Presentations                              |
| Sapphire Ballroom OPKL | 1:15 - 1:30 p.m. | 2010 John D. Michenfelder New Investigator Award Oral Presentation  
Moderator, Zhiyi Zuo, M.D., Ph.D., University of Virginia, Charlottesville, VA |
| Sapphire Ballroom OPKL | 1:30 - 3:00 p.m. | Symposium on Neurocritical Care – Current Controversies  
Regarding Perioperative ICU Management of Neurosurgical Patients  
Hosted by NCS and SNACC  
Moderators: Michael J. Souter, M.B., Ch.B., D.A., FRCA, University of Washington, Seattle, WA  
Neeraj Badjatia, M.D., M.S., Columbia University Medical Center, New York, NY |
|                   |               | 1:30 - 1:55 p.m. Transfusion Targets for the Brain  
Andrew M. Naidech, M.D., MSPH, Northwestern University, Chicago, IL |
|                   |               | 1:55 - 2:20 p.m. Evidence Based Hemodynamic Management  
After Neurological Injury  
Miriam Treggiari, M.D., University of Washington, Seattle, WA |
|                   |               | 2:20 - 2:45 p.m. Decompressive Craniectomy - Does it Work?  
William M. Coplin, M.D., FCCM, Wayne State University, Detroit, MI |
|                   |               | 2:45 - 3:00 p.m. Discussion with the Panelists                     |
| Sapphire OPKL     | 3:00 - 3:30 p.m. | Poster Session Announcement  
Jeffrey Pasternak, M.D., Mayo Clinic College of Medicine, Rochester, NY |
| Sapphire H        | Coffee Break  |                                                                     |
| Sapphire CGH      | 3:30 - 4:45 p.m. | Poster Session 2: Walk-around with Moderators                      |
### SNACC 38th Annual Meeting Program Schedule - Continued

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| 4:45 - 6:00 p.m. | **SNACC Journal Club – Interesting Recent Articles in Neuroanesthesia and Neurocritical Care**  
(Presented by Original Authors)  
Moderator: Deborah J. Culley, M.D., Harvard Medical School, Brigham and Women's Hospital, Boston, MA  
4:45 - 4:55 p.m. | Overview of Trends in Practice and Major Morbidity/Mortality  
Deborah J. Culley, M.D., Harvard Medical School, Brigham and Women's Hospital, Boston, MA  
4:55 - 5:10 p.m. | Intraoperative Hypothermia or Supplemental Protective Drug and Neurologic Outcomes in Patients Undergoing Temporary Clipping during Cerebral Aneurysm Surgery  
(Anesthesiology, 2010)  
Bradley J. Hindman, M.D., University of Iowa Carver College of Medicine, Iowa City, IA  
5:10 - 5:25 p.m. | Safety and Efficacy of Intensive Insulin Therapy in Critical Neurosurgical Patients  
(Anesthesiology, 2009)  
Federico Bilotta, M.D., Ph.D., Policlinico Umberto I, University of Rome, “La Sapienza,” Rome, Italy, Albert Einstein College of Medicine, Yeshiva University, The Bronx, New York, New York  
5:25 - 5:40 p.m. | Association of Perioperative Risk Factors and Cumulative Duration of Low Bispectral Index with Intermediate-term Mortality after Cardiac Surgery in the B-Unaware Trial  
(Anesthesiology, 2010)  
Michael S. Avidan, M.B., B.Ch., F.C.A.S.A., Washington University School of Medicine, St. Louis, MO  
5:40 - 6:00 p.m. | Discussion with the Panelists  
Sapphire Ballroom OPKL 6:00 - 6:10 p.m. | Closing Remarks  
Gregory J. Crosby, M.D.  
Sapphire Ballroom CDGH 6:10 - 7:40 p.m. | Wine and Cheese Reception  
* Opportunities for Q&A will be provided at the conclusion of each presentation.  
Sapphire Ballroom OPKL 6:00 - 6:10 p.m. |  
Closing Remarks  
Gregory J. Crosby, M.D.  
Sapphire Ballroom CDGH 6:10 - 7:40 p.m. | Wine and Cheese Reception  
* Opportunities for Q&A will be provided at the conclusion of each presentation.
MEETINGS AND WORKSHOPS

THE SOCIETY FOR NEUROSCIENCE IN ANESTHESIOLOGY AND CRITICAL CARE

WOULD LIKE TO THANK THE FOLLOWING SUPPORTERS OF THE SNACC 38TH ANNUAL MEETING:

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Integra is a leading provider of systems used in neurosurgery, neuromonitoring, neuro-trauma, and related critical care. We offer products for monitoring intracranial pressure; Camino® ICP monitor and metabolic activity LICOX® brain tissue oxygen monitoring system and equipment for drainage of excess cerebral spinal fluid AccuDrain™ and LimiTorr™ External Ventricular Drainage Systems.

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The Medicines Company focuses on advancing treatment of critical care patients by delivering innovative, cost-effective medicines to the worldwide hospital marketplace marketing Angiomax® in the U.S. and other countries and Cleviprex® injectable emulsion in the U.S.
SNACC Breakfast Panel at the ASA Annual Meeting*

This ASA Breakfast Panel Session is not a part of the SNACC Annual Meeting; to attend you must register through ASA meeting registration. Please check the ASA website for any changes to the location of this ASA session.

The SNACC Breakfast Panel will be presented at the ASA Annual Meeting on:
Monday, October 18, 2010, 7:00AM-8:15AM
San Diego Convention Center-Upper 10

Anesthetic Neurotoxicity in Children: What Do We Tell the Parents?
Moderator: Gregory Crosby, M.D.
Department of Anesthesia Harvard Medical School Brigham and Women’s Hospital, Boston, Massachusetts

Description: Anesthesiologists, parents, the FDA, and the popular media are alarmed about the possibility that general anesthetics might harm the brain of young children. This panel will examine whether the concern is justified. The panelists will discuss the preclinical science that sounds the alarm, recent clinical studies that enlighten the debate, and the difficulties and challenges of extrapolating this information to everyday clinical anesthetic practice.

The Preclinical Science: A Rich Story
Faculty: Laszlo Vutskits, M.D., Ph.D.
Geneva, Switzerland

The Clinical Science: A Recent Story
Faculty: Randall P. Flick, M.D.
Chair, Division of Pediatric Anesthesiology,
Medical Director,
Mayo Eugenio Litta Children’s Hospital,
Rochester, Minnesota

Can/Should We Believe It?
Faculty: Sulpicio G. Soriano, M.D.
Department of Anesthesia
Harvard Medical School
Boston, Massachusetts
Copied below is the ASA Neurotrack schedule, as of September 27, 2010. You can search for specific elements at http://www2.asahq.org/web/index.asp. Click on the “Search Sessions” tab, and then select “Neuroanesthesia (NA)” from the “Learning Track” search selection box, then click on the “Search” button. If you want more detail for each, click on event title and you get all presenters, meeting location and objectives.

The summary of the lineup is:

Panels:
- Anesthetic Neurotoxicity in Children: What Do We Tell the Parents?
- Neurosurgical Emergencies
- Anesthesia for Functional Neurosurgery
- POCD Across the Surgical Spectrum: Different Risks, Common Lessons
- Rebuilding the Central Nervous System after Injury (Translational Science)

PBLD:
- Patient With Rheumatoid Arthritis for Cervical Spine Surgery
- The Disappearing Waveforms: Cervical Spine Surgery With Evoked Potential Monitoring
- Child With Polytrauma: Emergent Laparotomy or Crash Craniotomy or ORIF Compound Fractures?
- Acute Subarachnoid Hemorrhage: Anesthetic Management of Endovascular Aneurysm Coiling
- Awake Craniotomy in a Patient With Obstructive Sleep Apnea
- Management of Acute Ischemic Stroke. What Does Anesthesia Have To Do With It?
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- Postoperative Ulnar Nerve Dysfunction - Could I Have Done Something To Prevent It?
MEETINGS AND WORKSHOPS

Point - Counter Point:
- Anesthetics and Neuroprotection

Refresher Courses:
- Evaluation and Management of the Patient With Carotid Artery Disease
- Intracranial Aneurysm Patients: Evaluation and Management
- Neuroanesthesia: Pharmacology and Physiology That Really Matters
- Preventing CNS Complications During Anesthesia and Surgery
- Boomer Brain and Beyond: Implications for You and Your Patients
- Management of Patients Undergoing Spine Surgery
- Adult Head Injury: Management Update and Controversies
- Fluids and Metabolic Management in the Neurosurgical Patient

Scientific Papers – Oral Presentations:
- CLINICAL NEUROSCIENCES: Outcome and Complications
- EXPERIMENTAL NEUROSCIENCES: Neurotoxicity

Scientific Papers – Poster Discussions:
- CLINICAL NEUROSCIENCES: Outcome and Complications
- CLINICAL NEUROSCIENCES: Monitoring the Central Nervous System
- CLINICAL NEUROSCIENCES - Cerebral Blood Flow, Metabolism and Protection
- EXPERIMENTAL NEUROSCIENCES: Neuroprotection and Regeneration
- EXPERIMENTAL NEUROSCIENCES: General Anesthetic Mechanisms/Synapses, Networks and Systems
- EXPERIMENTAL NEUROSCIENCES: Monitoring the CNS, CBF and Metabolism
- EXPERIMENTAL NEUROSCIENCES: Outcome and Complications
- EXPERIMENTAL NEUROSCIENCES: Depth of Anesthesia Monitoring
- EXPERIMENTAL NEUROSCIENCES: CNS Ischemia and Injury
- EXPERIMENTAL NEUROSCIENCES: Neuroprotection and Regeneration
- EXPERIMENTAL NEUROSCIENCES: Neurotoxicity
# MEETINGS AND WORKSHOPS

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The SNACC Distinguished Service Award honors a career neuroanesthesiologist and/or neuroscientist who has made substantial lifetime contributions to the specialty of neuroanesthesia and critical care and to the larger anesthesiology community as a whole.

2009  Michael M. Todd, MD
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2003  John D. Michenfelder, M.D.
2002  Harvey M. Shapiro, M.D.
2001  Maurice Albin, M.D.

Teacher of the Year Award
The SNACC Teacher of the Year Award was created to recognize and encourage outstanding teaching of healthcare professionals in the areas of neuroscience, neurosurgical anesthesia and neuro-critical care.

2009  Arthur M. Lam, M.D.
2008  Eberhard Kochs, M.D., Ms.C.
2007  John C. Drummond, M.D.
2005  David S. Smith, M.D., Ph.D.

John D. Michenfelder New Investigator Award
The SNACC John D. Michenfelder New Investigator Award is presented annually to the resident, fellow or starting junior faculty whose research exemplifies the Society’s mission of improving the art and science of neurosurgical anesthesia, and the care of the critically ill, neurologically impaired patient.

2009  Michael L. James, M.D., Assistant Professor of Anesthesiology, Duke University, Durham, NC
“Brain Natriuretic Peptide Improves Long-Term Functional Recovery After Acute CNS Injury in Mice”

2008  Alexander Zlotnik, M.D., University of Washington, Department of Anesthesiology, Seattle, WA
“Effect of Maleate on Blood Scavenging Activity and Neurological Outcome in Closed Head Injury in Rats.”

2007  Andrew V. Dao, M.D., VA Medical Center, University of California, San Diego, CA
“Effect of Dexmedetomidine on CBF Velocity, Cerebral Metabolic Rate and CO2 Response in Normal Humans”

2006  Ines P. Koerner, M.D., Ph.D., Oregon Health and Science, University, Portland, OR
“Polymorphisms in the Human Soluble Epoxide Hydrolase Gene (EPHX2) Linked to Neuronal Survival after Ischemic Injury”

2005  Chanannait Paisansathan, M.D., University of Illinois at Chicago, Chicago, IL
“CSF S100B Related to Vasospasm in Patients Undergoing Intracerebral Aneurysm Clipping Surgery”

2004  Olaf L. Cremer, M.D., University Medical Center, Utrecht, The Netherlands
“Effect of Intracranial Pressure Monitoring and Targeted Intensive Care on Functional Outcome after Severe Head Injury”

2003  Satoki Inoue, M.D., Nara Medical University, Kashihara, Nara, Japan
“Isoflurane and Caspase 8 Inhibition Reduce Cerebral Injury in Rats Subjected to Focal Cerebral Ischemia”

2002  Kirstin E. Erickson, M.D., Mayo, Rochester, MN
“Anesthetic Technique Influences Brain Temperature, Independent of Core Temperature, During Craniotomy in Cats”
2009-10 Officers

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<td>John D. Michenfelder, M.D.</td>
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<td>1975-76</td>
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