AUA
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Update
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Contents

ASA President Update
AUA 2013: 'Advancing the Practice, Securing the Future'

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American Society of Anesthesiologists

The practice of medicine and the delivery of health care will be a primary concern in the eyes of the American public this year and perhaps for many years to come. As we embark on the many challenges and opportunities ahead, the American Society of Anesthesiologists (ASA) continues to pursue its mission to "Advance the Practice and Secure the Future." The two central strategies of ASA are advocacy and education.

Our advocacy efforts are led by a very capable team. Our ASA Director of Congressional Advocacy, Manuel Bonilla, heads up many of our initiatives in Washington, D.C. Front and center is the preservation of anesthesia value in the Medicare arena. Currently, anesthesiologists are paid less than 33 percent of the rate paid by most commercial carriers. Therefore, much of our effort is focused on advocating for better payments for anesthesia-related services in the Medicare and Medicaid programs. There have also been ill-conceived policies adopted by the Centers for Medicare & Medicaid Services (CMS), such as allowing payment for pain medicine services provided by nurse anesthetists. Despite a vigorous and vocal response to this proposal, officials at CMS have allowed the payment for pain medicine services to nonphysicians (CRNAs). We continue to pursue other avenues to remedy this violation of the practice of medicine. Other priorities include reviewing the tsunami of regulations emerging from the adoption of the Affordable Care Act, truth and transparency legislation, and rural changes allowing for equity in payment for services provided in rural settings.

Drug shortages continue to be a prominent struggle for all anesthesiologists. ASA continues to be a leader in efforts to address this issue thorough convening coalitions and interacting with FDA officials. Though legislation and executive orders have been passed to address this critical problem, there is still more definitive action required. Most recently, ASA has formally supported a study to be conducted by the Government Accountability Office, looking for causes and potential remedies to the problem.


John M. Zerwas, M.D

> "Education is the other central pillar of the ASA strategic direction. Through annual surveys of our membership, ASA continually refines and updates its numerous educational opportunities. There are currently more than 140 education products available through the ASA's Education Center."

The ASA Political Action Committee (ASAPAC) celebrated another record year in 2012, raising more than $1.83 million dollars. Through your generous contributions, ASAPAC continues to be the largest physician PAC in the country. If you're not a member, I highly encourage you to get on board.

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SAB Report:
Anesthetic Toxicity in the Developing Brain: An Update

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Millions of infants and young children undergo anesthesia and sedation annually for a variety of diagnostic and therapeutic procedures that are in some cases lifesaving, but in all cases to enhance the health status and quality of life for these young patients. Morbidity and mortality in pediatric anesthesia have declined dramatically, just as in the adult population. However, in recent years there has arisen another concern for anesthesia in infants and children. In the Winter 2012 issue of the AUA Newsletter "SAB Report," Dr. Pamela Flood identified anesthetic neurotoxicity in the developing brain as one of the "Big Questions for Anesthesiology." As chief of a large pediatric anesthesia department frequently answering questions from parents and surgeons, and as a clinical researcher in this area, I could not agree more. This article will update some of the recent developments in animal and human research and identify some future directions in this field.

Animal Studies

In 1999, Ikonomidou et al.[1] reported in Science that ketamine, an N-methyl-D-aspartate (NMDA) antagonist, caused widespread neuroapoptosis in multiple brain regions in 7-day-old neonatal rats. This report received little attention in the anesthesia community, but a 2003 study by Jevtovic-Todorovic et al.[2] found that commonly used gamma-aminobutryic (GABA) agonist anesthetics, including isoflurane, midazolam and N_2O, produce widespread neuroapoptosis in neonatal rats and also produce persistent memory and learning impairment lasting into adulthood. This study gained widespread attention and is considered to be the seminal study to launch the past decade's intense investigation into the problem of anesthetic neurotoxicity in the developing brain.

Several hundred published studies have now confirmed the finding that all commonly used NMDA antagonist and GABA agonist anesthetics and sedatives produce a similar widespread neurodegeneration in fetal and neonatal animal models accompanied by longer-term neurobehavioral problems in all species tested to date, including rodent, sheep and now subhuman primates.[3] Brambrink et al.[4] reported that five hours of isoflurane exposure at 0.7-1.5 percent end-tidal concentration in neonatal rhesus macaques produced a 13-fold increase in neuroapoptosis by activated caspase-3 staining. All regions of the cerebral cortex were affected, with layers II and V of the primary visual cortex most severely. They also reported that five hours of ketamine exposure to neonatal or fetal rhesus macaques produced similar widespread neuroapoptosis; four times greater than control for neonatal brains and five times greater for fetal brains.[5] The pattern of apoptosis was different, predominantly basal ganglia in the neonatal brain versus frontal cortex and thalamus in the fetus. Finally, Paule et al.[6] demonstrated that the neurodegeneration caused by ketamine exposure in neonatal rhesus monkeys results in long-term problems in learning to perform the Operant Test Battery, a well established series of neurobehavioral tests in this species, out to three years after exposure.


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An important limitation of nearly all published animal neurotoxicity models is the lack of a surgical or painful stimulus in the model; thus the contribution of the stress response, inflammation and undertreated pain from surgical trauma is not thoroughly represented. Both Anand et al.[7] and Liu et al.[8] demonstrated in a neonatal rat model of repetitive inflammatory pain that untreated pain results in widespread neuroapoptotic changes. Ketamine at either sedative or anesthetic doses reduces this neuroapoptosis to baseline levels. However, Shih et al.[9] and Shu et al.[10] found that surgical stimulation either did not affect, or in fact increased, neuroapoptosis and neurobehavioral defects in neonatal rats, with the inflammatory response to surgery potentially playing an important role.

Shih et al.[9] demonstrated that an enriched living environment ameliorates the long-term neurobehavioral changes after neonatal rat exposure to sevoflurane. Enriched housing consisted of a larger area than standard housing with access to a running wheel, tunnels, toys and free access to other rats in the enriched environment. The enriched environment was maintained throughout the period of testing and resulted in reversal of sevoflurane's effects on short-term memory and improved many tested aspects of cognitive function to normal or near-normal values.

Mechanisms of Anesthetic Neurotoxicity

The mechanisms of increased neuroapoptosis and downstream synaptogenic effects after binding of GABA agonist and NMDA antagonist anesthetics are complex and just beginning to be understood. Lemkuil et al.[11] demonstrated in neuronal tissue culture and animal model that isoflurane inhibits formation of mature brain-derived neurotrophic factor (BDNF), and its precursor proBDNF activates the p75 neurotrophin receptor, which in turn induces apoptosis and actin cytoskeletal depolymerization. The result was a decrease in neuritic process development, leading to decrease in synaptic formation,

evidenced by a reduction in dentritic filopodal spines. This important line of investigation demonstrated that, in addition to widespread neuronal death, GABA receptor activation by isoflurane significantly reduces synapse formation crucial in the period of rapid synaptogenesis in the developing brain. Briner et al.,[12] in a paper with dramatic electron photomicrographs, demonstrated that propofol has a similar effect inhibiting dendritic spine formation in neonatal rats.

Sanchez et al.[13] demonstrated that N_2O, isoflurane and midazolam anesthesia in neonatal rats impairs mitochondrial morphogenesis, evidenced by decrease in density, enlargement, impairment in structural integrity, decrease in complex IV electron chain activity, and decrease in their regional distribution in presynaptic neuronal profiles.

Human Studies

Despite the reproducible effects of all GABA and NMDA binding anesthetics in animal models and tissue culture in hundreds of publications, demonstrating adverse neurodevelopmental effects of anesthetic exposure in infancy in humans has proven to be difficult. The phenotype of subtle neurodevelopmental problems, including intelligence, behavior, learning, memory and fine motor deficits, is difficult to recognize clinically; and in fact it was the animal studies that brought anesthetic neurotoxicity to the attention of clinical anesthesiologists. In addition, the developing infant will require years to be able to be assessed with neurobehavioral testing instruments that have the capacity to evaluate the multiple domains required. To date, almost all published studies in humans have been retrospective in nature, and the neurobehavioral outcomes have not been determined by prospective, formal neurodevelopmental testing. Outcomes have included standardized school test results, diagnosis of neurobehavioral disorders found in state Medicaid databases, and diagnosis of learning disability after teacher referral for standardized testing. One recent study demonstrating an adverse effect of anesthetic exposure did have prospective neurodevelopmental assessments; however, this patient cohort was not originally designed to assess anesthetic neurotoxicity.[14]

> "An important limitation of nearly all published animal neurotoxicity models is the lack of a surgical or painful stimulus in the model; thus the contribution of the stress response, inflammation and undertreated pain from surgical trauma is not thoroughly represented."

DiMaggio et al.[15] performed a Bayesian meta-analysis of six retrospective cohorts with more than 20,000 patients, including exposed and unexposed patients; all exposed patients had anesthesia at age 4 years or less. Unadjusted odds ratio for an adverse neurobehavioral outcome with any anesthesia exposure was 1.9 (95 percent confidence interval 1.2-3.0); and the odds ratio after risk adjustment with six factors was 1.4 (95 percent CI 0.9-2.2). Of the six cohorts, three demonstrated an odds ratio excluding 1.0 for the 95 percent CI, and three did not.

Prospective studies designed to assess the association of anesthetic exposure include the PANDA study, a multicenter, ambidirectional study design identifying children exposed to a single anesthetic for hernia repair at less than 3 years of age. At age 8-15, a battery of neuropsychological tests designed to assess multiple domains is administered. Control unexposed patients consist of a sibling of the exposed patient who is within 3 years of the same age. Sun et al.[16] reported on the first 28 sibling pairs, and although the study was not powered to detect a difference between exposed and unexposed siblings, the investigators demonstrated 96.7 percent success in obtaining all required data and confirmed that the proposed sample size for the full study of 500 sibling pairs is appropriate.

Finally, the GAS study is a multicenter international study of infant inguinal hernia repair, randomizing patients to standard general anesthetic techniques versus regional anesthesia alone: spinal or caudal anesthesia.[17] Approximately 700 patients were required to determine a five-point difference in full scale IQ at age 5 years. Enrollment is nearly complete as of this writing, and the results of the neurodevelopmental evaluations at age 2 years should be available in 2014 or 2015.

Thus, although published studies to date have not conclusively demonstrated an effect of anesthetic exposure in humans, the retrospective data so far are concerning for such an effect. Separating the effect of the anesthetic drugs from the effects of surgery, pre-existing conditions, socioeconomic and genetic factors is problematic, and well designed prospective clinical research is needed.

Future Directions

Recent research has assessed approaches to ameliorate the neuroapoptotic injury in animal models. Although less studied than the GABA and NMDA agents, opioids and dexmedetomidine (alpha-2 presynaptic receptor agonist) do not appear to produce neuroapoptosis in animal models in clinical dosing ranges. Dexmedetomidine in particular may be a promising adjunct to general anesthesia, or primary technique for sedation, because of its ability to reduce doses of volatile anesthetics during a balanced technique. In addition, dexmedetomidine prevents the neuroapoptosis and long-term neurobehavioral effects of isoflurane in a neonatal rat model.[18]

The dopamine agonist pramipexole, approved for treatment of Parkinson's disease, also blocks permeability transition pores, restores the integrity of mitochondrial membranes and limits reactive oxygen species production. Boscolo et al.[19] demonstrated that pramipexole restores mitochondrial integrity and abolishes anesthesia-induced cognitive impairment by N_2O, isoflurane and midazolam in a neonatal rat model.

The SmartTots organization is a public-private partnership of the FDA, International Anesthesia Research Society, Society for Pediatric Anesthesia, and American Academy of Pediatrics. SmartTots has funded two research grants for clinical studies in anesthetic neurotoxicity and has recently announced a doubling of research funding for two more larger grants. SmartTots has

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EAB Report:
Milestones and NAS (Next Accreditation System)

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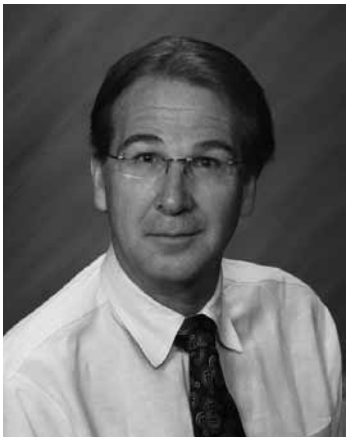
Anesthesiology residency program directors are beginning to prepare for NAS – the abbreviation used by the Accreditation Council for Graduate Medical Education (ACGME) for the **Next Accreditation System**. The NAS will include less frequent site visits with an expectation that accreditation will be a continuous process.

One of the most noteworthy changes in the NAS is that residency programs will evaluate educational outcomes rather than just the educational process. Programs will not only be responsible for evaluating resident educational outcomes but also reporting these to the ACGME as part of the accreditation system. The standardization of educational outcomes through the development of milestones in each of the competencies is currently under way. In anesthesiology, these milestones have been developed and are under review by program directors. Each milestone includes five performance levels from entry to advanced level. Each competency includes various subcategories. For example, the educational outcomes in professionalism include eight to 12 subcategories. For seven specialties, in Phase I of the milestones process, programs will be expected to implement these milestones beginning in July 2013. For anesthesiology and other Phase 2 specialties, the NAS and associated milestones will begin in July 2014.

The process of setting milestones for knowledge in anesthesiology is likely to be more easily achieved than for the other competencies. The knowledge expectations of an anesthesia consultant are relatively well defined, and a variety of reliable and valid methods exist to measure knowledge. The American Board of Anesthesiology (ABA) will begin transitioning to a staged Part I (Basic and Advanced) examination for residents who start their CA-1 year in July 2013. The ABA written examination will be divided into two parts. A basic examination ensures that residents have acquired the basic anatomy, physiology and pharmacology required to function as a consultant in anesthesiology. The advanced examination would indicate that residents understand the breadth of clinical knowledge and concepts required in anesthesia practice. The oral examination would confirm that a consultant could apply knowledge and make clinical judgments

The practical application of the milestones would be to assess these educational milestones at the various transition points during residency. The ABA has already defined a transition point related to knowledge milestones. There are a variety of additional "natural" transitions and progressions that residency programs recognize either formally or informally during anesthesiology residency training. Some examples of these transitions include:

1. Start of Internship (Graduate Physician)
2. Start of Clinical Anesthesia Training (CA-1)
3. Beginning of On-Call Responsibility
4. Start of Subspecialty Training in ICU, Obstetrics, Cardiothoracic, Pediatrics
5. Start of Subspecialty Call Responsibilities
6. Completion of Program Requirements
7. Subspecialty Certification



David J. Murray, M.D.

There are some potential pitfalls in the approach. The concept of a milestone or dividing the stages of developing expertise into well-defined steps would seem a reasonable goal, but measuring performance is anything but a simple and straightforward process. More than a decade ago, in response to an Institute of Medicine recommendation that specialty boards and credentialing committees develop better methods to ensure provider competence, the Anesthesia Patient Safety Foundation, or APSF (Robert K. Stoelting, M.D.), observed that these measures "are not a simple matter and (defining and assessing competence in practice) will require considerable research." The APSF concluded that "there is no known mechanism by which (competence) can be measured readily." Despite considerable attention to performance assessment, this observation continues to confound measures of clinical ability (Gaba 2004, Weinger 2007). In addition, there are few assessment modalities that could be used to reproducibly measure clinical performance in each of these core competencies. Even in a controlled "laboratory" setting such as a simulated environment where "patient" response and illness, hospital environment and performance of health care professional confederates can be strictly standardized and controlled, the majority of studies have found it difficult to define competence and effectively discern a valid and reliable measure of competence, let alone separate a specialist's skill into a number of milestones (Fehr, Gaba, Murray, Murray).

The ACGME commitment to the competencies has contributed to a broader perspective about residency education. The outcomes project required residency programs to include skills, knowledge and attitudes that extend beyond factual knowledge and clinical experiences. The goal of NAS is essentially to help residencies graduate clinically competent clinicians. Now, considerable research is needed to effectively define and measure each of these competencies. An important

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initial step should include a pragmatic consideration of the number of milestones that each specialty should assess as well as how many steps to expertise can be reproducibly defined during residency. The concern is that there will be a tendency to achieve compliance with the directive rather than accurately measure and report competence.

As residency programs prepare for less frequent accreditation visits, residency program directors, residents and faculty will have an opportunity to concentrate on education rather than merely react to ACGME directives. Residents are savvy, successful learners and residency programs have many tools available to offer learning experiences. Hopefully, residency programs will have the latitude necessary to innovate learning and assess competence.

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Oh, No!... Not Another Checklist!

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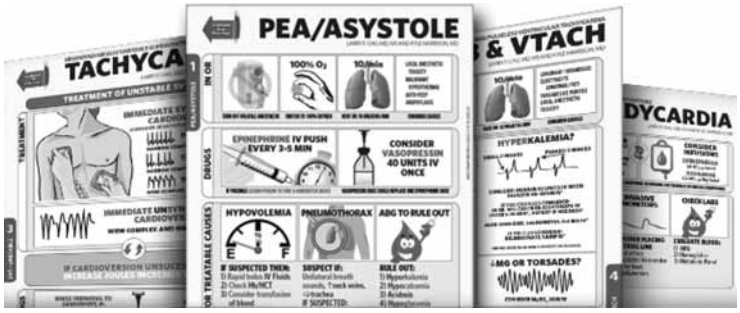

Dr. Larry Chu and colleagues at the Stanford AIM lab are proposing just that. Modeling after the emergency checklists that pilots use for emergencies, they are introducing the notion that we in anesthesia and critical care should do the same.

Checklists are thought to be a particularly useful tool in situations where complexity may promote errors due to omission of critical tasks. Medicine, notwithstanding its increasing administrative, technological and biological complexity, has yet to fully explore the use of checklists in many appropriate clinical situations. Several early studies have shown some improvements in patient safety with non-emergency checklists used in the midst of distractions and complexity, decreasing the rate of central line infections and surgical site infections.

However, the potential benefits of checklists have not been fully explored in emergency clinical situations. The human memory is imperfect and stressful scenarios can adversely affect performance and attention. Emergency checklists have become a routine element of operating procedures in aviation. For example, in an airplane facing engine failure due to birds in the flight path, while one pilot focuses on flying the airplane the other one quickly pulls up the relevant to-do list for this specific emergency. A handful of important bullet points come up, such as: rudder/flap instruction, set fuel appropriately, look for an emergency landing site, notify the tower, and so on, thus addressing well known attention issues in emergencies. Chu and colleagues suggest that a simple comparable emergency checklist, accessed upon presentation of an emergency, will improve performance in intra-operative emergencies, using high-fidelity simulation as a surrogate for the clinical situation. This has the potential to have a significant impact on anesthesia patient safety. Evidence for this notion was recently published in the *New England Journal of Medicine*: Arriaga AF, et al. Simulation-based trial of surgical-crisis checklists. *N Engl J Med*. 2013; 368:246-53.

Dr. Chu has been working with Dr. Kyle Harrison on medical checklists for critical events in medicine since 2005. Their work has culminated in the publication of a new pictographic approach to cognitive aids that is designed to assist doctors in managing critical events in medicine. Their first set of cognitive aids is designed to guide health professionals through the process of advanced cardiac life support. How does their unique picture-based approach compare with text-based aids? Chu reports recent results from the AIM lab show that doctors are able to find critical information--such as the correct dose of atropine to treat bradycardia and the correct treatment for unstable SVT -- on average more than 2-times faster when pictures are used. Harrison and Chu plan to publish their work shortly. They are working on releasing many more cognitive aids in the coming months.

They invite interested AUA members to download their cognitive aids and share them with friends, residents, fellows, and colleagues. They are free of charge to the public. You may find them useful in teaching ACLS to your trainees and in managing critical events in medicine. Provide feedback to Dr. Chu at **lchu@stanford.edu**.

An example of the checklist in action can be viewed at **https://vimeo.com/59380161**

You can get the cognitive aids by visiting Anesthesia Illustrated or clicking on this link (**http://www.cognitiveaids.org**). An iOS app and Kindle book are in the works.

ASA President Update

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Education is the other central pillar of the ASA strategic direction. Through annual surveys of our membership, ASA continually refines and updates its numerous educational opportunities. There are currently more than 140 education products available through the ASA's Education Center. The ANESTHESIOLOGY™ 2012 annual meeting in Washington, D.C. was a tremendous success with over 14,500 attendees. More than 2,800 sessions or presentations were conducted, along with a unique and entertaining Opening Session with political commentators James Carville and Mary Matalin. The 2013 annual meeting is shaping up to be a similar success and will be held in San Francisco.

Providing quality cost-effective Maintenance of Certification in Anesthesiology (MOCA®) modules is a primary effort of ASA. These include Practice Performance Assessment and Improvement, Patient Safety modules and the Self-Assessment Module-Pain Medicine. In addition, the society has established a process for endorsement of simulation centers that will allow members to seek out centers providing MOCA® simulation requirements.

The Perioperative Surgical Home™ model of care will help manage the full spectrum of surgical episodes, reduce costly complications and improve efficiency of care. ASA will continue to advocate for the widespread adoption of such coordinated care. We will also continue to proactively educate patients that the role of the anesthesiologist extends beyond the operating room, coordinating and managing comprehensive patient safety before, during and after surgical procedures.

"Advancing the Practice and Securing the Future" serves as our beacon for ASA's activities and strategic initiatives. Through the strong and vibrant volunteer spirit of its 50,000-plus members, ASA will continue to embrace vast opportunities in the future. With your ongoing support, I look forward to keeping anesthesiology as the premier medical specialty in the world.

SAB Report:

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also released a public statement with the FDA that recognizes concern about anesthetic neurotoxicity in animal and human data but acknowledges the inconclusive nature of the data. SmartTots advocates using existing anesthetic drugs and techniques for needed anesthesia for surgical and diagnostic procedures in young children.[20]

Conclusion

Anesthetic neurotoxicity in the developing brain is an important problem potentially affecting millions of young children annually. Many pediatric anesthesiologists believe anesthetic neurotoxicity is the single most important research and clinical question facing the subspecialty for years to come. A significant basic science, translational, and clinical research effort across the anesthesia community will be required, sustained over many years, to define the extent of the problem and develop alternative techniques and drugs – if the problem indeed has clinical relevance as many researchers and clinicians suspect.

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Tom Hornbein: Just the 'Doc' Who Climbed Everest?

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This is a story of one man's journey. It is a story of mountains, medicine and the life of a man, Dr. Thomas Hornbein. This story may be of one mountain in particular, Mount Everest, but Mount Everest reflects on only one part of Tom Hornbein's life journey. It is a journey that travels through a career in medicine – in particular, anesthesiology. To Professor Hornbein, Everest, and mountains in general, are but a metaphor of his life's adventures.

When he was 13, Dr. Hornbein discovered the mountains at a camp in Colorado. Even at that time, he began to write about mountains and his life's journey up until that point. He grew up in St. Louis, a place completely devoid of mountains. Yet this vision, be it a memory, remained a persistent thought and constant reminder of something he wanted to pursue. He majored in geology at the University of Colorado, but later premed, after becoming involved in mountain rescue activities that included teaching first aid. In 1952, he returned to his hometown to attend medical school at Washington University. While there, he met Professor Albert Roos, a pulmonary researcher who took Dr. Hornbein under his wing to study how polycythemia affects breathing. It was at this point that Hornbein's research interests came into fruition. His first research study as a senior medical student examined the effect of blood transfusions for polycythemia – like that occurring at high altitude – on ventilation. Using himself as the study's only subject, Hornbein's work was nevertheless impressive enough to be published in the Journal of Applied Physiology.[1]

After an internship in Seattle, Dr. Hornbein returned to St. Louis for his anesthesiology residency and two years of NIH-supported research training. Working again in the laboratory of Professor Roos, Dr. Hornbein began studying the stimulus-response relationships of the carotid body, focusing on how a thoracic epidural block influenced sympathetic innervation to the carotid chemoreceptors and its affect on breathing, According to Dr. Hornbein, the procedure itself took the form of "perhaps a needle, separating two nervous people." Roos was a role model of a dedicated science, something Hornbein attempted to emulate and to pass along to his own mentees.

In 1961, Dr. Hornbein was invited to become a member of the 1963 American Mount Everest expedition (AMEE), the first official American attempt to climb Everest (for more information, see **www.everesthistory.com/everestsummits/1963.htm**). However, the U.S. Navy had a prior claim on Hornbein through a doctor draft known as the Berry Plan, and denied it Hornbein's request for a leave of absence from the Navy to join the expedition. In fall 1962, Hornbein's climbing friend, Will Unsoeld, also an invited member of the expedition, learned of Dr. Hornbein's plight. Unsoeld, who was about to depart for Nepal to become second in command of the first Peace Corps group, called his boss in Washington, D.C., Sargent Shriver, who contacted his brother-in-law, President Kennedy. From there, the request for Hornbein's leave descended to Secretary of Defense Robert McNamara, who relieved Hornbein from his duties at the Naval Hospital in San Diego, allowing him to join the expedition.

Hornbein and Unsoeld made climbing history by completing the first ascent of Everest's West Ridge (chosen because the outcome was more uncertain), a steep snow-filled gully, now referred to as the Hornbein Couloir. After reaching the summit, they made the first traverse of a major Himalayan peak and spent an unplanned night out while descending the standard route via the South Col.

On returning home, Dr. Hornbein gathered his family into their Volkswagen van and drove northwest to Seattle where he began his academic career at the University of Washington. With mountains physically surrounding him, Hornbein proceeded to climb his own professional mountain in academic anesthesiology and physiology.

He had been recruited by Dr. John Bonica who had paid his own way through medical school with the money earned as a professional wrestler. Hornbein and Bonica shared similar attributes – both were small of stature, but full of energy, perseverance and dedication. Hornbein's relationship with Bonica grew from mutual respect to a close friendship.

Hornbein credits Dr. Bonica with providing an ideal environment for the young anesthesia faculty to grow academically. Armed with Bonica's support and a Research Career Development Award that Hornbein was awarded early in his career, Dr. Hornbein was able to spend 10 formative years largely dedicated to research. Hornbein's relationship with Bonica also helped nurture Hornbein as a future national leader and to succeed Dr. Bonica as department chair from 1978 to 1993.

Hornbein continued to perfect his own ideas of faculty development as department chair. He diligently modeled the lessons he had learned in mountaineering and under Bonica's tutelage. He also believed it was vital to instill into the faculty the spirit of research that he inherited from Roos. To this end, he largely curtailed his own research to foster the careers of others and to share the richness of opportunity he himself had experienced. He believed that his responsibility was to

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Tom Hornbein: Just the 'Doc' Who Climbed Everest?

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his faculty and trainees; for this reason, he tried to minimize his time on the road lecturing. During his academic career, Dr. Hornbein served as mentor to many. Indeed, mentoring and teaching residents and medical students were his most prized activity, in part because the learning was a two-way street. The following examples demonstrate "Hornbein's theorem": mentee to mentor = mentor to mentee.

In addition to Roos and Bonica, others influenced Hornbein early in his career. One of those individuals was Dr. John Severinghaus. Hornbein describes Severinghaus as caring, sometimes intimidating, but an insightful questioner. Over the years, the two colleagues became close friends. They would often use themselves as research subjects. In fact, the 2003 AUA Update (**www.auahq.org/fall03aua.pdf**) contains a picture of the bold and daring Tom Hornbein in the lab of Dr. John Severinghaus, having undergone jugular bulb puncture for baseline measurements to study changes in cerebral blood flow, upon ascent to 12,450 feet at the Barcroft Laboratory in the White Mountains of California.

Dr. Eger, at UCSF at the time, met Dr. Hornbein at the home of John Severinghaus, where Hornbein gave an inspirational talk about his ascent of Mt. Everest shortly after he returned home. For Eger, "The talk was more than about climbing; it was about the limits within yourself and how far can you go."

Dr. Eger recalls how Hornbein invited him to Seattle and bought him a pair of climbing boots. According to Eger, the boots were "big, clumsy and clunky and hurt his feet." Yet despite the torture of the boots at the time, Eger and Hornbein would share many outdoor adventures together. Eger describes the field of anesthesiology as a perfect fit for Tom's passions: climbing and respiratory physiology. "In fact, Tom had a hip replacement just so he could continue to climb." In addition to climbing together, they also discussed questions in anesthesia research over the decades and at times collaborated on various projects. According to Eger, "Anesthesia was fun at the time; you could tell volunteers to breathe this gas and go to sleep and we would then study them." Both Drs. Ted Eger and Larry Saidman describe Hornbein as a man "who is larger than life" but yet in a "gentle frame."

To Dr. Larry Saidman, "Tom Hornbein is an amalgam of characteristics, describing a person who is gentle, loving, loyal, honest, heroic and mystical. He brings his own homemade hot fudge (called Hornbein's Hot Sludge) when he stays in your home. He takes his house guests on mountain walks when you visit his home in Estes Park. He is learning to play the piano at age 81, and has raised six children, most of whom share his love for the world and the outdoors. He is respected and humble; he owns a single tie and perhaps not a single suit." Saidman further states, "He is in some respects the most amazing person I know, but is in many ways more ordinary than amazing."

In the words of Dr. Elliott Krane, "Tom Hornbein is a remarkable individual, and was a marvelous chair. I remember him best for his good humor and gentle nature, yet incredible intelligence, keen insight, equanimity, egalitarianism and unimpeachable ethical standards that made him a role model for his faculty. I continue to make him a role model for my own career and life to this very day. I remember his humility."

Dr. Krane continued, "Not only was he a mountain climber, but one who conquered Everest. During that historic climb, he and Unsoeld were forced to bivouac overnight without tent or oxygen at 28,000 feet, in freezing conditions. They both emerged miraculously alive, but frostbitten. Tom said that after that night of hypoxia his mind was never the same, yet he was by far about the smartest person I've ever met 15 years later. If what he says is true, it is scary to think of how sharp and creative he was before that historic climb in 1963." Hornbein jokes that he was genius before Everest, but after that hypoxic experience, he became a department chair.

Krane further elaborates, "Tom is a legend in the mountain climbing community, yet I worked for him for five years before I came to know the story of his achievements. He never boasted of them; his office walls and home walls were not papered with posters and letters trumpeting his accomplishment. He was completely humble and unassuming. I can honestly say that without Tom, I would not be who or where I am today. He took an undifferentiated and overconfident young Boston-trained anesthesiologist and molded him into what I hope is a more thoughtful and introspective one. I learned scientific methodology and thinking at his feet. And through all those years he was, just as importantly, indeed more importantly, my friend and a counselor. He was also defiantly incorruptible and repudiated money and influence from industry, decades before it became stylish to do so. In Yiddish, Tom Hornbein is more than a mensch, a 'good man'; he is a 'tzaddik,' a righteous man. My life is infinitely richer for having known him." Upon reading these comments of Dr. Krane, Hornbein, concerned that he would be mostly known as "just the doc who climbed Everest," took particular delight in learning that it took Dr. Krane five years to discover his other life.

Tom Hornbein life's journey also includes Dr. Robert Schoene, better known as "Brownie," a pulmonary/critical care doctor, and another Hornbein mentee, research and teaching colleague, and also friend. Brownie has known Tom since 1976. In Brownie's words, "I have seen a professional relationship evolve into a closest personal one. …Tom does not suffer fools well, while on the other hand, he is the most dedicated friend and supporter of those he is fond of. He keeps those close to him on belay. He has done that for me professionally as well as

literally, as he once held me on a leader fall while rock-climbing. He loves to deny that he is the 'doctor who climbed Everest,' while at the same time, somewhat paradoxically, cherishes that experience and the life and fame that came after it. He has used it well without abusing that notoriety."

William Sumner, physicist and mountaineering equipment designer, wrote this poem, which captures some of the essence of the Hornbein he cherishes:

Two Birthdays

For Tom Hornbein and Sasha Sumner:

Tom worked his way up a steep, sunny slab, his rope disappearing into shadows below.
"I'm there!"
An anchored Tom pulled the rope tight against Sasha's waist.
"Belay on! Climb!"
Sasha followed this gentle master, remembering as best he could,
When to search high and left and when to just smoothly step up,
Everything depending on one foot.
Sasha hesitated.
"Try it!
I will hold you if you fall."
Sasha moved his foot but was afraid.
"I've got you!"
Slowly, very slowly Sasha stood up.
His first grin was tiny, but with every meter it grew,
Until Tom and Sasha shared a laughing, passionate embrace perched high on a little ledge.

In Sumner's words, "Thirteen years before, Tom was gowned and wearing a surgical mask in an operating room at University Hospital in Seattle. With tears of joy in his eyes, he brought me a tiny bundle. My tears fell on a little face as I laid our son gently into the arms of Flura, his crying mom. Tom cared as much for Sasha at birth as he cared for Sasha high on the Platypus on the morning of November 6, 2010, his 80th birthday."

Hornbein now resides in Estes Park, Colorado. From his home are views of the mountains, a remembrance of the past, which continues in his present. His eyes are as blue and as vast as the Colorado mountain skies, reflecting the gentle man within, short in stature but still larger than life and always the mentor. A man whose views in life, medicine and mountaineering still influence those individuals who are willing to take the time for the adventure and to learn what Hornbein has to teach. When asked, in the solitude and serenity of his mountains in Colorado, when he thought it would be time to retire from anesthesiology and patient care, he noted how difficult it was to end what had been such a rich and rewarding part of his medical life. He liked to say that "you either quit before you need to, or after you should have." And yet for Hornbein, it was perhaps easier to move on than for many, for there were still many new mountains to explore and even to try to climb.

In the 25th Emery A. Rovenstine Memorial Lecture, "Lessons from on High," delivered on October 16, 1989,[1] Hornbein said that he believes that his other life as mountaineer has relevance to his professional life as researcher, educator and clinician. Richard Emerson, another member of their small West Ridge team and a sociologist, hypothesized that uncertainty (i.e., risk) maximizes motivation. On a mountain such as Everest, there are two very real potential outcomes, two sides of the same coin: on one side is the mountain's summit, a tangible, touchable goal, and on the other, the possibility of an early death. In research, scientists may invest years of effort testing a hypothesis, yet it is possible to come up with little of consequence at the end of their search. He suggests that the ability to accept uncertainty may be an important attribute in moments of clinical crisis, when staying cool is a critical ingredient to managing a situation replete with uncertainty. He likes to imagine that "risk-acceptance is like oxygen to your life, an essential dietary constituent," particularly in our specialty

From his book, Everest: The West Ridge and in his Rovenstine lecture, one only gets a glimpse of the now 82-year-old Hornbein. Though he has reached the summit of Mount Everest from the West Ridge, he describes himself as this "small figure in a limitless vastness," a phrase that highlights Hornbein's essential humility.

We all have metaphorical mountains within ourselves that represent challenges we must overcome. These dreams are a reflection of what stirs inside us and what we might be if we are willing to take the risk. Tom Hornbein is a man who always confronted those challenges, in medicine and mountaineering and life, always striving to climb the next peak and to see what lay beyond the horizon. To this day, with humanity and humility, Tom Hornbein shares his own life experiences in his writings and lectures, giving us a glimpse of what a person can achieve through dreaming, persevering and confronting one's personal mountains.

Hornbein TF. The 28th Rovenstine lecture: lessons from on high. *Anesthesiology* 74: 772-7

The editorial assistance of Maureen Donohue, Medical Editor, Stanford University, is gratefully acknowledged.

For further reading, see "Members of first US team to top Mt. Everest reunite" at **news.msn.com/us/members-of-first-us-team-to-top-mt-everest-reunite**.

‘Obama Seeking to Boost Study of Human Brain’

Charles Emala, M.D.
Columbia University
Chair, Scientific Advisory Board

W. Andrew Kofke, M.D.
University of Pennsylvania
Editor, AUA Update

The above headline was on a recent (February 17) *New York Times* article reporting on The Brain Activity Map (BAM) Project, a new ambitious federal research proposal aimed at reconstructing the full record of neural activity across complete neural circuits. It is anticipated to be a component of the Obama fiscal budget proposal for 2014 to be unveiled in March 2013. If funded, it is envisioned as a 10-year multibillion dollar proposal…a second “decade of the brain.” Although it draws parallels with the focused funding of Human Genome Project of the previous century in terms of its scope of funding and grandeur of discovery, it does not currently have the defined endpoints and in-place required technologies of this previous undertaking. The initiative hopes to fund $300 million per year for the next 10 years and is to be coordinated by the Office of Science and Technology Policy (OSTP), which is an office in the Executive Office of the President. Additional federal agencies to be involved include the National Institutes of Health, the Defense Advanced Research Projects Agency and the National Science Foundation. Private foundations are also involved and will include the Howard Hughes Medical Institute and the Allen Institute for Brain Science in Seattle.

Beyond leading neuroscientists and nanoscientists, leaders of information technologies from Google, Qualcom and Microsoft have been involved to determine the computing needs of this adventure. Six leading neuroscientists explained in detail the visions of the project in a Neuron review in June 2012.[1] Traditionally, neuroscientists have relied on sampling neuronal activity by recording from one to a few neurons within a region. However, neuronal circuits, comprising up to millions of neurons, require the understanding of complex interactions among many constituents. To preserve single cell resolution while recording from complex circuits will require a revolution in nanosensing technologies such as quantum dots and nanodiamonds yielding high sensitivity to electrical and magnetic fields. Optical sensing and even DNA polymerases acting as “spike sensors” are envisioned as technologies that will allow complex recordings from many neurons simultaneously. Why this undertaking? It is believed that significant advancements in our understanding of the function of the brain and functional disorders of the brain require a much more complex understanding of dynamic circuit function not resolvable with current approaches. This undertaking may be an unparalleled opportunity for an understanding of many areas of cognition and consciousness. For anesthesiologists and neuroscientists, it may offer resources to develop breakthroughs in our understanding of unconsciousness, the mechanisms of anesthesia and short- and long-term effects of anesthetics on cognition and brain pathology.

1. 1. Alivisatos AP, Chun M, Church GM, Greenspan RJ, Roukes ML, Yuste R: The brain activity map project and the challenge of functional connectomics. *Neuron*. 2012; 74:970-4.

Anesthesia History Calendar

Check out what happened in anesthesia history, month by month! This online calendar includes a monthly selection of items related to the history of anesthesia, pain and pain management, and critical care medicine. Entries are related to clinical, scientific and cultural aspects of history in these areas. The calendar is a work in progress and plans include the addition of more entries.

A version of the calendar is available at the Anesthesia History Association’s web site at **ahahq.org/Calendar2012/Calendar.php**.

A PDF version can also be found at **tinyurl.com/crb3wc2**.

Suggestions for additions, corrections, etc., can be sent to A.J. Wright, M.L.S., at **ajwright@uab.edu**.

Future strategies for research funding

AUA 60th Annual Meeting

April 4-6, 2013

J.W. Marriott Marquis • Miami, Florida

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UHealth UNIVERSITY OF MIAMI HEALTH SYSTEM and AUA Association of University Anesthesiologists

Welcome to Miami!

We are extremely pleased to host the 2013 Association of University Anesthesiologists' Annual Meeting in Miami. The Department of Anesthesiology, Perioperative Medicine, and Pain Medicine at the Health System of the University of Medicine is proud to host this meeting for the first time, and we look forward to an exciting program.

We wish to extend to the AUA membership a warm welcome to Miami, the multicultural "Magic City" on Biscayne Bay between the Florida Everglades and the Atlantic Ocean. The city and the institution also has a great tradition for clinical medicine, research and medical education. The school's history is intertwined with that of the AUA. In 1953, Emanuel M. "Manny" Papper, M.D., Ph.D., co-founded the AUA with Dr. Robert Dripps. Dr. Papper later served as Dean and Vice-President of the University of Miami Health System, from 1969 to 1981. He passed away 10 years ago. Dr. David Lubarsky now holds the chair endowed in his name.

The AUA leadership has again created an exciting program, assembling elements of healthcare dynamics, anesthesiology education, and basic science. The Host Program entitled "Our City and Institution" is divided into two sessions. The first part of the morning will be entitled "Who We Are." Speakers will outline what makes Miami such a special place. Its architecture, its unique weather conditions and role in geo-politics will all be discussed. After the break the second session will be entitled "What We Do" and will feature a taste of some of the very exciting academic work being done at the University of Miami. Speakers will range from the use of mathematic models in political decision making, aging and spirituality (we are all getting older!), and genomics.

The meeting's welcome reception will be on Thursday night; This reception will be held at the JW Marriott Marquis Miami. Friday night you will be free to explore some of the very exciting dining opportunities Miami has to offer. Alternatively you may want to explore the night life of South Beach.

Great meetings do not just happen. Christine Dionne and her team from the AUA headquarters in Park Ridge, Illinois have made a major commitment to making this a great meeting, handling logistics, challenging scheduling issues and the innumerable critical issues involved in creating a running a meeting of this size. The EAB and SAB have done their usual stellar job of assembling a cutting edge program. The University of Miami Health System has made positive suggestions, and the leadership of the J.W. Marriott Marquis Hotel has planned a warm, comfortable welcome for all AUA attendees. The planning committee gratefully acknowledges the hard work and expertise of all who have contributed to creating this program. We look forward to seeing you in May.

Host Committee:

David A. Lubarsky, M.B.A., M.D.
David J. Birnbach, MPH, M.D.
Keith A. Candiotti, M.D.
Steven I. Gayer, MVBA, M.D.
Michael C. Lewis, M.D.
Michael M. Vigoda, M.B.A., M.D.

Hotel and Transportation Information

Be sure to make your room reservations at the JW Marriott Marquis Miami

255 Biscayne Boulevard Way • Miami, Florida 33131
Phone: 1(305) 421-8600 • Fax: 1(305) 421-8601

The complete program schedule and registration information is available on the AUA website at www.AUAhq.org

Miami International Airport (MIA)

The JW Marriott Marquis Miami is approximately 8.5 miles from the Miami International Airport. The estimated taxi fare if $25 (one way). Not all taxis accept credit cards, so please ask in advance to avoid confusion.

Future Meetings

AUA 61st Annual Meeting

April 24 - 26, 2014
Stanford, California

Hosted by Stanford University School of Medicine

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AUA 62nd Annual Meeting

April 30 - May 2, 2015
Nashville, Tennessee

Hosted by Vanderbilt University Medical Center

Program Schedule

Thursday, April 4, 2013

10:00 a.m. - 6:00 p.m.	**Registration**
1:00 - 1:15 p.m.	**Introduction and Welcome to the 60th Annual Meeting** David A. Lubarsky, M.D., M.B.A.
1:15 - 1:30 p.m.	**SAB Program Introduction** Charles W. Emala, M.D.
1:30 - 3:00 p.m.	**SAB Oral Session (Part 1)** • Junior Faculty Presentation (1) • Resident Presentation (1) • Member Presentations (6)
3:00 - 4:30 p.m.	**Moderated Poster Discussion Session** Moderator: Charles W. Emala, M.D.
5:30 - 6:00 p.m.	**Resident Meet and Greet Reception – Marriott**
6:00 - 8:00 p.m.	**Welcome Reception – Marriott**

Friday, April 5, 2013

6:30 a.m. - 5:30 p.m.	**Registration**
7:00 a.m. - 8:00 a.m.	**Continental Breakfast**
8:15 - 9:45 a.m.	**EAB Program (Part 1) Performance Measurement: Does It Matter?** Moderator: Richard P. Dutton, M.D., M.B.A. **Pro:** Lee A. Fleisher, M.D. **Con:** Avery Tung, M.D.
9:45 - 10:15 a.m.	**Break**
9:45 - 10:15 a.m.	**Poster Viewing and Discussion** Moderator: Charles W. Emala, M.D.
10:15 - 11:45 a.m.	**EAB Program (Part 2) Faculty Development** Moderator: T.J. Gan, M.D. • **Challenges and Solutions to Mentorship in Anesthesiology** Monica S. Vavilala, M.D. • **Faculty Attrition: Is it a Problem?** Brenda A. Bucklin, M.D. • **Burnout or Whining, You Decide** Robert R. Gaiser, M.D.
11:45 a.m. - 1:00 p.m.	**Luncheon**
11:45 a.m. - 1:00 p.m.	**EAB, SAB and Presidents' Luncheon**
1:00 - 1:30 p.m.	**ASA President's Update** John M. Zerwas, M.D.
1:30 - 2:30 p.m.	**SAB Plenary Lecture** **Anesthetics - The Final Frontier** Beverley A. Orser, M.D., Ph.D.
2:30 - 3:00 p.m.	**Break/Poster Viewing**

Resident and Junior Faculty Meet and Greet Reception

JW Marriott Marquis Miami
Thursday, April 4, 2013
5:30 - 6:00 p.m.
(Included in the Resident/Fellow registration fee)

A return feature from last year is the Resident and Junior Faculty Meet and Greet Reception. This reception gives residents and fellows and opportunity to meet their peers and the AUA Council members in an informal settling before the start of the formal program.

Program Schedule

Friday, April 5, 2013 (cont.)

3:00 - 4:30 p.m.	**Anesthesiology Foundation Funding Opportunities**
3:00 - 3:20 p.m.	**FAER Funding** Denham Ward, M.D., Ph.D.
3:20 - 3:40 p.m.	**IARS Funding** Alex S. Evers, M.D.
3:40 - 4:05 p.m.	**SCA Funding** Joyce A. Wahr, M.D.
4:05 - 4:30 p.m.	**APSF Funding** Steven K. Howard, M.D.
4:30 - 5:30 p.m.	**AUA Business Meeting**

Explore Miami on your own!

Saturday, April 6, 2013

6:30 a.m. – 5:00 p.m.	**Registration**
7:00 – 8:00 a.m.	**Continental Breakfast**
8:00 a.m. - Noon	*CME is not provided for this portion of the program* **Host Program** Michael C. Lewis, M.D. **Where We Live?** • **Our Climate:** Roni Avissar, Ph.D. • **Our Buildings:** Elizabeth Plater-Zyberk • **Our Neighbors:** Andy S. Gomez, Ph.D. **What We Do?** • **Physics of Collective Behavior:** Neal Johnson, M.D. • **Aging and Spirituality:** Stephen Sapp, Ph.D. • **Genomics of Alzheimer's:** Margaret A. Pericak-Vance, Ph.D.
10:00 – 10:30 a.m.	**Break/Poster Viewing and Discussion**
Noon. - 1:30 p.m.	**All Attendee Luncheon (Residents at Reserved tables)**
1:30 – 1:40 p.m.	**SAB Program Introduction** Charles W. Emala, M.D.
1:30 - 3:00 p.m.	**SAB Oral Session (Part 2)** • **Junior Faculty Presentation (1)** • **Resident Presentation (1)** • **Member Presentations (6)**
3:00 – 5:00 p.m.	**Break**
3:00 – 5:00 p.m.	**Poster Viewing and Discussion** Moderator: Charles W. Emala, M.D.
6:00 - 10:00 p.m.	**Social Event – JW Marriott Marquis Miami**

Resident Luncheon

Saturday, April 6, 2013
Noon - 1:30 p.m.
(Included in the Resident/Fellow registration fee)

At the all attendee luncheon, tables will be reserved for residents, fellows and their sponsoring chair. Members of the AUA Council will be present to meet with these future academic anesthesiology leaders.

Reception and Dinner at the JW Marriott Marquis

JW Marriott Marquis Miami,19th Floor
Saturday, April 6, 2013
6:00 - 10:00 p.m.

Join your friends and colleagues for a perfect ending to the 60th Annual Meeting. This Saturday event offers an opportunity to unwind and relax. AUA meeting attendees are encouraged to attend the Welcome Reception. This is an ideal opportunity to catch up with friends and colleagues.

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