

ASET 2017

ANNUAL CONFERENCE

PRELIMINARY PROGRAM & REGISTRATION

58TH ANNUAL MEETING

AUGUST 10-12

WESTIN LA PALOMA RESORT & SPA

TUCSON, AZ

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SCHEDULE OF EVENTS

THURSDAY, AUGUST 10

	Program Committee: Linda Kelly, R. EEG/EP T., R.NCS.T., CNCT, FASET, BS Kelly Clement, R. EEG T., CNIM	Course Director: Julie Peterson, R. EEG/EP T., CLTM	Course Director: Cyndi Miller, R. EEG T., CNIM, R.NCS.T., CNCT	Course Director: Petra Davidson, R. EEG/EP T., FASET, BS
	Platform Presentations	LTM/Epilepsy	Nerve Conduction Studies	Autonomic Mini-Course
8:15 – 9:15 a.m.	Plenary Session: Lewis Kull Memorial Keynote Address "The Bright Future of the Neurodiagnostic Profession" <i>Amar Mann, MA</i>			
9:15– 9:45 a.m.	Evaluation of Femoral Nerve Monitoring Data in Far Lateral Transpsoas Lumbar Spine Surgery <i>Jon Block, DC, CNIM</i>	An LTM Patient Story from A-Z First Admission to Surgery <i>Joseph Sirven, MD</i>	NCS Techniques and Insider Tips <i>Holli Horak, MD</i>	The Autonomic Nervous System and Function and Disorders of the ANS <i>Brent Goodman, MD</i>
9:45 – 10:15 a.m.	A Novel Approach for the Intraoperative Detection of C5 Nerve Root Palsies <i>Justin W. Silverstein, DHSc, CNIM, R. EP T., R.NCS.T., CNCT, NCT-C</i>			
10:15 – 11:00 a.m.	Break in Exhibit Hall with Poster Viewing			
11:00 - 11:55 a.m.	The Threat is Real: Stories of Encroachment and Inadequate Patient Care ASET Government Advocacy Committee Presentation <i>Roberta Esfandiari, R. EEG T.;</i> <i>Kristin Neel-Roberts, R. EEG/EP T., AS</i>	Figure Semiology <i>Adriana Turner, MD</i>	Brachial Plexus NCS <i>Jim Lewis, R.NCS.T., CNCT</i>	Autonomic Workshop Part I: Tour of the Equipment and Demonstration <i>Stephanie Weid, R. EEG T., CAP</i>
Noon – 1:30 p.m.	Annual Business Meeting Luncheon			
1:30 – 2:00 p.m.	Benefit of IONM in a Pediatric Patient with Spinal Dysmorphism, Split Cord Malformation and Scoliosis <i>Faisal Jahangiri, MD, CNIM, D.ABNM, FASNM</i>	1:30- 2:15 p.m. Asystole in the LTM Lab <i>Laura Lehnhoff, MD</i>	Everything You Need to Know About Blink Reflex Studies <i>Mark Ryland, R. EP T., RPSGT, R.NCS.T., CNCT, FASET, Au.D.</i>	Autonomic Workshop Part II: Hands On Practice <i>Stephanie Weid, R. EEG T., CAP</i>
2:00 – 2:30 p.m.	Could Improvement in Evoked Potentials During Craniovertebral Decompression in Patients with Arnold Chiari Malformation Type II Obviate the Need for Duraplasty? <i>Joshua Castle, R. EEG/EP T., CNIM</i>	2:15 - 3:00 p.m. The Critically Ill LTM Patient <i>Amy Crepeau, MD</i>	NCS for the Femoral, Lateral Femoral, Cutaneous & Obturator Nerve <i>Jerry Morris, R.NCS.T., CNCT, FASET, MS</i>	TCD Mini-Course
2:30 – 3:00 p.m.	A Checklist for Responding to Intraoperative Neuromonitoring Changes <i>Rebecca Rendahl, R. EEG T., CNIM</i>			TCD Workshop Part I Introduction: Anatomy, Theory and Technique <i>DonaLee Davis, CNRN</i>
3:00 – 3:45 p.m.	Break in Exhibit Hall with Poster Viewing			
3:45 – 4:15 p.m.	TCeMEP Neuromonitoring in Neurosurgery: Technological Advancement with Navigation <i>Ernesto Lima, MD, D.ABNM</i>	3:45 - 4:30 p.m. Alternative Treatments for Epilepsy <i>David Labiner, MD</i>	Hands-On NCS Workshop <i>Jim Lewis, R.NCS.T., CNCT</i> <i>Jerry Morris, R.NCS.T., CNCT, FASET, MS</i> <i>Joyce Riedel, R. EEG T., CNIM, R.NCS.T., BA</i> <i>Judy LonCar-Milkovich, R.NCS.T.</i>	3:45 - 4:15 p.m. TCD Workshop Part II: Hands-On Workshop <i>DonaLee Davis, CNRN</i>
4:15 – 4:45 p.m.	Neuromonitoring for International Medical Missions <i>Jon Block, DC, CNIM</i>			
4:45 – 5:15 p.m.	Neural Mapping Techniques for Transpsoas Lateral Interbody Fusion <i>Justin W. Silverstein, DHSc, CNIM, R. EP T., R.NCS.T., CNCT, NCT-C</i>	4:30 - 5:15 p.m. Stereotactic EEG <i>Michael Stein, MD</i>		
5:15 – 6:30 p.m.	Exhibit Hall Welcome Reception			

THURSDAY, AUGUST 10, 2017

PLENARY SESSIONS & PLATFORM PRESENTATIONS

LEWIS KULL MEMORIAL KEYNOTE ADDRESS

“The Bright Future of the Neurodiagnostic Profession”

Amar Mann, MA

Description on page 6.

Evaluation of Femoral Nerve Monitoring Data in Far Lateral Transposas Lumbar Spine Surgery

Jon Block, DC, CNIM

The Lateral Lumbar Interbody Discectomy & Fusion (LLIF) surgical procedure has grown in popularity due to the many advantages this approach offers over more traditional surgical approaches. Potential complications include injury to the lumbar plexus, bowel, and vasculature with injuries to the lumbar plexus being the most common. Multiple investigators have reported promising results from various techniques aimed at monitoring the function of the lumbar plexus elements with attention on the femoral nerve. Nonetheless, there are still no well-established guidelines for performing or interpreting femoral nerve neuromonitoring for LLIFs. There are multiple factors that can affect the quality of the acquired data and thus, the utility of the neuromonitoring can vary considerably from case to case. The authors recommend a standardized format of reporting utilizing a grading scale to describe the quality of the neuromonitoring data to equip surgeons with the relevant information required for effective intraoperative decision making.

A Novel Approach for the Intraoperative Detection of C5 Nerve Root Palsies

Justin W. Silverstein, DHSc, CNIM, R. EP T., R.NCS.T., CNCT, NCT-C

C5 neuropraxia is a known, poorly understood complication of cervical spine surgery and has a reported incidence as high as 30% in some studies. Weakness of the deltoid and bicep muscles present immediately postoperatively or in a delayed fashion. The exact etiology remains elusive and controversy regarding the efficacy and utility of neuromonitoring for intraoperative detection of these injuries exist. We present a novel paradigm for monitoring C5 nerve root palsies by evaluating motor evoked potential recordings (MEP) and electromyographic recordings (EMG) from the three heads of the deltoid muscle along with standard MEP/EMG target muscle recordings contemporaneously. Relevant anatomy, potential mechanisms of injury, and general difficulty obtaining proximal MEP recordings were the impetus for this study.

The Threat is Real: Stories of Encroachment and Inadequate Patient Care: ASET Government Advocacy Committee Presentation

Roberta Esfandiarfard, R. EEG T.; Kristin Neel-Roberts, R. EEG/EP T., AS

Present and imminent threats to our Scope of Practice abound. Neurodiagnostic technologists have lost their jobs to non-credentialed and inexperienced replacements as hospitals and clinics struggle to cut cost. The field is being usurped by others and we are being deemed expendable to do what we have chosen, studied, and trained to do. Properly educated and trained neurodiagnostic technologists provide the best patient care for the patients we serve. Neurodiagnostic technologists will share stories of how other Allied Health professions are encroaching on our Scope of Practice and how patients have received inadequate care from health care providers not educated and trained in the proper way to conduct neurodiagnostic procedures. Having a license specific to neurodiagnostics is the only way to protect our jobs and ensure quality testing for our patients. To protect our Scope of Practice and the patients we serve, we need to come together to support the enactment of legislation requiring a professional license to perform neurodiagnostic procedures.

Benefit of IONM in a Pediatric Patient with Spinal Dysmorphism, Split Cord Malformation, and Scoliosis

Faisal Jahangiri, MD, CNIM, D.ABNM, FASNM

This presentation is a retrospective analysis of a pediatric patient who underwent twelve operations for the correction of scoliosis, split cord, and untethering of the spinal cord. A multimodality IONM protocol including SSEP, TcMEP and EMG was utilized during the last six procedures. At age six (procedure #7) a vertical expandable prosthetic titanium rib (VEPTR) expansion was performed with loss and recovery of lower MEPs. The postoperative MRI showed partial split cord malformation with retethering of the spinal cord. Following that, the patient underwent surgery for the repair of the split cord malformation and release of tethered spinal cord with IONM. After laminectomy, an intracanal bone spur was found. The cartilage band was completely removed. The cord was split. All arachnoid and adhesions in between the cord and the dura were removed. Then, the filum terminale was isolated utilizing 1.0 mA triggered EMG. Utilization of IONM for this patient was extremely helpful. Sudden loss of TcMEP and SSEP resulted in cancellation of the procedure and MRI showed a thick remnant attached to the spinal cord. If the procedure was performed without IONM, the underlying pathology could have been missed resulting in paraplegia.

Could Improvement in Evoked Potentials During Craniovertebral Decompression in Patients with Arnold Chiari Malformation Type II Obviate the Need for Duraplasty? Joshua Castle, R. EEG/EP T., CNIM

A posterior fossa decompression for Chiari malformation is one of the pediatric neurosurgical procedures that benefits from IONM. Posterior fossa decompression for Arnold Chiari type II malformation (ACM-II) is the standard surgical technique applied in all cases. This procedure is often supplemented by dural patch grafting (duraplasty). Though less common, patients with more severe ACM-II characteristically have displacement of the medulla, fourth ventricle, and cerebellum through the foramen magnum likely due to small posterior fossa, which is usually accompanied by myelomeningocele. Pediatric neurosurgeons routinely perform a ventriculoperitoneal shunt prior to craniovertebral decompression for symptomatic patients. Controversy exists regarding the extent of decompression and need for duraplasty. We report two cases where there was predominant improvement in IONM signals during bony decompression, which lead to modifying the course of the surgical decision for the duraplasty. Both the patients had good postoperative clinical recovery.

A Checklist for Responding to Intraoperative Neuromonitoring Changes

Rebecca Rendahl, R. EEG T., CNIM

When changes occur in surgery, it is very important that staff understand their role in responding because any changes can lead to permanent injury. Timely interventions are needed and different personnel have specific tasks. Our intent was to reduce role confusion and delay by implementing a checklist that assigns tasks and designates a coordinator. We used a checklist developed by Vitale et al. (2014), and added a list of instructions for implementation on the reverse side. A survey of operating room (OR) staff was done before and after our education session to assess understanding and confidence in roles. Furthermore, staff that used the checklist were asked about ease of use and perceptions about patient safety and case efficiency. Survey results found that staff are more confident of their role during IOM changes when using the checklist. Survey results also showed ease of use and a perceived increase in patient safety with no perceived decrease in case efficiency. Given the successful adoption of the checklist, we will include it in training for new hires and yearly in-service for the spine team staff.

TCeMEP Neuromonitoring in Neurosurgery: Technological Advancement with Navigation

Ernesto Lima, MD, D.ABNM

Routine TCeMEP scalp stimulation follows the 10-20 Electrode System or slightly anterior sites, M1, M2, M3 & M4 per MacDonald [J Clin Monit Comp. 2006 Oct;20(5):347–

77]. We have developed the linked quadri-polar electrode placement which pairs two anodes against two cathodes, as M1M3 vs M2M4. This, along with advances in preoperative planning using coregistered CT/CTA/MRI sequences and intraoperative neuronavigation, allows more accurate placement of electrodes. This study focuses on the use of navigation to identify the precentral, superior, inferior frontal and central sulcus for the purposes of scalp electrode placement in intracranial surgery. Preoperative and intraoperative neuromonitoring data were collected from 10 patients undergoing intracranial surgery. Purpose-built 3-D rendering software for cortical and subcortical mapping with segmentation of critical pathways for somatosensory and motor areas was used to co-locate these anatomic regions. Use of neuronavigation allows more accurate electrode placements compared to traditional measurements, leading to a decreased overall electrical threshold required for stimulation. Use in combination with LQP-TcMEP results in lower stimulation intensities with the benefit of less patient movement.

Neuromonitoring for International Medical Missions

Jon Block, DC, CNIM

There is a growing need for volunteers skilled in surgical neuromonitoring as there are now multiple well-established charitable organizations that contribute to international medical missions that provide surgeries for children with severe spinal deformities in developing or underserved countries around the world. Skilled surgical neurophysiologists are required as the majority of the surgeries are for the treatment of severe pediatric spinal deformities that can require complex osteotomies or even vertebrectomies that place the spinal cord and nerve roots at significant risk. The missions are usually a week in duration with time divided between clinical patient evaluations, surgery, and educational efforts including formal lectures or educational spine surgery symposiums. In addition to providing life-transforming surgeries for children in need, a major emphasis is placed on educating the local surgical staff so that they are better equipped to treat their own patient population thereafter. Volunteering for an international medical mission should be considered an excellent opportunity for surgical neurophysiologists to improve their technical and clinical skills in addition to being an opportunity to contribute to helping children with severe spinal deformities that might otherwise go untreated.

Case Report: Neural Mapping Techniques for Transposas Lateral Interbody Fusion

Justin W. Silverstein, DHSc, CNIM, R. EP T., R.NCS.T., CNCT, NCT-C

Mapping of the lumbar plexus during lumbar lateral interbody fusions (LLIF) using electrical stimulation with concurrent electromyography (EMG) is advocated to detect

SESSION DESCRIPTIONS CONTINUED

the presence of neural tissue and provide estimates of the proximity of the lumbar plexus elements during surgical dilation and retraction of the psoas muscle. Common current techniques utilize a myotomal approach when choosing EMG target muscles which may not cover the lumbar plexus elements adequately. A case report is presented. Mapping of the lumbar plexus was performed using an electrified sequential dilator system and a handheld electrified monopolar stimulating probe with concurrent EMG to record responses from muscles innervated by the various elements of the lumbar plexus. In this particular case, if our mapping protocol did not include adductor muscle recordings, it is possible that deployment of the intra-discal shim could have pierced the obturator nerve. The authors believe this is an important case study that is worth attention to support the need for a lumbar plexus-based anatomical approach for mapping the lumbar plexus during LLIF procedures as opposed to a myotomal approach which is frequently advocated.

LTM/EPILEPSY

An LTM Patient Story from A-Z: First Admission to Surgery

Joseph Sirven, MD

Dr. Sirven's work as an epileptologist at the Mayo Clinic in Phoenix includes guiding many epilepsy patients through an extensive work-up to determine the feasibility of epilepsy surgery. He will tell the story of one patient's journey from first admission to LTM through the Phase I pre-surgical workup which includes imaging studies for localization, through the Phase II workup with surgical implant of grid electrodes and anatomical mapping, concluding with resection surgery and the outcome for control of seizures. This session will illustrate all that is involved in the extensive surgical work-up.

Seizure Semiology

Adriana Tanner, MD

Dr. Tanner is an attending epileptologist at Mercy Health in Grand Rapids, MI, and completed her fellowship at the Cleveland Clinic. She will provide an overview of the International Classification of Seizures with detailed analysis of the symptoms of various seizure types and how the epilepsy team, including the neurodiagnostic technologists, can categorize seizures based on clinical features.

Asystole in the LTM Lab

Laura Lehnhoff, MD

It is not uncommon to discover cardiac findings when observing a patient during a long-term monitoring admission. An episode of asystole is a serious medical emergency. It is vital that the entire epilepsy team responds correctly and efficiently. It is also important to address the

question: is the change in cardiac function a component of the seizure or does it have another cause.

The Critically Ill LTM Patient **Amey Crepeau, MD**

Everyone who works in a LTM lab has encountered patients who are critically ill and medically unstable. Episodes of status epilepticus or other critical conditions may require that the patient be temporarily transferred to the ICU. This presentation will include tips on patient management and safety, ways to continue the LTM monitoring session in the ICU and how to determine when a patient's condition will require urgent intervention and transfer out of the epilepsy monitoring unit.

Alternative Treatments for Epilepsy

David Labiner, MD

What can an epilepsy patient do when standard antiepileptic medications are not effective or cause significant side effects, but surgical intervention is not feasible either? Exploring alternative treatments is an option. Dr. Labiner will provide an update on alternative treatments for epilepsy, including ketogenic diet, medical marijuana and implantable devices. Dr. Labiner is the head of neurology services at the University of Arizona in Tucson. He is a strong advocate for patients with epilepsy, and is active with the American Epilepsy Society and the Epilepsy Foundation of America, as well as past president of the National Association of Epilepsy Centers. He has published articles on the social, economic and cultural aspects of epilepsy.

Stereotactic EEG

Michael Stein, MD

Stereotactic EEG is increasingly recognized as a very successful option for assessment of seizure activity with surgically implanted electrodes. These are thin, needle-like electrodes that are implanted stereotactically, i.e., with the help of a stereotactic frame using pre-calculated coordinates that guarantee accurate targeting of specific deep regions in the brain. It is a less invasive procedure than implanting a large array of grid electrodes and yet it does provide significant diagnostic information when patients are carefully selected for this option. Dr. Stein will discuss the implant process, show examples of recordings, and present case histories to demonstrate the effective use of stereotactic EEG.

NERVE CONDUCTION STUDIES

NCS Techniques and Insider Tips

Holli Horak, MD

Dr. Horak specializes in neuromuscular medicine at the University of Arizona in Tucson, where she also teaches NCS and EMG to residents and fellows. She will provide an overview of NCS techniques and will offer helpful tips to

obtain the best studies possible, find the optimal stimulation points and use instrument settings to the best advantage.

Brachial Plexus NCS **Jim Lewis, R.NCS.T., CNCT**

While nerve conduction studies of the brachial plexus are commonly requested, they always present unique challenges and require a good understanding of the complex anatomy of the nerves serving this area. Jim Lewis has been training technologists in nerve conduction techniques for many years and will share his expertise to make this procedure easier to perform with better results.

Everything You Need to Know about Blink Reflex Studies

Mark Ryland, R. EP T., RPSGT, R.NCS.T., CNCT, FASET, Au.D.

The blink reflex study is often considered an advanced technique and has unique challenges. Dr. Ryland teaches in the neurodiagnostic technology program at Cuyahoga Community College and is well known for his dynamic teaching style. He will share his expertise and explain everything you need to know to perform a blink reflex study.

NCS for the Femoral, Lateral Femoral, Cutaneous & Obturator Nerve

Jerry Morris, R.NCS.T., CNCT, FASET, MS

If asked to name three of the most difficult nerve conduction studies to perform, many technologists might list these three nerves! Jerry's presentation will include the anatomy of these nerves, how to access stimulation points and you'll be able to perform these tricky studies like an expert! Jerry is an enthusiastic teacher, and has received the Theda Sannit Outstanding Educator Award, so you won't want to miss this lively discussion.

Hands-On NCS Workshop

Jerry Morris, R.NCS.T., CNCT, FASET, MS; Jim Lewis, R. NCS.T., CNCT, Joyce Riedel, R. EEG T., CNIM, R.NCS.T., BA, Judy LonCar-Milkovich, R.NCS.T.

What would a Nerve Conduction Course be without an opportunity to practice hands-on skills? We will have three work-stations so that everyone who wants to try a nerve conduction study will have the opportunity to do so with guidance from our expert faculty.

AUTONOMIC MINI-COURSE

The Autonomic Nervous System and Function and Disorders of the ANS

Brent Goodman, MD

Neurodiagnostic technologists are increasingly involved in testing for autonomic nervous system disorders and ABRET has developed a new certification exam in this specialty. So whether you are new to this subject, or

seeking continuing education, this presentation will provide the foundation for additional learning. Dr. Goodman will explain how the autonomic nervous system functions and how disorders of the ANS can be diagnosed with a variety of special tests.

Autonomic Workshop Part I: Tour of the Equipment and Demonstration **Stephanie Weid, R. EEG T., CAP**

This introduction will provide a tour of autonomic nervous system testing equipment. Of course, some equipment is not mobile enough to bring to a workshop, so Stephanie will include a virtual tour of the full autonomic lab.

Autonomic Workshop Part II - Hands on Practice

Stephanie Weid, R. EEG T., CAP

We'll have some autonomic testing equipment available and we will provide the opportunity for workshop attendees to practice skills in an informal learning setting. Stephanie has passed the ABRET certification exam for autonomic nervous system testing so she can also share her insights about the process with you.

TCD MINI-COURSE

TCD Workshop Part I Introduction: Anatomy, Theory and Technique

DonaLee Davis, CNRN

Transcranial doppler is another diagnostic tool that is increasingly performed by neurodiagnostic technologists, often in the ICU or Intraoperative neuromonitoring setting. DonaLee Davis is nationally recognized for her skills as an instructor in this specialty and she will cover the basics of blood vessel anatomy, instrumentation theory and common TCD techniques.

TCD Workshop Part II: Hands-On Workshop **DonaLee Davis, CNRN**

TCD equipment will be provided for workshop participants to learn techniques to perform the transcranial doppler studies most commonly used in neurodiagnostics.

