Objectives:
At the conclusion of this activity, participants will be able to:
1. Employ a thorough understanding of neuroanatomy and neurophysiology to identify risks for injury to the brain, spine, and cranial and peripheral nerves during surgical and other invasive procedures, and to select appropriate monitoring techniques to minimize these risks;
2. Design a comprehensive monitoring plan for individual patients, including multimodality intraoperative monitoring techniques (e.g. recordings of sensory and motor evoked potentials, EEG, EMG and spinal reflex activity) to monitor segments of the nervous system at risk during surgery;
3. Recognize changes in intraoperative neurophysiologic tests which indicate damage to neural structures, and distinguish these from common technical artifacts;
4. Communicate normal and abnormal results to the surgical team and incorporate the results into clinical recommendations that may alter the surgical technique to avoid, limit or reverse injury to neural structures;
5. Identify the effects of anesthetic drugs on neurophysiology and employ methods to limit the adverse impact of anesthetics on intraoperative monitoring techniques.

Agenda:
9:00AM Welcome & Introduction
9:05AM BAEP Monitoring  
Alan D. Legatt, MD, PhD, FACNS
9:45AM SEP Monitoring  
Andres A. Gonzalez, MD, MMM, FACNS
10:25AM Break
10:40AM MEP Monitoring  
Ronald Emerson, MD, FACNS
11:20AM EEG and Doppler Ultrasound Monitoring  
Michael McGarvey, MD, FACNS
12:00PM Panel Discussion
12:15PM Lunch
1:15PM Mapping of Cortical and Subcortical Brain Structures  
Mirela V. Simon, MD, MSc, FACNS
1:55PM Monitoring of Spinal nerve Roots  
Monica Islam, MD
2:35PM Monitoring of Peripheral Nerve Surgery  
Leo T. Happel, PhD
3:15PM Break
3:30PM Anesthetic Management and IOM
David Ferson, MD

4:10PM    Case Presentations and Discussions

4:50PM    Panel Discussion
EP Reading Session
7:00 - 8:30 AM
Location: Salon B
Chair: Alan Legatt, MD, PhD, FACNS

Objectives:
At the conclusion of this activity, participants will be able to:
1. Select appropriate evoked potential techniques (visual, brainstem auditory, and somatosensory) based on a thorough understanding of neuroanatomy and neurophysiology;
2. Accurately interpret visual, brainstem auditory, and somatosensory evoked potentials to localize dysfunction of the nervous system;
3. Integrate the results of evoked potentials with clinical history and other diagnostic techniques to improve accuracy of neurologic diagnosis.

Agenda:
7:00AM  Brainstem Auditory Evoked Potentials (BAEPs)
         Alan D. Legatt, MD, PhD, FACNS
7:30AM  Visual Evoked Potentials (VEPs)
         Elayna Rubens, MD
8:00AM  Somatosensory Evoked Potentials (SEPs)
         Ronald Emerson, MD, FACNS

Introduction to Stereo-EEG
7:00 - 8:30 AM
Location: Salon C
Co-Chairs: Stephan Schuele, MD, MPH, FACNS and Nitin Tandon MD, FAANS

Objectives:
At the conclusion of this course, participants will be able to:
1. Understand the principles underlying Stereo EEG including patient selection and targeting electrode placement;
2. Familiar with the fundamentals of pre and postoperative image processing and co-registration;
3. Learn about the principles of stereotactic surgical implantation, pitfalls and complications.

Agenda:
7:00AM  Patient and Electrode Selection
         Stephan Schuele, MD, MPH, FACNS
7:25AM  Questions
7:30AM  Image Processing and Surgical Planning
         Giridhar Kalamangalam, MD, DPhil
7:55AM  Questions
8:00AM  Nuts and Bolts of Surgical Implantation
         Nitin Tandon, MD, FAANS
8:25AM  Questions
Electrocorticography and Intracranial EEG
9:00 AM - 5:00 PM
Location: Salon C
Co-Chairs: Stephan Schuele, MD, MPH, FACNS and Greg Worrell, MD

Objectives:
At the conclusion of this course, the learner should be able to:
1. Identify patients from Phase 1 evaluations that are good candidates for a Phase 2 evaluation;
2. Know what EEG patterns, seen on invasive EEG, are more likely to have a "good" surgical outcome and;
3. Have an updated understanding of ongoing research into basic physiology of focal onset epilepsy based on invasive EEG techniques.

Agenda:
9:00AM Introduction & Overview
9:15AM Phase 1 Evaluations that Lead to Phase 2 Testing  
Giridhar Kalamangalam, MD, DPhil
9:45AM Choosing Phase 2 Electrodes  
Stephan Schuele, MD, MPH, FACNS
10:15AM Utility of Source Localization and Magnetoencephalography  
Richard C. Burgess, MD, PhD, FACNS
10:45AM Break
11:00AM Patterns of Seizure Onsets & Spread, Underlying Pathological Substrates, Surgical Outcomes in Adults  
Lawrence J. Hirsch, MD, FACNS
11:30AM Discussions and Demonstrations of Patterns of Seizure Onsets & Spread, Underlying Pathological Substrates, Surgical Outcomes in Children  
Tobias Loddenkemper, MD, FACNS
12:00PM Lunch
1:00PM The Use on Invasive Electrodes to Map "Epileptic Zones"  
William C. Stacey, MD, PhD
1:45PM Wideband Intracranial EEG and Localization  
Greg Worrell, MD
2:30PM Case Presentation I: Implantation Strategy  
Jurriaan M. Peters, MD
3:00PM Break
3:15PM Case Presentation II: Implantation Strategy  
Jay Gavvala, MD
3:45PM Functional Mapping  
Nitin Tandon, MD, FAANS
4:30PM Case Presentation III: Mapping Strategy  
Giridhar Kalamangalam, MD, DPhil
Neurophysiologic Intraoperative Monitoring (NIOM) Part II
9:00 AM - 5:00 PM
Location: Salon B
Co-Chairs: Jaime Lopez, MD, FACNS and Michael McGarvey, MD, FACNS

Objectives:
At the conclusion of this activity, participants will be able to:
1. Employ a thorough understanding of neuroanatomy and neurophysiology to identify risks for injury to the brain, spine, and cranial and peripheral nerves during surgical and other invasive procedures, and to select appropriate monitoring techniques to minimize these risks;
2. Design a comprehensive monitoring plan for individual patients, including multimodality intraoperative monitoring techniques (e.g. recordings of sensory and motor evoked potentials, EEG, EMG and spinal reflex activity) to monitor segments of the nervous system at risk during surgery;
3. Recognize changes in intraoperative neurophysiologic tests which indicate damage to neural structures, and distinguish these from common technical artifacts;
4. Communicate normal and abnormal results to the surgical team and incorporate the results into clinical recommendations that may alter the surgical technique to avoid, limit or reverse injury to neural structures;
5. Identify the effects of anesthetic drugs on neurophysiology and employ methods to limit the adverse impact of anesthetics on intraoperative monitoring techniques.

Agenda:
9:00AM Monitoring Cerebral and Spinal Endovascular Procedures
   Viet Nguyen, MD
9:40AM Electrocorticography During Pediatric Epilepsy Surgery
   Juriaan Peters, MD
10:20AM Break
10:35AM EMG Monitoring of Central Motor Pathways During Spine Surgery
   Stan Skinner, MD, FACNS
11:15AM Regulatory, Medical-Legal and Coding/Billing Issues
   Marc R. Nuwer, MD, PhD, FACNS
11:55AM Panel Discussion
12:10AM Lunch
1:10PM Monitoring of Spinal D-Waves
   Eva K. Ritzl, MD
1:50PM Monitoring of Motor Cranial Nerves and Cranial Nerve Nuclei
   Jaime Lopez, MD, FACNS
2:30PM Evidenced Based Studies in IOM
   Jonathan C. Edwards, MD, FACNS
3:10PM Break
3:25PM Troubleshooting During IOM
   Brett Netherton, MS, FASNM, CNIM
4:05PM Case Presentations and Discussion
EMG and EEG Technology
7:00 - 8:30 AM
Location: Salon C
Co-Chairs: Susan Herman, MD, FACNS and Seward Rutkove, MD

Objectives:
At the conclusion of this activity, participants will be able to:
1. Describe the fundamental operation of neurophysiologic recording equipment, including differential amplifiers, common-mode noise rejection, ground and filters;
2. Explain the concepts of analog-to-digital conversion, aliasing and general frequency analysis;
3. Evaluate and select neurophysiologic equipment based on knowledge of appropriate technical specifications for clinical or research use.

Agenda:
7:00AM EMG & EEG Technology
Susan T. Herman, MD, FACNS

7:45AM EMG & EEG Technology
Seward Rutkove, MD

Neonatal EEG
7:00 - 8:30 AM
Location: Salon B
Co-Chairs: Mark Scher, MD and Courtney Wusthoff, MD

Objectives:
At the conclusion of this activity, participants will be able to:
1. Recognize normal features of EEG unique to premature newborns, and distinguish those expected at different gestational ages;
2. Identify abnormal findings on EEG for premature newborns;
3. Evaluate recent data regarding the frequency of neonatal seizures in premature newborns.

Agenda:
7:00AM Normal and Abnormal Background Patterns in Preterm EEG
Eli Mizrahi, MD

7:45AM Seizures in Preterm Newborns
Courtney J. Wusthoff, MD

8:15AM Case Discussion
Courtney J. Wusthoff, MD
**New Directions in Sleep Medicine**

**7:00 - 8:30 AM**

Location: Bexar/Travis/Nueces

*Chair: Madeleine Grigg-Damberger, MD, FACNS*

**Objectives:**
At the conclusion of this activity, participants will be able to:

1. Realize obstructive sleep apnea (OSA) is highly prevalent in patients with stroke, associated with poorer outcomes after stroke, and prospective studies show OSA independently increases risks of incident ischemic stroke, composite risk of stroke, TIA and death;

2. Appreciate that Juvenile Myoclonic Epilepsy is an epilepsy syndrome profoundly affected by circadian rhythms and Nocturnal Frontal Lobe Epilepsy by sleep itself;

3. Know that the goals of chronopharmacology are to determine whether a particular drug or treatment is affected by endogenous circadian rhythms, and whether aligning it to endogenous circadian rhythms results in optimal levels, improved seizure control, and the least adverse or toxic effects;

4. Understand how short sleep duration, fragmented sleep, varying degrees of intermittent nocturnal hypoxemia, and excessive daytime sleepiness (EDS) in older adults are associated with Minimal Cognitive Impairment (MCI), incident Alzheimer’s disease (AD) and rates of cognitive decline.

**Agenda:**

7:00AM

Chronobiology and Chronopharmacology Applied to Epilepsy  
*Tobias Loddenkemper, MD, FACNS*

7:30AM

Sleep and Stroke  
*Hrayr Attarian, MD*

8:00AM

Sleep as a Robust Biomarker of Neurodegenerative Diseases  
*Madeleine M. Grigg-Damberger, MD, FACNS*

**EMG**

9:00 AM - 12:00 PM

Location: Salon B

*Chair: Francis Walker, MD, FACNS*

**Objectives:**
At the conclusion of this activity, participants will be able to:

1. Apply basic and advanced EMG techniques to diagnose common entrapment neuropathies;

2. Incorporate advances in electrodiagnostic techniques and avoid technical pitfalls in evaluation of radiculopathies and plexopathies;

3. Recognize characteristic EMG patterns of neuropathic and myopathic disorders and interpret the clinical significance;

**Agenda:**

9:00AM

Motor Nerve Conductions and F-waves  
*Paul E. Barkhaus, MD*

10:00AM

Neuromuscular Ultrasound and Entrapment Neuropathies  
*Francis O. Walker, MD, FACNS*

11:00AM

Muscle Disease and EMG  
*Elliot Dimberg, MD*
Video EEG
9:00 AM - 12:00 PM
Location: Bexar/Travis/Nueces
Co-Chairs: William Tatum, DO, FACNS and Tobias Loddenkemper, MD, FACNS

Objectives:
At the conclusion of this activity, participants will be able to:

1. Describe the technical requirements for optimal video-EEG monitoring in inpatient and outpatient settings;
2. Recognize the electroencephalographic and clinical features of seizures and nonepileptic events in adults and children commonly encountered in the video-EEG monitoring unit;
3. Translate EEG and video interpretations into clinical reports which accurately describe diagnosis, seizure localization and implications for patient management, including candidacy for epilepsy surgery;
4. Determine the localization of seizure onsets based on combined video and intracranial EEG recordings.

Agenda:
9:00AM   Technical aspects of Video EEG
          Terrence D. Lagerlund, MD, PhD

9:20AM   Epilepsy Surgery Evaluation in Pediatrics with VEM
          Phillip Pearl, MD, FACNS

10:00AM  Video-EEG Pearls in pediatric patients
          Tobias Loddenkemper, MD, FACNS

10:40AM  Scalp Epilepsy Surgery evaluation in adults with VEM
          Meriem Bensalem-Owen, MD, FACNS

11:20AM  Video EEG Pearls in Adult Patients
          William O. Tatum, DO, FACNS
ICU EEG
9:00 AM - 5:00 PM
Location: Salon C
Co-Chairs: Cecil Hahn, MD, MPH, FACNS and Lawrence Hirsch, MD, FACNS

Objectives:
At the conclusion of this activity, participants will be able to:
1. Discuss current guidelines and evaluate various practice models for ICU EEG monitoring to improve patient care;
2. Apply the revised ACNS nomenclature to ICU EEG recordings, to improve standardization of ICU EEG reports and communication between providers;
3. Recognize controversial EEG patterns in ICU patients with altered mental status, and formulate a rational plan for treatment based on these EEG patterns;
4. Develop a comprehensive ICU EEG monitoring program, including equipment selection, training of interdisciplinary staff, quality improvement and risk management.

Agenda:
9:00AM Overview of ICU EEG monitoring in Neonates, Children and Adults
Nicholas S. Abend, MD
9:30AM Q&A Discussion
9:40AM Guidelines and Nomenclature for ICU EEG Monitoring
Susan T. Herman, MD, FACNS
10:00AM Q&A Discussion
10:10AM Coffee Break
10:30AM cEEG Interpretation: Assessment of Background, Sleep, Reactivity & Artifacts
Nicolas Gaspard, MD, PhD
10:50AM Q&A Discussion
11:00AM cEEG Interpretation: Seizures and Periodic Patterns
Suzette M. LaRoche, MD, FACNS
11:20AM Q&A Discussion
11:30AM cEEG Interpretation: Neonates
Mark Scher, MD
11:50 AM Q&A Discussion
12:00PM Lunch
1:00PM Quantitative EEG for Seizure and Ischemia Detection
M. Brandon Westover, MD, PhD
1:20PM Q&A Discussion
1:30PM Logistics of ICU EEG Monitoring
Cecil Hahn, MD, MPH, FACNS
1:50PM Q&A Discussion
2:00PM  Finances, Billing and Coding  
  
  Marc R. Nuwer, MD, PhD, FACNS  
  
2:20PM  Q&A Discussion

2:30PM  Coffee Break

2:50PM  Treatment of Non-Convulsive Seizures and Status Epilepticus
  Jan Claassen, MD, PhD

3:10PM  Q&A Discussion

3:20PM  Treatment of Postanoxic Coma/Myoclonus
  Thomas P. Bleck, MD, FACNS

3:40PM  Q&A Discussion

4:00PM  ICU EEG Reading Session: Neonatal Cases
  Courtney J. Wusthoff, MD

4:20PM  ICU EEG Reading Session: Adult Cases
  Elizabeth Gerard, MD

4:40PM  ICU EEG Reading Session: Pediatric Cases
  Eric Payne, MD, MPH

Applied Autonomic Neurophysiology
1:00 - 2:30 PM
Location: Bexar/Travis/Nueces
Co-Chairs: Jong Woo Lee, MD, PhD, FACNS and Claus Reinsberger MD, PhD

Objectives:
At the conclusion of this course, the learner should be able to:
   1. Recognize the clinical features and patterns on autonomic testing in systemic and primary neurological disorders affecting central and peripheral autonomic pathways;
   2. Understand an approach to the diagnostic evaluation and management of disorders of the autonomic nervous system.

Agenda:
1:00PM  Introduction

1:05PM  Autonomic Testing
  Jeffrey Liou

1:35PM  Neurological Disorders with Central Autonomic Failure
  Alexandra Hovaguimian, MD

2:00PM  Peripheral Autonomic Failure
  Brent Goodman, MD

2:25PM  Questions
Business in Clinical Neurophysiology
1:00 - 5:00 PM
Location: Salon B
Co-Chairs: Deborah Briggs, MD, FACNS and Yafa Minazad, DO, FACNS

Objectives:
At the conclusion of this activity, participants will be able to:
1. Understand the current challenges facing neurologists/electrophysiologists employed in private practice and employed by hospital system;
2. Appreciate the changes and challenges that will be coming to how neurologists/electrophysiologists practice with the implementation of ACOs;
3. Understand the factors that need to be considered when negotiating with a hospital to bring in new technologies;
4. Know what neurologists/electrophysiologists should be focusing on when implementing EMRs, coding and billing systems given the changing field of reimbursements.

Agenda:
1:00PM Should I Stay or Should I Go?
Yafa Minazad, DO, FACNS & Deborah Briggs, MD, FACNS

1:50PM Criteria for Performance Excellence – Concept for Professional & Group Practice in an ACO
Elizabeth Mullikin, MPA, FACHE

2:35PM Break

2:55PM Operation Considerations in the New World
John Vargas, MSL

3:40PM Bringing in New Technology into a Hospital System
Elizabeth Delledera, MBA, MHA, BSN, RN

4:25PM Question & Answer

Case Studies in Peripheral Neurophysiology
3:00 - 5:00 PM
Location: Bexar/Travis/Nueces
Chair: Elliot Dimberg, MD

Objectives:
At the conclusion of the session, the learner should be able to
1. Interpret patterns of clinical neurophysiological findings in peripheral nervous system disease;
2. Appropriately localize neuromuscular abnormalities according to the neurophysiological findings.

Agenda:
3:00PM Case Studies in Peripheral Neurophysiology
Raghav Govindarajan, MD

3:40PM Case Studies in Peripheral Neurophysiology
Randa Jarrar, MD

4:20PM Case Studies in Peripheral Neurophysiology
Elliot Dimberg, MD