

# EXAMINATIONS

The 2-hour examinations will be administered at a Prometric Testing Center or by live remote proctoring.

## General Clinical Neurophysiology Examination

The Clinical Neurophysiology Examination is mandatory for candidates who have not completed an ABPN subspecialty examination in Clinical Neurophysiology or Epilepsy but is also open to other candidates. The examination consists of approximately 120 objective, multiple-choice questions (1 correct answer and 3 distractors).

### I. Basic physiology and instrumentation (20%)

- A. Physiology
  - 1. Anatomy of neural generators
  - 2. Mechanisms of EEG and evoked potential generation
  - 3. Pathophysiology of abnormal waveforms
- B. Instrumentation and Recording
  - 1. Basic electricity and electronics
  - 2. Amplifiers
  - 3. Filters
  - 4. Principles of EEG digitalization
- C. Electrical safety
- D. Electrodes and montages
- E. Determination of brain death and ECI

### II. Routine EEG (30%)

- A. Normal EEG
  - 1. Maturational changes and normal findings across the age spectrum: Neonatal, pediatric, adult, elderly
  - 2. Normal waking and sleep patterns
  - 3. Normal variants
  - 4. Activation procedures
- B. Abnormal EEG
  - 1. Neonatal and childhood encephalopathies
  - 2. Interictal epileptiform abnormalities
  - 3. Focal background abnormalities
  - 4. EEG correlates of encephalopathy
- C. Drug and treatment effects
- D. Artifacts

### III. Epilepsy monitoring (20%)

- A. Seizure localization

- B. Correlation of interictal EEG findings with seizure type / epilepsy syndrome
- C. Correlation of behavioral and EEG changes
- D. Non-epileptic events (functional and physiological)
- E. Planning and interpretation of intracranial monitoring

#### **IV. Critical Care EEG Monitoring (10%)**

- A. Periodic and Rhythmic Patterns/ Standardized terminology
- B. Quantitative EEG
- C. ICU specific artifacts

#### **V. EP and IOM (15%)**

- A. Clinical evoked potentials – visual, brainstem auditory and somatosensory
  - 1. Stimulation and recording techniques
  - 2. Presumed generators of major waveforms
  - 3. Criteria for abnormality
  - 4. Clinical correlation of normal/abnormal findings
- B. Intraoperative monitoring
  - 1. Impact of anesthetics, environmental and systemic factors on monitoring
  - 2. SEP/MEP/EMG monitoring for spinal cord surgery
  - 3. BAEP monitoring for brainstem surgery

#### **VI. Sleep (5%)**

- A. Recognition of sleep stages and arousals
- B. PSG findings in common sleep disorders
- C. Interpretation of MSLT

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## **Epilepsy Monitoring Exam Content Outline**

### **I. Correlation of interictal EEG with seizure type (10%)**

- A. Partial onset
- B. Secondly generalized
- C. Primary generalized
  - 1. Convulsive
  - 2. Nonconvulsive

### **II. Identification of various patterns of ictal onset, propagation, and resolution along with their localizing significance in scalp recordings (25%)**

- A. Focal onset seizure
- B. Generalized convulsive seizure
- C. Generalized nonconvulsive seizure
- D. Syndromes
  - 1. Hypsarrhythmia – electrodecremental seizures
  - 2. Lennox Gastaut syndrome
  - 3. Electrical SE during slow sleep
  - 4. Landau-Kleffner syndrome

- E. Recognition of non-ictal events & patterns
  - 1. Artifacts
  - 2. Nonepileptic paroxysmal patterns
- F. Technical aspects
  - 1. Appropriate recording montages
  - 2. Use of additional electrodes (T1, T2, sphenoidals, etc.)
  - 3. Activation techniques
  - 4. Other approaches that may assist in event interpretation

**III. Recognition of clinical manifestations of various seizure types, and their appropriate classification (20%)**

- A. Simple partial
- B. Complex partial
  - 1. Automatisms
  - 2. Lateralizing signs
  - 3. Localizing signs
- C. Secondarily generalized
  - 1. Lateralizing signs
  - 2. Localizing signs
- D. Primary generalized
  - 1. Convulsive
  - 2. Absence
- E. Myoclonic
- F. Atonic

**IV. Identification and localization of neonatal seizures (6%)**

- A. Interictal EEG patterns
- B. Ictal EEG patterns
  - 1. Focal
  - 2. Multifocal
- C. Clinical manifestations

**V. Recognition of behavioral features suggestive of non-epileptic events (15%)**

- A. Psychogenic
- B. Syncope/Arrhythmia
- C. Parasomnia
- D. Other

**VI. Planning and Interpretation of Intracranial Monitoring (2%)**

- A. Indications for intracranial monitoring
- B. Choice of intracranial electrodes
  - 1. Subdural strips
  - 2. Grids
  - 3. Depth electrodes
  - 4. Stereo EEG
- C. Interictal epileptiform activity
- D. Ictal activity
  - 1. Identification of seizure onset
  - 2. Localization

- E. Functional mapping with cortical stimulation
  - 1. Intra-operative
  - 2. Extra-operative

**VII. Evaluation of patients for epilepsy surgery (12%)**

- A. EEG findings leading to
  - 1. Temporal lobectomy
  - 2. Corpus callosotomy
  - 3. Multiple subpial transection
  - 4. Neurostimulators
  - 5. Stereotactic ablation and other techniques
- B. EEG and the intracarotid amobarbital test (Wada)
- C. Intraoperative electrocorticography
  - 1. Uses
  - 2. Limitations
- D. Other diagnostic modalities
  - 1. ictal SPECT
  - 2. MEG
  - 3. EEG-fMRI
  - 4. PET-EEG

## **Neurophysiologic Intraoperative Monitoring Exam Content Outline**

**I. Basic NIOM techniques (20%)**

**(Methodology and Principle/Neurophysiologic Anatomic Correlation)**

- A. SEP
- B. MEP
- C. BAEP
- D. EEG
- E. ECoG
- F. EMG/NCS
- G. VEP
- H. Others

**II. Planning an NIOM procedure (5%)**

- A. Customized multimodal technique for monitoring and mapping
  - 1. Extracting the necessary information from patient history and exam
  - 2. Choosing the appropriate techniques
  - 3. Foreseeing challenging recordings (poor baselines, changes with position)
- B. Discussing the plan with surgical/anesthesia teams

**III. Live NIOM monitoring and mapping (40%)**

- A. Critical steps of different surgical procedures
- B. Interpretation of monitoring results: expected patterns of neurophysiologic changes and mechanisms of injury
- C. Management of the neurophysiologic changes
- D. Interpretation of mapping results

E. Communication in the operating room and documentation

**IV. Anesthetic effects on neurophysiologic recordings (15%)**

- A. SEP
- B. MEP
- C. BAEP
- D. EEG
- E. ECoG
- F. EMG/NCS
- G. VEP
- H. Anesthesia not modality related
- I. Others

**V. Operating room procedures (15%)**

**(Equipment/networking issues and technical troubleshooting)**

- A. NIOM equipment, hardware, and software (e.g., amplifiers, filters, averaging, electrical issues)
- B. Other NIOM equipment (e.g., electrodes, stimulators, cables, connectors)
- C. Networking/Remote access
- D. Anesthesia and OR equipment, sterilization, safety in the operating room.

**VI. Ethical and medicolegal issues (5%)**

- A. ACNS guidelines
- B. AANEM guidelines
- C. AAN guidelines
- D. Billing rules/CPT coding
- E. Standard of care and other medicolegal issues
- F. Other

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## **Critical Care EEG Monitoring Exam Content Outline**

**I. Terminology (15%)**

- A. Standardized critical care EEG nomenclature
- B. Periodic discharges and modifiers
- C. Rhythmic delta activity and modifiers
- D. Clinical correlation

**II. Technical aspects of recording (5%)**

- A. Electrodes
- B. Montages
- C. Troubleshooting

**III. Background patterns (15%)**

- A. EEG correlates of different types of encephalopathy
- B. EEG continuity and reactivity
- C. Medication effects

**IV. Artifacts (10%)**

- A. Physiological
- B. Non-physiological

**V. Quantitative EEG (25%)**

- A. Basic principles of qEEG and trending
- B. Clinical application
  - 1. Identification of seizures
  - 2. Identification of ischemia
  - 3. Recognition of artifacts

**VI. Indications for long term ICU EEG monitoring (5%)**

- A. Seizures
- B. Cerebrovascular disease
- C. Coma and altered consciousness

**VII. Seizures and status epilepticus (15%)**

- A. Non-convulsive seizures
- B. Status epilepticus
- C. Ictal-interictal continuum

**VIII. Hypoxic-ischemic brain injury (10%)**

- A. Dynamic EEG changes
- B. Prognosis

**Pediatric EEG Exam  
Content Outline**

**I. Pediatric Electroencephalography (35%)**

**(Infant to adolescent)**

- A. Age-related normal patterns
  - 1. Wakefulness
  - 2. Drowsiness
  - 3. Sleep
- B. Benign variants and variants of unknown clinical significance
- C. Non-epileptiform abnormalities
- D. Epileptiform abnormalities
  - 1. Interictal
  - 2. Ictal
- E. Medication effects
- F. Activation procedures
  - 1. Hyperventilation
  - 2. Photoc stimulation
- G. Artifacts

**II. Pediatric Prolonged Monitoring (35%)**

- A. Clinical correlation of EEG with behavior/seizure type/epilepsy-related syndrome
- B. Seizure semiology

- C. Localization and propagation of seizures
- D. EEG in relation to non-epileptic events
- E. Periodic, coma and seizure patterns
- F. Status epilepticus

### **III. Neonatal EEG (30%)**

- A. Basic EEG characteristics of premature and term neonates
- B. Age-related EEG waveforms
- C. Ontogeny of sleep/wake cycling
- D. Non-epileptiform abnormalities
- E. Epileptiform abnormalities
- F. Clinical correlation of EEG with medical condition/epilepsy-related syndrome