



**AMERICAN BOARD OF CLINICAL
NEUROPHYSIOLOGY, INC.**

Candidate Handbook

ABCN Executive Office
2908 Greenbriar Dr., Suite A
Springfield, IL 62704
Phone 217-726-7980
Fax 217-726-7989
abcn@att.net

www.abcn.org

TABLE OF CONTENTS

General information	3
Training Requirements	3
Exemptions	4
Application Procedure	4
The Examination	5
Notification of Results	5
Certification & Recertification	5
Verification of Credentials	6
Examination	
Part I	7
Content Outline	7
Reference List	9
Part II Tracks	
Epilepsy Monitoring Track	12
Neurophysiologic Intraoperative Monitoring	14
Critical Care EEG	16
Generalist Track	17
Recertification Outline	18

GENERAL INFORMATION

The American Board of Clinical Neurophysiology, Inc. (formerly The American Board of Qualification in Electroencephalography, Inc.) was founded in 1946 by Herbert Jasper, M.D. It is one of the oldest free-standing Board for medical certification.

The purpose of the Board is to establish and improve standards of knowledge and proficiency in the professional practice of Clinical Neurophysiology. The ABCN examination is intended to test the knowledge of the candidate in CNP involving the central nervous system. The Board will expect the candidate to demonstrate knowledge in the area of basic neurological science that is relevant to understanding and performing related procedures involved with the practice of CNP in disorders of the nervous system. This is accomplished by examinations in the field of Clinical Neurophysiology (CNP) of the Central Nervous System, including Electroencephalography (EEG), Evoked Potentials (EP), and Sleep. The Board grants one or more subspecialty designations (upon successful completion of the Part II examination) in the areas of: General Clinical Neurophysiology, Epilepsy Monitoring, Neurophysiologic Intraoperative Monitoring and Critical Care EEG. The Board issues certification to eligible candidates who have satisfactorily completed both Parts I and II of the examination.

ADMINISTRATION

The ABCN Clinical Neurophysiology examinations are sponsored by the American Board of Clinical Neurophysiology. The examinations are administered by the Professional Testing Corporation (PTC) on behalf of ABCN. PTC utilizes PSI, Inc. testing sites for delivery of the computer-based examinations.

Questions concerning the ABCN examinations should be directed to the ABCN Executive Office, (217) 726-7980/ janice@abcn.org or abcn@att.net.

TRAINING REQUIREMENTS

The ABCN is an American medical subspecialty board. Therefore, all candidates for Diplomate status must be physicians (MD, DO, MBBS, or equivalent) who have completed primary board certification in Neurology or a related board that is recognized by the American Board of Medical Specialties.

An applicant who wishes to be examined by the Board must be a physician who has successfully completed residency training in Neurology (including Pediatric Neurology) or a related field such as Neurosurgery, Psychiatry, or a critical care specialty such as Anesthesia or Critical Care, in an ACGME, UCNS or RCPSC-accredited program, and has obtained primary board certification in that area of medical subspecialty.

In addition, an applicant must have completed (or will complete within two months) training for a minimum of 12 months (full time, or full-time-equivalent through extended part-time training), as supervised by a senior clinical neurophysiologist, in a CNP fellowship program. At least 9 months of the 12 month CNP training following successful completion of residency training is required for board eligible status.

The Critical Care EEG Track requires one year of Neurophysiology/EEG Fellowship training or six months of EEG training during NeuroCritical Care Fellowship and an additional six months of supervised experience.

The training required for board eligibility includes broad exposure to the scientific basis of CNP, as well as relevant aspects of technique and instrumentation. Additional knowledge of sleep, NIOM, EM, and EP is required depending on the track chosen. All candidates are expected to have extensive experience interpreting EEGs, in all age groups and in a wide range of clinical disorders.

ABPN Subspecialty in Clinical Neurophysiology Exemption

As of 2016, new applicants who have earned certification through the American Board of Psychiatry and Neurology (ABPN) in Clinical Neurophysiology may submit documentation of this certification and be exempt from taking the ABCN Part I examination. Candidates who are successful on a Part II Track will be awarded a five year Diplomate certification.

ABEM Electrodiagnostic Exemption

As of 2016 applicants who have earned EMG certification through the American Board of Electrodiagnostic Medicine (ABEM) may submit documentation of this certification to be exempt from taking the ABCN Part I examination, and will be eligible to take the Part II NIOM Track. Upon successful completion, a five year certification in Neurophysiologic Intraoperative Monitoring will be awarded.

The ABCN also offers examination and certification for international candidates who are ineligible for primary (US) board certification. Primary training in Neurology and subspecialty training in Clinical Neurophysiology is required, as well as a current license to practice medicine. Upon successful completion of the examination, they will be designated "International Diplomates" with added competency in General CNP, EM, NIOM or CC-EEG.

APPLICATION PROCEDURE

Applications are submitted online at the ABCN website, www.abcn.org. The application process is complete only when the application fee, the application form, and the required supporting documents have been received by the Executive Office. Candidates who have trained in more than one location must have verification of their attendance from each program director to certify that the applicant has satisfactorily completed the program and is capable of independent interpretation of the appropriate CNP area of interest. Endorsement requests should be obtained near the end of training.

A candidate may apply to take the examination within the last three months of a fellowship. Upon successful completion of the examinations and notification from the fellowship director that the candidate has completed the fellowship, certification will be awarded.

All ABCN Part I and Part II Tracks are offered twice a year during two testing windows. Candidates are given six weeks to schedule and take the examination(s).

Candidates with primary (US) board certification, completing Clinical Neurophysiology training programs should submit

1. A completed ABCN application and application fee.
2. Copy of a valid and current license to practice medicine.
3. Evidence of primary US board certification, e.g. in Neurology from the ABPN, or related field.
4. Documentation from the Clinical Neurophysiology fellowship program director stating that the candidate "has (or will have within three months) completed 12 months of formal training in Clinical Neurophysiology and is competent to interpret CNP studies within their respective area of interest independently without supervision."
5. The completed scan forms for each part (I and/or II) being attempted (PDFs available on the website that may be emailed or faxed.)
6. The examination fee(s).
7. Separate testing center form and fee with intent to examine outside of North America, if desired.

Candidates who have not completed primary (US) board certification seeking ABCN International Diplomate status upon completing appropriate CNP training should submit

1. A completed ABCN application and application fee.
2. Documentation of completion of medical training and residency in neurology or related field.
3. Copy of a valid and current license to practice medicine.
4. Documentation from a CNP program director stating that the candidate "has completed 12 months of formal training in CNP and is competent to interpret EEGs and other CNP studies independently without supervision."

5. The completed scan forms for each part (I and/or II) being attempted (PDFs available on the website that may be emailed or faxed.)
6. The examination fee(s).
7. Special Testing Center form and fee (electronic submission) to examine outside of North America, if desired.

It is the responsibility of the applicant to obtain the necessary supporting documentation from the fellowship director using the provided form. Program directors should send completed forms directly to the Executive Office. The executive director of the ABCN will verify and notify the candidate of the application eligibility.

THE EXAMINATION

Examinations are conducted during two testing windows each spring and fall. Contact PSI according to instructions only after receipt of the Scheduling Authorization. If you do not receive a Scheduling Authorization within three weeks of the opening of the testing window, contact **PTC** at (212) 356-0660. It is the candidate's responsibility to contact PSI to schedule the examination appointment.

A current government-issued photo ID (driver's license or passport) must be presented in order to gain admission to the testing center. It is recommended to take a printed copy of the Scheduling Authorization as well as the PSI appointment confirmation.

To reschedule a current examination appointment to a different date within your testing window, you **MUST** contact PSI at (833) 207-1288 two business days **PRIOR** to the scheduled appointment, no later than noon Eastern Time. Candidates may not transfer outside of the testing window.

Reasonable and appropriate accommodations will be made for special needs, according to the Americans with Disabilities Act (ADA) regulations. Candidates may request a form for special accommodations.

LENGTH OF ELIGIBILITY

It is expected that both Part I and Part II examinations must be satisfactorily completed within three years after notification of approval of the application. Failure to do so requires that a new application and fee be re-submitted. A candidate who fails either Part must retest. Candidates are strongly advised to seek further education before re-examination. There is no limit to the number of times a candidate may attempt the examination within the three year period.

NOTIFICATION OF RESULTS

At the end of the examination, candidates will receive a printout that confirms their completion of the exam session. Unofficial test results will be provided prior to leaving the testing center. Approximately 4 weeks following the examination, official test results will be sent to each candidate. ABCN will release results only to the candidate.

To request a Handscore Report of the examination, visit the www.ptcny.com to complete the Handscore Request Form. There is a \$25 fee for this service.

Complaints must be sent in writing to the Executive Office no later than 14 calendar days after taking the examination. Examination materials shall not be available for review by candidates.

Certificates are sent to successful candidates within 6 weeks of exam completion. The names of new Diplomates and Certificants are announced on the ABCN website and shared with the American Clinical Neurophysiology Society and may be published in the Journal of Clinical Neurophysiology. Contact information will not be

provided. New certificants are added to the ABCN online verification database at www.abcn.org. An opt-out preference is available to prevent disclosure.

CERTIFICATION AND RECERTIFICATION

Candidates will be certified by the Board when they have passed both Part I and Part II examinations. Those successfully completing the EM track will be certified in Central CNP “with special competency in Epilepsy Monitoring.” Those successfully completing the NIOM track will be certified as a diplomate of the ABCN “with special competency in Intraoperative Monitoring.” Those successfully completing the General CNP track will be certified in “Central Clinical Neurophysiology.” Those successfully completing the CC-EEG track will be certified “with special competency in Critical Care EEG.”

ABCN certificates are time-limited. Certificants and diplomates are subject to recertification by written examination every 10 years.

Physicians certified under the ABPN Clinical Neurophysiology exemption, will be awarded a five year certification and will need to renew their certification at the end of the five year period.

Physicians certified in Neurophysiologic Intraoperative Monitoring under the ABEM exemption will be awarded a five year certification and will need to renew their certification at the end of the five year period.

Any certificate issued by the Board shall be subject to revocation any time the Board shall determine in its sole discretion that the diplomate to whom the certificate was issued either was not properly qualified to receive it or has since become disqualified because the medical license of the diplomate is withdrawn or suspended for cause. Individuals whose certificate has been revoked by the Board will be entitled to appeal the Board’s action by submitting new evidence to the Board. Any such appeal process must be initiated in writing. If this is done, the Board will consider the new evidence and then take final action. Once this procedure is completed, the Board’s decision will be final and uncontestable. Upon reinstatement of the license, certification will be reinstated upon petition by the physician.

It is the responsibility of the diplomate to keep the Executive Office informed of changes in name and address and licensure status as soon as the change is made.

VERIFICATION OF CREDENTIALS

A database of ABCN Diplomates and Certificates is maintained in the ABCN executive office. An online database of certificants and diplomates is maintained on the ABCN website for verification purposes. Requests to verify credentials in writing should be directed to the office.

The American Board of Clinical Neurophysiology, Inc. does not discriminate on the basis of age, sex, race, religion, national origin, marital status, or disability.

THE BOARD OF DIRECTORS

The Board consists of appointed or elected physicians with special expertise in the performance and practice of clinical neurophysiology.

AMERICAN BOARD OF CLINICAL NEUROPHYSIOLOGY

PART I EXAMINATION INFORMATION

The three-hour examination will be administered at a PSI Computer Testing, Inc. The examination consists of 120 objective, multiple-choice questions (1 correct answer and 3 distractors).

PSI has many computer-based testing sites in the United States. Scheduling is done on a first-come, first-service basis. Please note that hours and days of availability vary at different centers. You will not be able to schedule your examination appointment until you have received a Scheduling Authorization notice from the ABCN testing organization, Professional Testing Corporation (PTC). Candidates must schedule and take the examination(s) within the specified six week testing window.

If you need to cancel your examination appointment or reschedule to a different date within the testing period you must contact PSI at (833) 207-1288 no later than noon, Eastern Standard Time of the second business day PRIOR to your scheduled appointment. There are no refunds for this examination. If you fail to arrive for your appointment or cancel without giving the required notice, you will forfeit your examination fee. Transfers are not available. If the candidate fails to test within the 6 week period, they have forfeited their fee and must reapply for examination.

A candidate who is unsuccessful on the Part I examination may repeat the test within two years without filing a new application by advising the Executive Director and submitting a second examination fee. If the candidate does not pass the examination within five years, a new application, application fee, and examination fee must be filed with the Board. Eligibility requirements will be those in place at the time of the new application.

I. Physiology and Instrumentation 30%

- A. Physiology
 - 1. Anatomy of neural generation
 - 2. Mechanisms of EEG and evoked potential generation
 - 3. Pathophysiology of abnormal waveforms
 - 4. Basic mechanisms of epileptogenesis
- B. Instrumentation and Recording
 - 1. Basic electricity and electronics
 - 2. Amplifiers and their characteristics
 - 3. Calibration
 - 4. Filters
 - 5. Localization and polarity
 - 6. Artifacts
 - 7. Electrical safety
 - 8. Computers and principles of averaging
 - 9. Electrodes and their application
 - 10. Techniques of ECS determination
 - 11. Statistics
 - 12. Long term monitoring
 - 13. Instrumentation and safety in the operating room
 - 14. Principles of EEG digitalization

II. **Clinical EEG**

30%

- A. Normal EEG
 - 1. Maturational changes (neonatal, etc.)
 - 2. Normal adult patterns-wake
 - 3. Normal sleep patterns
 - a. Neonatal
 - b. Child
 - c. Adult
 - 4. Normal variants
 - 5. Activation procedures
- B. Abnormal EEG
 - 1. Neonatal disorders
 - 2. Epileptiform abnormalities
 - 3. Seizures
 - a. Childhood
 - b. Adulthood
 - 4. Spells
 - 5. Focal lesions of the CNS
 - 6. Encephalopathy
 - 7. Brain death and Electrocerebral Inactivity
 - 8. Drug and treatment effects

III. **EEG Recording Techniques**

10%

- A. Ambulatory EEG monitoring
- B. Video/EEG monitoring
- C. Critical Care EEG
 - 1. Coma
 - 2. Periodic Patterns
 - 3. Non-clinical seizures
 - d. Status Epilepticus
- D. EEG during surgery
 - 1. Indications and considerations
 - 2. Carotid endarterectomy
 - 3. Epilepsy
- E. Quantitative EEG

IV. **Clinical Evoked Potentials**

10%

- A. Visual
 - 1. Criteria of abnormality
 - 2. Clinical correlation
- B. Auditory

- 1. Criteria of abnormality
 - 2. Clinical correlation
 - C. Somatosensory
 - 1. Criteria of abnormality
 - 2. Clinical correlation
 - D. Event related
 - 1. Criteria of abnormality
 - 2. Clinical correlation
 - E. Clinical Application in Demyelinating Disease
 - F. Other monitoring
- V. **Basic Principals of Intraoperative Monitoring** 10%
- A. SEP monitoring of the spinal cord
 - B. BAEP monitoring during brainstem surgery
 - C. Motor evoked potential monitoring for spinal cord surgery
 - D. Cranial nerve monitoring
 - a. Acoustic Neuromas
 - b. Facial nerve reconstruction
- VI. **Clinical Sleep** 10%
- A. Indications for PSG/MSLT
 - B. Scoring of sleep stages and arousals
 - C. Scoring of apneas and hypopneas
 - D. Scoring of periodic leg movements
 - E. Clinical significance of apnea-hypopnea index
 - F. Clinical significance in MSLT of mean sleep latency and sleep-onset REM

2016

REFERENCES

The latest editions of the following references may be of some help in preparing for the ABCN examination. This list does not attempt to include all acceptable references, nor is it suggested that the exam is necessarily based on these references.

Abou-Khalil, B., Misulis, K.E., Atlas of EEG and Seizure Semiology. Butterworth-Heinemann, 2006.

American Clinical Neurophysiology Society Guidelines www.acns.org.

Aminoff, M.J. (Ed.) Electrodiagnosis in Clinical Neurology, 6th Edition. Churchill Livingstone, 2012.

- Blume, WT., Halloway, GH, Kaibara, M., Young, GB., Atlas of Adult Electroencephalography, 3rd Edition. Lippincott, Williams & Wilkins, 2010.
- Brenner, RP and Scheuer, M. EEG on DVD – Adult: An Interactive Reading Session. Demos Medical, 2013.
- Chiappa K., Evoked Potentials in Clinical Medicine, 3rd Edition. Raven Press, 1997.
- Chokroverty S. (Ed) Sleep Disorders Medicine: Basic Science, Technical Considerations and Clinical Aspects, 3rd Ed. Elsevier Health Sciences, 2005.
- Ebersole, JS, Husain, AM, Nordli, DR. Current Practice of Clinical Electroencephalography, 4th Edition. Wolters Kluwer, 2014.
- Fisch, BJ, Epilepsy and Intensive Care Monitoring. Demos Medical, 2010.
- Fisch, B., Fisch & Spehlmann's EEG Primer: Basic Principles of Digital and Analog EEG, 3rd Revised and Enlarged Edition. Elsevier. 1999.
- Galloway, G. Clinical Neurophysiology in Pediatrics: A Practical Approach to Neurodiagnostic Testing and Management. Demos Medical, 2015.
- Goldensohn ES, Legatt, AD, Koszer, S., Wolf, SM. Goldensohn's EEG Interpretation: Problems of Overreading and Underreading, 2nd Revised Ed. Futura. 1999.
- Hirsch, LJ and Brenner, R.P., Atlas of EEG in Critical Care, 2nd Edition. Wiley Blackwell, 2010.
- Husain, A. (Ed) A Practical Approach to Neurophysiologic Intraoperative Monitoring. 2nd Edition. Demos, 2015.
- Husain, A.M. Practical Epilepsy. Demos Medical, 2015.
- Kaplan, P.W. and Drislane, F.W., Nonconvulsive Status Epilepticus. Demos Medical, 2009.
- Kartush, J.M. and Bouchard, K. R., Neuromonitoring in Otolaryngology and Head and Neck Surgery. Raven Press, 1993.
- Krauss, G.L., Fisher, R.S., Kaplan, P.W. The Johns Hopkins Atlas of Digital EEG: An Interactive Guide. Johns Hopkins Press, 2013.
- Kryger., M.H., Dement, W., Roth, T. Principles and Practice of Sleep Medicine, 5th Ed. W. B. Elsevier Health Sciences, 2010.
- LaRoche, S.M., Handbook of ICU EEG Monitoring. Demos Medical, 2013.
- Lee-Chiong, T., Mattice, Brooks, R. Fundamentals of Sleep Technology. 2nd Edition. Lippincott Williams & Wilkins, 2015.
- Lee, K. The Neuro ICU Book. McGraw Hill, 2012.
- LeRoux, PD, Levine, JM, Kofke, AW, Monitoring in Neurocritical Care. Elsevier, 2013.

Misulis, K.E. and Head, T.C., Essentials of Clinical Neurophysiology, 3rd Ed. Elsevier Health Sciences, 2003.

Mizrahi, E.M., Hrachovy, R.A., Kellaway, P., Atlas of Neonatal Electronencephalography, 5th Edition. Lippincott Williams & Wilkins, 2003.

Moller, A., Intraoperative Neurophysiologic Monitoring. Harwood Academic Publishers. 2005.

Nuwer, M.R. (Ed.) Intraoperative Monitoring of Neural Function: Handbook of Clinical Neurophysiology. Elsevier, 2008.

Payne, T., Carney, PR, Aldrich, M., Atlas of Digital Polysomnography. Lippincott, Williams & Wilkins. 2010.

Pressman, M.R. Primer of Polysomnogram Interpretation. Butterworth-Heinemann. 2002.

Rosenow, F., Luders, O.H. (Eds.) Presurgical Assessment of the Epilepsies with Clinical Neurophysiology and Functional Imaging Handbook of Clinical Neurophysiology, Volume 3, Elsevier, 2004.

Russell, G.B., Rodichok. L.D. (Eds.) Primer of Intraoperative Neurophysiologic Monitoring. Butterworth-Heinemann, 2005.

Schomer, D.L., Da Silva, Fernando., Niedermeyer's Electroencephalography: Basic Principles, Clinical Applications and Related Fields, 6th Edition. Lippincott, Williams & Wilkins. 2011.

Simon, M.V., Intraoperative Neurophysiology. Demos Medical, 2010.

Stern, JM., Atlas of EEG Patterns. 2nd Edition. Lippincott, Williams & Wilkins, 2013

Wyllie, E., Cascino, GD, Lachhwani, DK, Gidal, BE, Goodkin, HP. The Treatment of Epilepsy: Principles and Practice, 5th Edition. Lippincott, Williams & Wilkins, 2010.

Yamada, T. and Meng, E. Practical Guide for Clinical Neurophysiologic Testing: EEG, Lippincott, Williams & Wilkins, 2010.

Yamada, T. and Meng, E., Practical Guide for Clinical Neurophysiologic Testing: EP, LTM, IOM, PSG and NCS, Lippincott, Williams & Wilkins, 2011.

Zouridakis, G. and Panpanicolaou, A., A Concise Guide to Intraoperative Monitoring. Lewis, 2000

AMERICAN BOARD OF CLINICAL NEUROPHYSIOLOGY

PART II EXAMINATION

The Part II three-hour examination will be administered at a PSI Computer Testing location.

The examination consists of approximately 100 objective, multiple-choice questions (1 correct response and 3 distractors). Candidates will have three hours to complete the track selected.

The candidate must select at least one of four tracks for the completion of Part II. Tracks include Epilepsy Monitoring, Neurophysiologic Intraoperative Monitoring, Critical Care EEG and General Clinical Neurophysiology.

Epilepsy Monitoring Track Content Outline

The Epilepsy Monitoring Track will contain more case-based items and will incorporate video segments.

- I. Correlation of interictal EEG with seizure type** 10%
 - A. Partial onset
 - B. Secondarily 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, subtemporal chain, sphenoidals, etc.)
 - 2. Activation techniques
 - 3. 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. Automatism
 - 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
 - 3. Functional mapping with cortical stimulation
 - a. Intra-operative
 - b. 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 Track Content Outline

The NIOM Track will contain more complex multiple-choice questions focused on all aspects of Neurophysiologic Monitoring. Candidates will have three hours to complete 120 items.

- I. Basic NIOM techniques** 25%
- A. SEP
 - B. MEP
 - C. BAEP
 - D. EEG
 - E. ECoG
 - F. EMG/NCS
 - G. VEP
 - H. Others
- II. Anatomy and physiology** 15%
- A. Cerebral cortex
 - B. Subcortical structures
 - C. Brainstem and cerebellum
 - D. Ascending and descending pathways
 - E. Cranial nerves
 - F. Spinal cord
 - G. Peripheral nerves, neuromuscular junction, muscles
 - H. Vascular anatomy
 - I. Head and neck
 - J. Spine and other bones
 - K. Cellular physiology
 - L. Others

III. Surgical procedures and NIOM (to include surgical technique and NIOM questions) 25%

- A. Vertebral column surgery
- B. Spinal cord surgery
- C. Lumbosacral surgery
- D. Tethered cord surgery
- E. Peripheral nerve surgery
- F. CPA surgery
- G. Vascular surgery
- H. Cardiac and aortic surgery
- I. Epilepsy surgery
- J. Brain tumor surgery
- K. Posterior fossa decompression surgery
- L. Selective dorsal rhizotomy
- M. Pain surgery
- N. Movement disorders surgery
- O. Cranial nerve surgery
- P. Pelvic floor surgery
- Q. Hip surgery
- R. ENT surgery
- S. Other surgery

IV. Anesthetic considerations 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 5%

- A. Sterilization techniques
- B. OR equipment
- C. Anesthesia equipment
- D. Aseptic techniques/sterile field
- E. Imaging
- F. Communication

VI. Equipment/Networking issues 10%

- A. Electrodes
- B. NIOM machines (incl. amplifiers, filters, averaging, electrical issues, etc)
- C. Networking, remote access
- D. Other/Ancillary equipment

VII. Ethical and medicolegal issues 5%

- A. ACNS guidelines
- B. AANEM guidelines
- C. AAN guidelines
- D. Medicare rules for interpretation
- E. Real time review issues
- F. Other

Critical Care EEG Monitoring 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%
D. Non-convulsive seizures	
E. Status epilepticus	
F. Ictal-interictal continuum	

- VII. Hypoxic-ischemic brain injury** 10%
- A. Dynamic EEG changes
 - B. Prognosis

General Clinical Neurophysiology Content Outline

The **General CNP track** will include short segments of neurophysiologic studies (EEG, evoked potentials, etc.), with one or more multiple-choice questions for each sample. Additional multiple choice questions will cover technical aspects of recording and clinical correlation.

- I. Electroencephalography** 50%
- A. Physiology of normal and abnormal waveforms
 - B. Instrumentation and acquisition procedures (include quantitative EEG)
 - C. Normal patterns of various ages in wake, drowsy, and sleep states
 - D. Neonatal normal and abnormal patterns
 - E. Activating procedures (hyperventilation, photic stimulation)
 - F. Drug effects
 - G. Focal abnormalities
 - H. Diffuse abnormalities
 - I. Coma and brain death
 - J. Epileptiform abnormalities
 - K. Benign EEG variants and patterns of unknown significance
 - L. Artifacts
- II. Epilepsy Monitoring** 25%
- A. Correlate interictal EEG with seizure type / epilepsy syndrome
 - B. Localization and propagation of epileptogenic foci (children, adults)
 - C. Correlation of behavioral and electrographic changes
 - D. Identify and localize neonatal seizures
 - E. Nonepileptic events (physiologic and psychogenic)
 - F. Plan and interpret intracranial monitoring
 - G. Evaluate patients for epilepsy surgery
- III. Evoked Potentials** 5%
- A. Visual evoked potentials (pattern reversal)
 - B. Brain stem auditory evoked potentials
 - C. Short latency somatosensory evoked potentials
 - a. Stimulus and recording techniques
 - b. Criteria for identification of major waveform components
 - c. Criteria for normal and abnormal evoked potentials for adults and children
 - d. Presumed generator sources of major waveform components
 - e. Clinical significance of various evoked potential abnormalities
 - f. Technical and non-pathologic factors that influence evoked potentials and affect interpretation

- IV. Sleep** 10%
- A. Recognition of sleep stages
 - B. Identification of examples showing the effects of age, physiological and environmental variables, and disease on sleep architecture
 - C. Interpretation of multiple sleep latency studies
 - D. Identification of polysomnographic findings in sleep-related disorders
 - E. Montages, special instrumentation and other technological aspects of sleep studies
- V. Intraoperative Monitoring** 10%
- A. SEP monitoring for spinal cord, brainstem and cerebral surgery
 - B. BAEP monitoring techniques for eighth nerve and brainstem surgery
 - C. EEG monitoring for cerebral surgery
 - D. Motor evoked potential monitoring for spinal cord surgery
 - E. Cranial nerve monitoring
 - F. Criteria for decision making

**American Board of Clinical Neurophysiology
Recertification Content Outline**

- I. EEG** 45%
- A. Epileptiform
 - B. Normal awake
 - C. Normal sleep
 - D. Artifacts
 - E. Focal (non epileptiform) abnormalities
 - F. Encephalopathy or coma
 - G. Pediatric and neonate
- II. LTM** 15%
- A. Semiology
 - 1. Epileptic
 - 2. Non-epileptic
 - B. Ictal EEG
 - 1. Epileptic
 - 2. Non-epileptic
 - C. Intracranial EEG
 - D. Presurgical Correlation
 - E. Neonatal seizures
- III. Evoked Potentials** 15%
- A. VEP
 - 1. Normal
 - 2. Abnormal
 - B. SSEP
 - 1. Normal
 - 2. Abnormal
 - C. BAEP

1. Normal
2. Abnormal

IV. Sleep 15%

- A. PSG
 1. Normal / Staging
 2. Apneas
 - a. central
 - b. obstructive
 - c. mixed
 3. PLM
 4. Other
- B. MSLT

V. Intraoperative Monitoring 10%

- A. Spine
- B. Carotid
- C. Intracranial vascular
- D. Functional surgery, mapping
- E. CP angle cases
- F. IOM Anesthesia
- G. Billing/ethics/involvement