AMERICAN BOARD OF CLINICAL NEUROPHYSIOLOGY, INC.

Candidate Handbook
2023

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INTRODUCTION

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 Boards for medical certification.

The American Board of Clinical Neurophysiology (ABCN) provides certification programs to recognize licensed physicians who demonstrate knowledge, skill, and proficiency in clinical neurophysiology (CNP) in order to facilitate the safe and proper evaluation, diagnosis, and treatment of patients. Successful candidates may earn subspecialty designations in General Clinical Neurophysiology, Epilepsy Monitoring, Neurophysiologic Intraoperative Monitoring (NIOM), Critical Care EEG, and Pediatric EEG.

The Board will expect the candidate to demonstrate knowledge in basic neurological science that is relevant to understanding and performing related procedures involved in the practice of CNP for disorders of the nervous system. This is accomplished by submitting verification of certification in Clinical Neurophysiology or Epilepsy by the American Board of Psychiatry and Neurology (ABPN) or completing the ABCN examination in CNP. The Board issues certification to candidates who have satisfactorily completed the examination. If desired, candidates may earn multiple subspecialty certifications.

The ABCN Clinical Neurophysiology examinations are recognized by the American Board of Clinical Neurophysiology. The examinations are administered by the Professional Testing Corporation (PTC) on behalf of ABCN. PTC utilizes Prometric testing sites and ProProctor for delivery of the computer-based examinations. Questions concerning the ABCN examinations should be directed to the ABCN Executive Office, ph: (217) 726-7980 or email: janice@abcn.org.

TRAINING REQUIREMENTS

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

An applicant who wishes to be examined by the Board must be a physician who has successfully completed residency training in Neurology/Pediatric Neurology or a related field such as Neurosurgery, Psychiatry, or a Critical Care specialty, such as Anesthesia, 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 training (or will complete within three months) for a minimum of 12 months (full time, or full-time-equivalent through extended part-time training), as supervised by a Board-certified clinical neurophysiologist, in a CNP, Epilepsy, NIOM, or Neuromuscular Fellowship program.

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 selected track. All candidates are expected to have extensive experience interpreting EEGs in all age groups and for a wide range of clinical disorders.

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

The NIOM exam requires a minimum of four months or 640 hours of IOM training, at least half of which have been completed during an accredited CNP Fellowship.

The Pediatric EEG exam requires a minimum of eight weeks of Pediatric-focused EEG training.

Candidates who are successful on ABCN examinations will be awarded a ten-year Diplomate certification in CNP, or CNP with special qualification in Epilepsy Monitoring, NIOM, Critical Care EEG, or Pediatric EEG.

ABEM and ABPN Electrodiagnostic/Neuromuscular Exemption

As of 2019, applicants who have earned Electrodiagnostic/Neuromuscular Medicine certification through the American Board of Electrodiagnostic Medicine (ABEM) or the ABPN may submit documentation of this certification to be exempt from the ABCN Clinical Neurophysiology Examination. Eligibility will be granted to take the NIOM exam. Upon successful completion, a ten-year certification in NIONM will be awarded. Certificants will not be boarded in CNP.

International Candidates

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 CNP is required, as well as a current medical US license. Upon completing the examination(s), successful candidates will be awarded a ten-year "International Diplomate" in CNP or CNP with special qualification in Epilepsy Monitoring, NIOM, Critical Care EEG, or Pediatric EEG.

LENGTH OF ELIGIBILITY

It is expected that an examination 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 may 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.

APPLICATION PROCEDURE

Step 1 – Complete ABCN Application

- Go to http://www.abcn.org/forms-fees and complete the online Application Form.
- Upload your license to practice medicine.

- Submit the Verification of Training Form from your program. Please note there is a form specific to IOM training and pediatric EEG training.
- Pay the application fee of $250.
- Select the exam(s) you will be taking.
- Pay the examination fee(s).

Please note: You must complete the examination application in full, entering your first and last name exactly as it appears on your current government-issued photo ID such as a driver's license or a passport.

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 for the examination within the last three months of a Fellowship. Upon successful completion of the examination(s) and notification from the Fellowship Director that the candidate has competed the Fellowship, certification will be awarded.

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 ABCN Executive Office (or janice@abcn.org).

If applying under one of the exemptions on page 4, submit documentation satisfying the exemption. You may opt to take multiple exams during the same testing window.

The Executive Director of the ABCN will verify submitted documentation and notify the candidate of the application eligibility.

Step 2 – Complete the PTC Application Forms

- Go to https://secure.ptcny.com/apply to complete the online PTC application. Retain the link to the form and your login information.

  Please note: For new applications, you will be asked to create a PIN number. This PIN will be used when returning to your existing application.

Applications are not considered complete until all information and payment has been provided. The completed application must be submitted online.

Step 3 – Receive Scheduling Authorization and Schedule Testing Appointment

Within eight (8) weeks prior to the start of the testing period, candidates will receive a Scheduling Authorization from PTC via email from notices@ptcny.com. The Scheduling Authorization includes an eligibility number and information on how to set up your examination location, date, and time through Prometric. Retain this document; you will need your eligibility number to access your score report. The American Board of Clinical Neurophysiology, Inc. does not discriminate on the basis of age, sex, race, religion, national origin, marital status, or disability.

EXAMINATION ADMINISTRATION AND SCHEDULING

The ABCN Subspecialty examinations are administered during an established six-week testing period on a daily basis, Monday through Saturday, excluding holidays, at computer-based testing facilities managed by Prometric. If desired, candidates may apply to take more than one examination during the testing window.

Scheduling Examination Appointments

If you do not receive a Scheduling Authorization at least three weeks before the beginning of the testing period, contact the Professional Testing Corporation at (212) 356-0660 or online at www.ptcny.com/contact.

The Scheduling Authorization will indicate how to schedule your examination appointment with Prometric as well as the dates during which testing is available. Appointment times are first come, first serve, so schedule your appointment as soon as you receive your Scheduling Authorization in order to maximize your chance of testing at your preferred location and on your preferred date. Candidates who wait until the last minute run the risk of missing out on their preferred date, time, and testing center. Candidates unable to schedule an appointment will forfeit their fees.

Your examination is now available to be administered in two ways: at a physical Prometric test center or via live remote proctoring in your home or another quiet distraction-free location. For the live remote proctoring option, you must provide a computer with a camera, microphone, and an internet connection to allow real-time communication with a remote proctor.

The remote proctoring option requires candidates to download ProProctor™ software from Prometric to establish remote access to the candidate's computer. This application includes Prometric's test engine software, as well as a lockdown browser to ensure secure test delivery.

1. Run a system readiness check to confirm that your computer and network will allow testing through ProProctor,™ from this link: https://rpcandidate.prometric.com/Home/SystemCheck
2. Schedule your exam by visiting www.prometric.com and selecting the appropriate icon under Remotely Proctored Exam menu.
3. Download Prometric's ProProctor™ application. This will enable you to take the exam online while a Prometric proctor is monitoring the examination process remotely. It is recommended that you download and install this software a day before you are scheduled to take the exam.

After you make your test appointment, Prometric will send you a confirmation email with the date, time, and location of your exam. Please check this confirmation carefully for the correct date, time, and location. Contact Prometric at (800) 741-0934 if you do not receive this email confirmation or if there is a mistake with your appointment.

If you wish to change your existing test appointment from a physical test center to live remote proctoring or vice versa, you will need to go to www.prometric.com/abcn and select the appropriate icon to make this change. Please note that candidates within five days of their scheduled appointment are not permitted to reschedule. If you are more than five days from of your test appointment, there is a $50 charge to change to/from remote proctoring to a physical test center.

Note: International candidates may also schedule, reschedule, or cancel an appointment online at prometric.com.

IMPORTANT! You must present your current driver's license, passport, or U.S. Military ID at the testing center or to your Remote Proctor at the time of your examination appointment or you will be refused admission. The first and last name on the ID must exactly match the first and last name on the Scheduling Authorization.

Rescheduling Examination Appointments within a Testing Period

Candidates are able to reschedule their examination appointments within the same testing period as long as the request is submitted within the timeframe described below. Reschedule within the permitted time frame by calling or going to the Prometric website: www.prometric.com/ABCN.

Time Frame	Reschedule Permitted?	Stipulations
Requests submitted 30 days or more before the original appointment	Yes	None
Requests submitted 29 to 5 days before the original appointment	Yes	Candidate must pay a rescheduling fee.
Requests submitted less than 5 days before the original appointment	**No**	Candidates who do not arrive to test for their appointment will be considered a no-show and all their examinations fees will be forfeited. Candidates will need to reapply and pay fees for a future testing period.

Failing to Report for an Examination

If you fail to report for an examination, you will forfeit all fees paid to take the examination. A completed application form and examination fee are required to reapply for the examination.

EXAMINATION 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 close of the testing window official test results will be sent to ABCN. ABCN will release results only to the candidate.

To request a Handscore Report of the examination, visist 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 8 weeks of receipt of official results. 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 an examination. Those successfully completing exams will be awarded the following designation(s):

- Diplomate of the ABCN in General Clinical Neurophysiology
- Diplomate of the ABCN in Clinical Neurophysiology with special qualification in Epilepsy Monitoring
- Diplomate of the ABCN in Clinical Neurophysiology with special qualification in Intraoperative Monitoring.
- Diplomate of the ABCN in Clinical Neurophysiology with special qualification in Critical Care EEG.
- Diplomate of the ABCN in Clinical Neurophysiology with special qualification in Pediatric EEG.

ABCN certificates are time limited. Certificants and Diplomates are subject to recertification every 10 years. Recertification requires the submission of 45 hours of Category I CME in Clinical Neurophysiology, Epilepsy, NIOM or Critical Care EEG every 5 years culminating in 90 hours by year 10. Current fees will apply.

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 BOARD OF DIRECTORS

The Board consists of appointed or elected physicians with special expertise in clinical neurophysiology.

SPECIAL NEEDS

The ABCN and PTC support the intent of and comply with the Americans with Disabilities Act (ADA). PTC will take steps reasonably necessary to make certification accessible to persons with disabilities covered under the ADA. According to the ADA, an individual with a disability is a person who has a physical or mental impairment that substantially limits a major life activity (such as seeing, hearing, learning, reading, concentrating, walking) or a major bodily function (such as neurological, endocrine, or digestive system). The information you provide and any documentation regarding your disability and special test accommodations will be held in strict confidence.

All approved testing accommodations must maintain the psychometric nature and security of the examination. Accommodations that fundamentally alter the nature or security of the exam will not be granted.

Special testing arrangements may be made upon receipt of the Application, examination fee, and a completed and signed Request for Special Needs Accommodations Form, available from www.ptcny.com/PDF/PTC_SpecialAccommodationRequestForm.pdf or by calling PTC at (212) 356-0660.

This Form must be uploaded with the online application no later than 8 weeks prior to the start of the chosen testing period.

Only those requests made and received on the official Request for Special Needs Accommodations Form will be reviewed. Letters from doctors and other healthcare professionals must be accompanied by the official Form and will not be accepted without the Form. All requests must be made at the time of application. Accommodations cannot be added to an existing exam appointment.

PREPARING FOR THE EXAMINATION

- Check your government issued photo ID (driver's license, passport, or U.S. Military ID) when you make your examination appointment. Is it expired? Does the name on your ID match the name on your Scheduling Authorization email? Proctors at the Prometric testing center will refuse admission to candidates with expired IDs, IDs with names that do not match their records, and temporary paper IDs. Candidates will be marked as no-shows and will forfeit their exam fees.

- Check your PTC Scheduling Authorization email and Appointment Confirmation email from Prometric to make sure everything is accurate (i.e., your name, exam name, appointment date, time, and location).

- Make yourself familiar with the location of your chosen testing site and any requirements they may have for parking and check the weather and traffic conditions before you leave for the testing center. Give yourself plenty of time to arrive as late arrival may prevent you from testing.

- In the event of inclement weather, check the Prometric website for site closures: https://www.prometric.com/en-us/pages/siteclosure.aspx.

- Prometric's website provides information on what you can expect on your test day, including a walkthrough of check in and security procedures: www.prometric.com.

- This Handbook provides the Content Outline for the Examination (see appendix). Use these to help you start studying for the examination.

- Review the Rules for the Examination on the next page before your appointment.

WHAT TO EXPECT AT THE TESTING CENTER

PTC has partnered with Prometric Testing Centers to deliver examinations to candidates. Here is what you can expect when you arrive at your Prometric Testing Center.

- Candidate Check-In
    - Candidates will be asked to present their IDs
    - Candidates will be asked to empty and turn out their pockets
    - Candidates will be "wanded" or asked to walk through a metal detector
    - Inspection of eyeglasses, jewelry, and other accessories will be conducted. Jewelry other than wedding and engagement rings is prohibited.
    - Religious headwear may be worn into the testing room; however, it may be subject to inspection by a testing center administrator before entry into the testing room is permitted.
    - Prometric provides lockers for candidates to store their purses, mobile phones, jackets, food, drinks, and medical supplies.

- During the Exam
    - No breaks are scheduled during the exam. Candidates who must leave the testing room to take a break will not be given extra time for the exam.
    - Accessing mobile phones or study materials during the examination is prohibited.
    - Smoking is prohibited at the testing center.
    - All examinations are monitored and may be recorded in both audio and video format.
    - Clinical Neurophysiology candidates will be given 2.5 hours to complete the examination. Candidates completing the other subspecialty examinations will have 2 hours.

Please keep in mind: other exams will be administered at the same time as your examination. Therefore, examinees may hear ambient noises such as typing, coughing, or people entering and

exiting the testing room that cannot be avoided. Prometric is unable to provide a completely noise-free environment. However, headphones may be requested to minimize impact.

Please see Prometric's website for more information about what to expect on testing day.

RULES FOR THE EXAMINATION

Please read the information below carefully. You are responsible for adhering to the examination rules while at the testing center.

- You must present your current driver's license, passport, or US Military ID at the testing center. Candidates without valid ID will NOT be permitted to test. Temporary or paper copies of your ID will not be accepted.

- No Electronic devices that can be used to record, transmit, receive, or play back audio, photographic, text, or video content, including but not limited to, cell phones, laptop computers, tablets, Bluetooth devices; wearable technology (such as smart watches), MP3 players (such as iPods), pagers, cameras, and voice recorders are permitted to be used and cannot be taken in the examination room. Prometric provides lockers for your personal items.

- No papers, books, or reference materials may be taken into or removed from the testing room.

- Accessing cell phones and electronic devices at any time while you are taking the exam is prohibited. You can only remove snacks, drinks, medicine, or personal healthcare items from your locker – no backpacks, bags, pocketbooks or clothing can be removed while your exam is in session.

- No questions concerning content of the examination may be asked during the examination session. The candidate should carefully read the directions that are provided on screen at the beginning of the examination session.

- Candidates are prohibited from leaving the testing room while their examination is in session, with the sole exception of going to the restroom.

- Bulky clothing, such as sweatshirts (hoodies), jackets, coats, and hats (except hats worn for religious reasons), and most types of jewelry may not be worn while taking the examination. Proctors will ask you to remove such items and place them in your locker. Please see Prometric's statement on Test Center Security for more information.

- Watches and "Fitbit" type devices cannot be worn during the examination.

- No food/beverages are permitted inside the testing room. Leave these items in your assigned locker.

Contact PTC at (212) 356-0660 or www.ptcny.com/contact with any questions about the Examination Rules.

VIOLATION OF ANY OF THE RULES LISTED ABOVE MAY LEAD TO FORFEITURE OF FEES, DISMISSAL FROM THE TESTING ROOM, AND CANCELLATION OF YOUR TEST SCORES.

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. 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, 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. Photic 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

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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.

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., Blume's Atlas of Pediatric and Adult Electroencephalography. Wolters Kluwer 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 Ed. Raven Press, 1997.

Chokroverty S. (Ed) Sleep Disorders Medicine: Basic Science, Technical Considerations and Clinical Aspects, 4th Ed. Springer, 2017.

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. Springer Publishing, 2015.

Geyer, J.D., Carney, PR, Payne, T. Atlas of Polysomnography, 2nd Ed. Lippincott, Williams & Wilkins. 2010.

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.

Husain, A.M. Illustrated Manual of Clinical Evoked Potentials. Demos, 2017.

Kaplan, P.W. and Drislane, F.W., Nonconvulsive Status Epilepticus. Demos Medical, 2009.

Kartush, J.M. and Bouchard, K. R., Neuromonitoring in Otology 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, 2nd Edition. Johns Hopkins Press, 2013.

Kryger., M.H., Roth, T., Dement, W. Principles and Practice of Sleep Medicine, 6th Ed. W. B. Elsevier Health Sciences, 2016.

LaRoche, S.M. and Haider H.A. Handbook of ICU EEG Monitoring, 2nd Ed. Demos Medical, 2018.

Lee-Chiong, T., Mattice, Brooks, R. Fundamentals of Sleep Technology. 3rd Ed. Wolters Kluwer, 2019.

Lee, K. The Neuro ICU Book, 2nd Ed. McGraw Hill Medical, 2017.

LeRoux, P.D., Levine, J.M., Kofke, A.W., Monitoring in Neurocritical Care: Expert Consult. Saunders, 2013.

Misulis, K.E. and Head, T.C., Essentials of Clinical Neurophysiology, 3rd Ed. Butterworth Heinemann, 2003.

Misulis, K.E., Atlas of EEG, Seizure Semiology, and Management, 2nd Edition. Oxford University Press, 2013.

Mizrahi, E.M., Hrachovy, R.A., Kellaway, P., Atlas of Neonatal Electroencephalography, 4th Edition. Springer Publishing, 2015.

Møller, A.R., Intraoperative Neurophysiologic Monitoring, 3rd Ed. Springer Publishing. 2011.

Nuwer, M.R. (Ed.) Intraoperative Monitoring of Neural Function: Handbook of Clinical Neurophysiology (Volume 8). Elsevier, 2008.

Pellock, J.M., Nordli, Jr. D.R., Sankar, R., Wheless, J.W. Pellock's Pediatric Epilepsy: Diagnosis and Therapy, 4th Ed. Demos Medical 2016.

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

Rosenow, F., Lüders, 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., Lopes da Silva, F.H. Niedermeyer's Electroencephalography: Basic Principles, Clinical Applications and Related Fields, 7th Ed. Oxford University Press. 2017.

Simon, M.V., Intraoperative Neurophysiology, 2nd Ed. Demos Medical, 2018.

Stern, J.M., Atlas of EEG Patterns, 2nd Ed. Lippincott, Williams & Wilkins, 2013

Tatum W.O. Atlas of Artifacts in Clinical Neurophsyiology. Demos Medical, 2019.

Wyllie, E., Gidal, B.E., Goodkin, H.P., Jehi L, Loddenkemper T. The Treatment of Epilepsy: Principles and Practice, 7th Ed. Lippincott, Williams & Wilkins, 2020.

Yamada, T. and Meng, E. Practical Guide for Clinical Neurophysiologic Testing: EEG, 2nd Ed. Wolters Kluwer, 2017.

Yamada, T. and Meng, E., Practical Guide for Clinical Neurophysiologic Testing: EP, LTM/ccEEG, IOM, PSG and NCS/EMG, 2nd Ed. Wolters Kluwer, 2011.

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