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
janice@abcn.org

www.abcn.org

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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 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.

The ABCN Clinical Neurophysiology examinations are sponsored by the American Board of Cliinical Neurophysiology. The examinations are administered by the Professional Tesitng Corporation (PCT) on behalf of ABCN. PTC utilizes Prometric 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/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 or Epilepsy Exemption

As of 2019, new applicants who have earned certification through the American Board of Psychiatry and Neurology (ABPN) in **Clinical Neurophysiology** or **Epilepsy** 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 ten year Diplomate certification.

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 American Board of Psychiatry and Neurology (ABPN) 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 ten year certification in Neurophysiologic Intraoperative Monitoring will be awarded.

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 Clinical Neurophysiology is required, as well as a current license to practice medicine. Upon successful completion of the examination, the designation earned will be “International Diplomates” with added competency in General CNP, EM, NIOM or CC-EEG.

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.

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, scanner 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 competed 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 in which to schedule and take the examination(s). If desired, candidates may apply to take both Part I and a Part II Track during the same testing window.

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

1. A completed ABCN online Part I Application and submission of fee.
2. PDF of completed Part I Scanner Form (Emailed, Faxed or Mailed to ABCN)
3. Copy of a valid and current license to practice medicine.
4. Evidence of primary US board certification, e.g. in Neurology from the ABPN, or related field.
5. 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."
6. If applying under one of the exemptions on page 4, submit documentation of satisfying the exemption for the Part I. Pay only the Application Fee and not the Part I examination fee.
7. A completed ABCN online Part II Application and submission of examination fee.
8. PDF of completed Part II Scanner Form (Emailed, Faxed or Mailed to ABCN)

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 online Part I 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).

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 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.

Scheduling Examination Appointments

Eleven weeks prior to the first day of the testing period, you will be emailed a Scheduling Authorization from notices@ptcny.com. Please ensure you enter your correct email address on the application and add the 'ptcny.com' domain to your email safe list. If you do not receive a Scheduling Authorization at least six 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 5 days of their scheduled appointment are not permitted to reschedule. If you are within 29-5 days 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 test center. Expired, temporary, or paper driver's licenses will NOT be accepted. The name on your Scheduling Authorization MUST exactly match the name on your photo ID. ***Fees will not be refunded for exams missed because of invalid ID.***

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 Prometric a rescheduling fee of $50.
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 session 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 6 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 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 every 10 years. Recertification requires the submission of 30 hours of Category I CME in Clinical Neurophysiology, Epilepsy, Intraoperative Monitoring or Critical Care EEG every 3 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 the performance and practice of 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. Make sure you 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 on 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

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.

- ⇨ No questions concerning content of the examination may be asked during the examination session. The candidate should read carefully 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.

PART I EXAMINATION

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

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

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.

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PART II EXAMINATION

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

The examination consists of approximately 100-120 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, 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 Track Content Outline

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

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

General Clinical Neurophysiology
Content Outline

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
    1. Stimulus and recording techniques
    2. Criteria for identification of major waveform components
    3. Criteria for normal and abnormal evoked potentials for adults and children
    4. Presumed generator sources of major waveform components
    5. Clinical significance of various evoked potential abnormalities
    6. 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