Background

Needle electromyography, or needle EMG, is a type of electrodiagnostic test used to determine whether a patient’s muscles and nerves are working properly. Physicians order the test when a patient is experiencing numbness, tingling, pain, weakness, or muscle cramping. Typically, neurologists, physical medicine and rehabilitation physicians (physiatrists), and, on occasion, orthopedic surgeons perform EMG.

During an EMG, a small, thin needle electrode is inserted through the skin and into a muscle. The electrical activity detected by the electrode displays on an oscilloscope. Recordings are made while the muscle is at rest and during the contraction. The physician performing the test may move the limb being tested and/or direct the patient to contract it. The electrical activity produced on the oscilloscope provides information about the ability of the muscle to respond when the nerves are stimulated. The needle can be repositioned in the same muscle for further recording, and other muscles may be tested as well. Patients can resume normal activities after the test and there are no lasting side effects.

EMG can help diagnose many muscle and nerve disorders, including:
- Peripheral neuropathy
- Guillain-Barre syndrome
- Amyotrophic lateral sclerosis
- Carpal tunnel syndrome
- Multiple sclerosis
- Muscular dystrophy
- Diabetic neuropathy
- Myasthenia gravis

Interpreting EMG results can be complex and requires analyzing the onset, duration, amplitude, and other characteristics of the spike patterns produced on the oscilloscope.

According to the American Association of Neuromuscular and Electrodiagnostic Medicine (AANEM), physicians who perform EMGs attend four years of medical school, then complete three or four more years of training in a residency program, typically in neurology or physical medicine and rehabilitation.
The American Board of Psychiatry and Neurology (ABPN) and the American Board of Physical Medicine and Rehabilitation (ABPMR) grant certification in neuromuscular medicine. Beginning in 2013, both boards will require successful completion of a fellowship in neuromuscular medicine approved by the Accreditation Council for Graduate Medical Education (ACGME). Applicants applying for certification prior to 2013 can do so under provisions that allow for other alternatives, including nonaccredited programs and work experience in neuromuscular medicine.

The American Board of Electrodiagnostic Medicine (ABEM) also offers board certification in electrodiagnostic medicine to neurologists and physiatrists. To qualify for certification, candidates must be board-certified in neurology or physiatry. They must also complete a six-month preceptorship and one year of experience following training. The board also has requirements for the number of electrodiagnostic evaluations completed (see ABEM on p. 5).

Involved specialties
Neurologists, physiatrists, orthopedic surgeons, and pediatric rehabilitation specialists

Positions of societies and academies
According to AANEM, only physicians who have been adequately trained in needle EMG testing should perform the procedure. That training includes four years of medical school, followed by three or four more years of residency training.

The AANEM publishes three position statements relating to the qualifications and education needed to perform EMGs.

In the AANEM statement Who is Qualified to Practice Electrodiagnostic Medicine?, the association states that the electrodiagnostic medicine consultant should be a physician specially trained in the diagnosis and treatment of neurological and neuromuscular diseases, as well as in the application of particular neurophysiologic techniques. The type of training is generally included in the residency or fellowship programs of physicians who specialize in physical medicine and rehabilitation or neurology.

Training should include the basic sciences pertinent to the understanding of these diseases, as well as additional special knowledge of electrophysiologic techniques. Recommended requirements include:

- A neurology or physical medicine and rehabilitation residency accredited by the ACGME or the Royal College of Physicians and Surgeons of Canada (RCPSC).
A period of preceptorship in electrodiagnostic medicine that is coordinated with the presentation of didactic material must be satisfactorily completed under direct supervision of an experienced consultant. This period of preceptorship may be taken during and/or after an approved residency training program and must be at least six months full-time or equivalent part-time. The first three months should be rigidly structured and supervised. During the preceptorship, at least 200 complete electrodiagnostic evaluations must be performed on separate occasions; these studies must be documented and interpreted. The individual must have experience with neuromuscular disorders in adults and children.

Electrodiagnostic training should include adequate educational experience in:

- Anatomy
- Muscle and nerve pathology
- Neuromuscular physiology
- Electrophysiology, including instrumentation, qualification, and statistical analysis
- Clinical aspects of neurological and musculoskeletal conditions, with particular emphasis on diagnosis and treatment of neuromuscular diseases as they pertain to clinical electrodiagnostic medicine

The statement also says that competency in electrodiagnostic medicine can be achieved only with at least one year of experience following training, during which physicians must perform 200 additional complete electrodiagnostic evaluations on separate occasions. This period of independent experience should begin after satisfactory completion of the approved graduate medical education program and the six-month preceptorship. The year of independent experience may be part of a post-residency program when the individual has been given primary responsibility for the performance and interpretation of the examination and preparation of the reports.

According to the AANEM statement *Credentialing of Physicians as Electrodiagnostic Medicine Consultants*, electrodiagnostic consultations are an extension of the neurologic portion of the physical examination. Its guidelines state that consultants should personally perform the needle electromyographic examination and not delegate these examinations to technologists or others who are not electrodiagnostic consultants.
The AANEM further states that each hospital or institution must define the criteria used to determine whether an individual physician is qualified for specific clinical privileges. Such criteria may include a combination of a wide range of requirements, including but not limited to:

- Completion of a residency training program
- Additional specialized course work
- Medical subspecialty certification

This position statement concludes by stating that consultants seeking credentials in an inpatient or outpatient facility should be evaluated on the basis of training, experience, and competence.

Physicians from various backgrounds may perform an electrodiagnostic consultation; therefore, basic formal background, including board certification in a given specialty, should not be the sole criterion for granting privileges.

In Qualifications of Physiatrists to Perform Electrodiagnostic Studies, the AANEM states that the electrodiagnostic medicine consultant should be a physician who has had special training in the diagnosis and treatment of neurological and neuromuscular diseases and in the application of particular neurophysiologic techniques to the study of these disorders.

The type of training is generally included in the residency or fellowship programs of physicians who specialize in physical medicine and rehabilitation or neurology. The recommended educational requirements for the electrodiagnostic consultant include a residency in neurology or physical medicine and rehabilitation.

The American Osteopathic Association (AOA) and the American College of Osteopathic Neurologists and Psychiatrists (ACONP) publish Basic Standards for Subspecialty Residency Training in Neurophysiology, which states that institutions must provide sufficient numbers of neurophysiological procedures, which include EMG, to enable the neurophysiologic subspecialty resident to gain special competence in neurophysiology.

The training program in neurophysiology must include one year of uninterrupted studies. As it relates to EMGs, the following are the variations for the one year of training:

- One year of uninterrupted studies and experience in neuromuscular disorders (EMG and evoked potentials) with
participation in a minimum of 500 documented EMGs, including academic experience lectures and case presentations of one year of formal concentrated study.

- One year of uninterrupted studies and experience in epilepsy and evoked potentials, with participation in a minimum of 500 documented EMGs, including academic experience lectures and case presentations of one year of formal concentrated study.

- One year of uninterrupted studies and experience in epilepsy and evoked potential studies (250 cases). Cases are to be documented; lectures and case presentations are to be representative of a wide variety of cases.

Each of the above programs will include experience in sleep studies.

**AOA/AOCPMR**

The AOA and the American Osteopathic College of Physical Medicine and Rehabilitation (AOCPMR) publishes *Basic Standards for Residency Training in Physical Medicine and Rehabilitation*, which states that the trainee must learn how to perform specific physiatric examinations, including EMG, nerve conduction studies, and other procedures common to the practice of physiatry.

The standards state that each resident should perform 200 electrodiagnostic consultations under appropriate supervision. These include EMG, nerve conduction, and somatosensory evoked potential studies.

**ABEM**

The ABEM grants certification in electrodiagnostic medicine to physicians who meet its requirements. It is organized and operated as a committee of the AANEM but is completely autonomous for the purposes of credentialing criteria and procedures.

Candidates seeking certification in electrodiagnostic medicine must be a diplomate of the ABPN, ABPMR, American Osteopathic Board of Neurology and Psychiatry, American Osteopathic Board of Physical Medicine and Rehabilitation, or Canadian equivalent.

A period of preceptorship in electrodiagnostic medicine that is coordinated with the presentation of didactic material must be satisfactorily completed under direct supervision of an experienced electrodiagnostic medicine consultant, preferably an ABEM board diplomate. The preceptorship may be taken during and/or after an approved residency training program. The
period of preceptorship must be at least six months full-time or equivalent part-time, with the first three months supervised. Any postresidency course of study in electrodiagnostic medicine must be conducted where there is an ACGME-, AOA-, or RCPSC-recognized neurology and physiatry residency training program, or at a participating institution to a sponsoring institution that has been approved by the ACGME to qualify as a portion of the six-month preceptorship. During these six months, at least 200 complete electrodiagnostic evaluations must be performed on separate occasions; these studies must be documented and interpreted. Training must have included adequate educational experience in:

- Anatomy
- Muscle and nerve pathology
- Neuromuscular physiology
- Electrodiagnostic medicine including instrumentation, quantification, and statistical analysis
- Clinical aspects of neuromuscular diseases as they pertain to clinical electrodiagnosis

The candidates must have been exposed to electrodiagnostic studies, diagnosis, evaluation, and treatment of neuromuscular disorders in adults and children.

Competency in electrodiagnostic medicine can be achieved only through the performance and interpretation of additional electrodiagnostic examinations. Candidates, therefore, must also document at least one year of experience following training, during which they must perform 200 additional complete electrodiagnostic evaluations on separate occasions. This period of independent experience can begin only after satisfactory completion of the approved residency training program and the six-month preceptorship. The year of independent experience may be part of a postresidency program (e.g., fellowship, which includes the practice of electrodiagnostic medicine). The time spent in such a postresidency program beyond the minimum six-month preceptorship will be counted toward the one year of independent experience.

The examination includes a written and oral component. The written examination tests knowledge in the areas of:

- Anatomy
- Physiology and pathophysiology
- Instrumentation and technical considerations
- Nerve conduction techniques
- Needle EMG
Clinical disorders and electrodiagnostic problem solving
➤ Single fiber EMG
➤ Somatosensory evoked potentials
➤ Autonomic testing
➤ Ethics

Among other tasks, candidates are also asked to identify and describe the characteristics of:
➤ Motor unit action potentials: amplitude, duration, number of phases, stability, recruitment, and firing patterns
➤ Spontaneous activity: fibrillation potentials; positive sharp waves; fasciculation potentials; and myotonic, complex repetitive, cramp, and neuromyotonic discharges

The written exam may also contain segments that test the candidate’s ability to identify nerves, major muscles, kinesiologic relationships, and physical examination findings potentially encountered during an electrodiagnostic medicine evaluation.

The oral examination tests practical and technical skills in performing an electrodiagnostic medicine consultation, in which the candidate is expected to:
➤ Develop an appropriate differential diagnosis
➤ Design an electrodiagnostic evaluation for the particular clinical problems, including performing appropriate nerve conduction studies, needle EMG, and, if needed, other electrodiagnostic tests
➤ Perform an appropriate number of tests to arrive at a diagnosis, while avoiding excessive testing
➤ Interpret individual test results, including amplitudes, latencies, velocities, late responses, needle EMG, and repetitive stimulation, and modify subsequent testing appropriately
➤ Synthesize test results into a precise, succinct, and meaningful final diagnosis for a referring physician

ABPN

The ABPN offers certification in the subspecialties of clinical neurophysiology and neuromuscular medicine. Applicants applying for certification in either must meet the following general requirements:
➤ Have a valid and unrestricted license to practice medicine in at least one state, commonwealth, territory, or possession of the United States or province of Canada
➤ Be a graduate of an accredited medical school in the United States or Canada or international medical school listed by the World Health Organization
Electromyography

Procedure 205

➤ Submit an official application form
➤ Have successfully completed the relevant specialized training requirements as listed below

Clinical neurophysiology
Applicants applying for certification in clinical neurophysiology must:
➤ Be certified by the board in neurology or neurology with special qualification in child neurology by February 1 prior to the examination administration
➤ Submit documentation of successful completion of one year of ACGME-accredited fellowship training in clinical neurophysiology that did not begin before the time general residency training (neurology or child neurology), including time spent in combined training programs, was completed
➤ Successfully complete the ABPN examination that covers basic science (physiology and instrumentation), as well as electroencephalography (EEG), EMG/nerve conduction studies, and other areas of clinical neurophysiology

The required one year of specialized training in clinical neurophysiology may be completed on a part-time basis, as long as it is not less than half-time. Credit is not given for periods of training lasting less than one year, except under special circumstances. Certification lasts for 10 years.

Neuromuscular medicine
To obtain certification in neuromuscular medicine from the ABPN, candidates must:
➤ Have requisite practice experience or documentation of successful completion of formal training requirements, as specified in descriptions or training pathways (see below for more information)
➤ Meet the ABPN’s licensure requirements
➤ Be certified by the board in neurology or child neurology by February 1 prior to the exam
➤ Successfully complete the neuromuscular medicine certification exam

Under temporary criteria, a practice pathway will be available for the first five years the examination is offered to ABPMR diplomates (2008–2012). Beginning with the 2013 examination, applicants will be required to complete one full year of training in neuromuscular medicine in an ACGME-accredited program that did not begin before the time general residency training
Electromyography

in neurology or child neurology was completed. Training or exposure to neuromuscular medicine given to neurology or child neurology residents as part of their basic neurology or child neurology curriculum does not count toward the one year of training.

As an alternative to the one year of ACGME-accredited fellowship training in neuromuscular medicine, 2008–2012 applicants may qualify for the exam in neuromuscular medicine if they can provide either of the following:

- Documentation of satisfactory completion of 12 months of fellowship training in a non–ACGME-accredited neuromuscular medicine program that did not begin before the time general residency training in neurology or child neurology was completed. Training or exposure to neuromuscular medicine given to neurology or child neurology residents as part of their basic neurology or child neurology curriculum does not count toward the one year of training.
- Attestation of a minimum of 25% of practice time devoted to neuromuscular medicine for a minimum of two years.

Training may be completed on a part-time basis, as long as it is not less than half-time.

Candidates applying after 2012 can only apply for certification through the training pathway. After the 2012 exam, all applicants, other than those initially approved during 2008–2012, are required to submit documentation of successful completion of one year of ACGME-accredited fellowship training in neuromuscular medicine that did not begin before the time general residency training in neurology or child neurology was completed. The required one year of specialized training in neuromuscular medicine may be completed on a part-time basis, as long as it is not less than half-time.

The neuromuscular medicine exam assesses candidates in all areas of neuromuscular medicine, including but not limited to:

- Clinical presentation
- Pathophysiology
- Genetics
- Diagnostic testing
- All aspects of acute and chronic management of disorders of the anterior horn cell, peripheral nerve, neuromuscular junction, and muscle
Examples of some of the more important or common conditions are:

- Amyotrophic lateral sclerosis
- Peripheral neuropathies (e.g., diabetic, inherited, and immune-mediated neuropathies)
- Muscular dystrophies
- Inflammatory myopathies (e.g., polymyositis)
- Myasthenia gravis

The candidate is examined at a level beyond the training and knowledge expected of a general neurologist, child neurologist, or specialist in physical medicine and rehabilitation.

**ABPMR**

To obtain certification in neuromuscular medicine from the ABPMR, candidates must:

- Already be a current ABPMR diplomate in good standing
- Meet the ABPMR’s licensure requirements
- Have requisite practice experience or documentation of successful completion of formal training requirements, as specified in descriptions or training pathways (see below for more information)
- Successfully complete the neuromuscular medicine certification exam

Under temporary criteria, a practice track will be available for the first five years the examination is offered to ABPMR diplomates (2008–2012). Beginning with the 2013 examination, applicants will be required to complete one full year of training in neuromuscular medicine in an ACGME-accredited program. Therefore, educational requirements in neuromuscular medicine can be fulfilled by either of the following:

- Satisfactory completion of 12 months in an ACGME-accredited fellowship. At least six months must be spent in clinical care of patients with neuromuscular disorders. The remaining six months of the fellowship will be flexible and may be spent studying related fields such as medical genetics, muscle pathology, electrodiagnostic medicine, or research. Physiatrists interested in this subspecialty may satisfy the requirements with six months’ training in clinical neuromuscular medicine and six months in an EMG lab. The training program must occur after completing residency and must be finished by the August 31 that precedes the examination date.
- Under temporary criteria (available though the 2012 examination), ABPMR diplomates who consider themselves neuromuscular medicine specialists by virtue of time and effort
may take the subspecialty examination by meeting the following criteria: Diplomates must have a minimum of 25% of professional time devoted to neuromuscular medicine for a minimum of two years, or one year of non–ACGME-approved fellowship training in neuromuscular medicine. Practice or training requirements must be completed on or before July 31 of the year of the examination for the September examination.

After the 2012 examination, candidates applying for the examination in neuromuscular medicine must complete 12 months of training in an ACGME-accredited neuromuscular program.

ACGME In its Program Requirements for Residency Education in Clinical Neurophysiology, the ACGME states that this subspecialty includes the application of electrical, magnetic, and mechanical methods needed to evaluate and treat diseases, including:

➢ Epilepsy
➢ Cerebrovascular disease
➢ Dementia and encephalopathies
➢ Multiple sclerosis
➢ Movement disorders
➢ Brain tumors and other mass lesions
➢ Encephalitis/meningitis
➢ Sleep disorders
➢ Traumatic disorders
➢ Myelopathies
➢ Motor neuron disease
➢ Radiculopathies and plexopathies
➢ Mononeuropathies
➢ Polyneuropathies
➢ Myopathies and neuromuscular transmission disorders

Training in neurophysiology is one year in duration and must follow completion of a residency program in neurology, child neurology, or general psychiatry accredited in the United States or Canada. The training must be separate and distinct from all training required for certification in neurology, child neurology, or general psychiatry. It must include significant didactic and clinical experience in two of the following:

➢ EEG
➢ EMG and nerve conduction studies
➢ Polysomnography and assessment of sleep disorders
The one year of training must cover the broad area of clinical neurophysiology, with clinical or didactic experience in the following:

- EEG
- EMG and nerve conduction studies
- Polysomnography and assessment of sleep disorders
- Movement disorder assessment, including tremor, spasticity, and dystonia
- Evoked potential studies
- Single fiber EMG
- Video EEG monitoring
- Intraoperative monitoring and analysis
- Testing of autonomic function

Experience must include opportunities to observe, evaluate, and manage patients of all ages with a wide variety of disorders, as well as to learn the effectiveness of procedures. It should provide for basic and advanced training and education and professional development. Experience must include appropriate outpatient and inpatient care and support services in the fields of pathology and radiology. There must be experience in the development and execution of a plan of evaluation and treatment, including the appropriate technical skills to care for patients with the specified disorders. The opportunity must include experience in clinical diagnosis and accumulation/interpretation of laboratory data relevant to these disorders, as part of outpatient and inpatient diagnostic evaluations.

The resident’s experience must include independent EEG, EMG, and/or sleep studies of a sufficient number of patients to achieve competence in the assessment of patients with a wide range of clinical disorders.

Neurophysiology residents must be provided with an advanced and extensive background in those basic sciences on which clinical neurophysiology is founded. These include neurophysiology, neuroanatomy, neuropharmacology, and neuropathology. Didactic lectures and seminars must include the basic neurological sciences as they pertain to clinical neurophysiology. Clinical neurophysiology residents should participate in the teaching of residents during their neurophysiology laboratory rotations at academic hospitals and major clinics.

The ACGME also publishes Program Requirements for Graduate Medical Education in Neuromuscular Medicine. According to the
organization, neuromuscular medicine is a subdiscipline of neurology and physical medicine and rehabilitation that includes abnormalities of the motor neuron, nerve roots, peripheral nerves, neuromuscular junction, and muscle, including disorders that affect adults and children. This encompasses the knowledge of the pathology, diagnosis, and treatment of these disorders at a level that is significantly beyond the training and knowledge expected of a general neurologist, pediatric neurologist, or physiatrist.

Neuromuscular medicine involves the evaluation and treatment of a wide range of diseases, including:
- Motor neuron disease
- Myopathy/neuromuscular transmission disorders
- Peripheral neuropathy
- Cranial/spinal single and multiple mononeuropathies
- Polynuropathy: infections/inflammatory
- Inherited neuropathy
- Polynuropathy: ischemia/physical agents/toxins
- Polynuropathy/systemic disease

The neuromuscular fellow must have successfully completed a residency program in either adult or pediatric neurology or physical medicine and rehabilitation accredited by the ACGME or the RCPSC. The minimum duration of fellowship training is 12 months, which must include the equivalent of at least six months of patient care in neuromuscular medicine (inpatient and outpatient). The remaining time must include additional experience in the care of patients with neuromuscular diseases, EMG, nerve conduction studies, autonomic function testing, nerve and muscle pathology, chemodenervation, and neuromuscular rehabilitation. Elective time to pursue individual interests must be provided.

Fellowship training in neuromuscular medicine must include opportunities to observe, evaluate, and manage patients with a wide range of disorders of muscle, neuromuscular junction, nerve, and motor neuron, as well as provide clinical experiences to allow the fellow to develop:
- Skills in interviewing and examining patients with neuromuscular diseases
- Knowledge of differential diagnosis for the various clinical presentations of neuromuscular problems
- Knowledge of the appropriate investigations for diagnosis of neuromuscular disorders, including laboratory, pathologic, radiologic, and electrodiagnostic/neurophysiologic testing
Knowledge and skills to manage inpatients and outpatients with neuromuscular diseases

The neuromuscular fellowship program must:

- Educate neurologists or physiatrists in neuromuscular disorders so they can provide an advanced level of subspecialty care
- Provide training that will ensure the understanding of the application of nerve and muscle imaging, biopsy, and electrophysiologic testing
- Provide high-quality clinical care and assessment of patients with neuromuscular disease, including diagnostic evaluation, treatment, management, and counseling
- Teach physicians, healthcare personnel, and the public about these disorders

Neuromuscular medicine fellows must have formal instruction, clinical experience, and demonstrate competence in clinical evaluation and management of all patients with neuromuscular disorders in inpatient and outpatient settings. This will include:

- Ability to integrate information obtained from patient history, physical examination, and diagnostic testing to arrive at an accurate and timely diagnosis and treatment plan
- Use of all available treatments and awareness of side effects
- Knowledge of the natural histories and prognoses of neuromuscular disorders, as well as how to integrate information garnered from a variety of testing modalities, including EMG, nerve conduction studies, genetic testing, and muscle imaging
- Critical appraisal of the professional and scientific literature and application of new contributions to management and care of patients

Fellows must have formal instruction in the rehabilitation aspects of neuromuscular disorders, including neuroanatomy, neurophysiology, neuropathology, safety issues related to diagnostic testing, interpersonal and communication skills, professionalism, practice-based learning, and systems-based practice. Fellows in neuromuscular medicine must also have formal instruction in nerve conduction and EMG studies and the pathology of nerve and muscle biopsies. An opportunity to observe these biopsies should be provided.

Training must provide the following clinical experiences:

- Inpatient evaluation and management of patients presenting with acute and severe neuromuscular disorders
- Critical care management of patients with conditions such as myasthenic crisis and acute severe Guillain-Barre syndrome
Electromyography

➤ Outpatient evaluation and diagnosis of patients with non-emergent neuromuscular disease manifestations
➤ Care of patients in different settings, including nursing homes, rehabilitation centers, and outpatient clinics
➤ Ordering and clinical interpretation of electrophysiologic studies and their role in the diagnosis and management of patients
➤ Ordering and clinical interpretation of diagnostic blood tests, including those involving molecular genetic testing
➤ Consulting with other medical professionals, including cardiologists, radiologists, rheumatologists, pediatricians, neurosurgeons, pathologists or neuropathologists, and physiatrists, in the overall care and management of patients with neuromuscular diseases

The program must also provide fellows with the opportunity to:
➤ Evaluate and manage pediatric and adult patients with neuromuscular diseases in various settings, including subspecialty clinics and ICUs.
➤ Participate in clinical and basic research projects in neuromuscular disorders.
➤ Attend formal lectures and teaching conferences on a regular basis. Participation in clinical conferences dealing with neuromuscular medicine is particularly important.
➤ Be involved (formally and informally) in the teaching of neuromuscular medicine to other residents, medical students, nurses, and other healthcare personnel.
➤ Concentrate a portion of their training in one or more areas of special interest in neuromuscular medicine.
➤ Conduct neuromuscular research.

Mark Bromberg, MD, PhD, is a professor in the department of neurology at the University of Utah School of Medicine in Salt Lake City, who specializes in neuromuscular disorders and electrodiagnosis, including EMG. Bromberg also directs the Motor Neuron Disease/ALS Clinic and Muscular Dystrophy Association Clinic at the University of Utah. He has worked to develop and advance several EMG techniques.

Bromberg says neurologists constitute the largest group of physicians to perform EMGs. Physiatrists also perform EMGs, although less actively and more restrictedly, he adds, and orthopedic surgeons perform EMGs, but much less frequently.
The EMG study has two parts: a nerve conduction study and the needle EMG. “During nerve conduction, you’re measuring the ability of sensory or motor nerves to conduct,” Bromberg says. “To do that, you have to be able to electrically stimulate the nerves and then put electrodes over the nerves or over the muscle and record their response.”

EMG machine manufacturers might help physicians set up the machine they purchase, but training to perform and interpret the studies is done by neurologists and physiatrists, he says.

Physicians who wish to focus on performing EMGs typically complete a one-year fellowship through a neurology department, says Bromberg, noting that few physical medicine and rehabilitation departments offer fellowships that include the study of EMG.

During a fellowship, physicians perform EMGs under supervision and present written reports. Most physicians enter the fellowship after having performed EMGs as a resident, he says.

Bromberg advises credentialing teams to determine whether a physician has a fellowship and certification from the ABPN or ABEM. If a physician has not completed a fellowship, credentialing teams should request a log of how many cases he or she has performed.

To be competent to perform an EMG, a physician would need to have completed 200 cases, the same number as required by the ABEM, Bromberg says.

To maintain competence, it would depend on whether a physician specializes in EMGs and other electrodiagnostic tests. Bromberg says physicians who specialize in EMGs and other electrodiagnostic tests could take a year off and still be considered competent. Otherwise, he says, physicians should complete a minimum of six per month (72 per year).

Bromberg says there is one controversial topic in his field relating to EMGs. A manufacturer called Neurometrix has designed a device for nerve conductions that physicians can tape to an upper or lower limb that contains a set of electrodes. With the device, physicians can then go through an automatic protocol of stimulating muscles and collecting data, after which the data can be sent to a central place so they can be analyzed and a report can be generated.
The idea behind it is that you don’t need any expertise whatsoever, so, in theory, any general practice physician could buy the machine and perform nerve conduction studies,” Bromberg says. “The problem with it is that it provides limited information compared to a full study.”

James M. Gilchrist, MD, is a clinical neuroscience professor in the department of neurology at Brown University’s Warren Alpert Medical School in Providence, RI. Gilchrist’s academic and clinical focus is on neuromuscular diseases.

Gilchrist says neurologists may or may not have experience performing EMGs during their residency. Brown University requires that residents perform three months of EMG testing. “Our program is very hands-on, so residents perform the studies,” says Gilchrist.

In regard to fellowships, Gilchrist says neurology has an approved clinical neurophysiology fellowship that is one year in duration and teaches EMG, EEG, and sleep studies. “A lot of fellowships are geared towards one or the other,” he says. “Fellows can either be in an EEG track or an EMG track.”

Physiatrists receive certification through the ABEM because they do not have a board that recognizes their electrodiagnostic skills. Gilchrist reports that neurologists, himself included, also take boards through the ABEM.

“It’s a much better test of EMG skills,” says Gilchrist, adding that the clinical neurophysiology exam with ABPN is a written exam that covers EEG, EMG, and sleep study questions. The ABEM exam only covers EMG and is a video, oral, and written exam. “It’s a much more rigorous test,” he says.

Gilchrist says ABEM certification requires six months of supervised EMG studies, which is more than most neurology residencies offer. “So, for a neurologist, it probably requires that they have done a fellowship,” he says. A lot of physiatry programs will devote at least six months to EMG, so a lot of them can take the ABEM exam after their residency.

A physician would need to perform at least 100 supervised studies to become competent in EMG testing. Gilchrist says, adding that it takes about 50–100 procedures before a physician is comfortable performing an EMG. To perform more complicated
Electromyography

The Joint Commission (formerly JCAHO) has no formal position concerning the delineation of privileges for EMG. However, in its Comprehensive Accreditation Manual for Hospitals, The Joint Commission states, “The hospital collects information regarding each practitioner’s current license status, training, experience, competence, and ability to perform the requested privilege” (MS.06.01.03).

In the rationale for MS.06.01.03, The Joint Commission states that there must be a reliable and consistent system in place to process applications and verify credentials. The organized medical staff must then review and evaluate the data collected. The resultant privilege recommendations to the governing body are based on the assessment of the data.

The Joint Commission further states, “The organized medical staff reviews and analyzes information regarding each requesting practitioner’s current licensure status, training, experience, current competence, and ability to perform the requested privilege” (MS.06.01.07).

In the EPs for standard MS.06.01.07, The Joint Commission says the information review and analysis process is clearly defined. The organization, based on recommendations by the organized medical staff and approval by the governing body, develops criteria that will be considered in the decision to grant, limit, or deny a request for privileges.

The Joint Commission further states, “Ongoing professional practice evaluation information is factored into the decision to maintain existing privilege(s), to revise existing privileges, or to revoke an existing privilege prior to or at the time of renewal” (MS.08.01.03).

In the EPs for MS.08.01.03, The Joint Commission says there is a clearly defined process facilitating the evaluation of each practitioner’s professional practice, in which the type of information collected is determined by individual departments and approved by the organized medical staff. Information resulting from the ongoing professional practice evaluation is used to determine whether to continue, limit, or revoke any existing privilege.
 CRC draft criteria

The following draft criteria are intended to serve solely as a starting point for the development of an institution’s policy regarding this procedure.

Minimum threshold criteria for requesting core privileges in EMG

Basic education: MD or DO

Minimal formal training: Successful completion of an ACGME- or AOA-accredited postgraduate training program in physical medicine and rehabilitation or neurology or an accredited fellowship program in clinical neurophysiology or an ACGME-accredited electrodiagnostic medicine preceptorship.

Required previous experience: Applicants for initial appointment must demonstrate current competence and evidence of the performance and interpretation of at least 200 EMGs in the previous 12 months. If training in EMG was not part of the formal residency program, the applicant must have completed hands-on training in EMG under the supervision of a qualified physician preceptor.

References

A letter of reference must come from the director of the applicant’s physical medicine and rehabilitation or neurology fellowship program or from the chief of physical medicine and rehabilitation or neurology at the institution where the applicant was most recently affiliated.

Reappointment

Reappointment should be based on unbiased, objective results of care, according to the organization’s existing quality assurance mechanism.

Applicants must demonstrate that they have maintained competence by showing evidence that they have successfully performed at least 200 EMG procedures annually over the reappointment cycle, based on the results of ongoing professional practice evaluation outcomes.

In addition, continuing medical education related to EMG should be required.
For more information

For more information regarding this practice area, contact:

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Web site: www.abemexam.org

American Board of Medical Specialties
1007 Church Street, Suite 404
Evanston, IL 60201-5913
Telephone: 847/491-9091 or 800/776-2378
Fax: 847/328-3596
Web site: www.abms.org

American Board of Physical Medicine and Rehabilitation
3015 Allegro Park Lane SW
Rochester, MN 55902-4139
Phone: 507/282-1776
Fax: 507/282-9242
Web site: www.abpmr.org

American Board of Psychiatry and Neurology
2150 East Lake Cook Road, Suite 900
Buffalo Grove, IL 60089
Telephone: 847/229-6500
Fax: 847/229-6600
Web site: www.abpn.com
Electromyography

Procedure 205

American College of Osteopathic Neurologists and Psychiatrists
28595 Orchard Lake Road, Suite 200
Farmington Hills, MI 48334
Telephone: 248/553-0010, Ext. 295
Fax: 248/553-0818
E-mail: acn-aconp@msn.com

American Osteopathic Association
142 East Ontario Street
Chicago, IL 60611
Telephone: 800/621-1773
Fax: 312/202-8200
Web site: www.osteopathic.org

American Osteopathic College of Physical Medicine and Rehabilitation
P.O. Box 4
Phillipsburg, NJ 08865
Telephone: 908/329-0270
Fax: 908/213-8903
Web site: www.aocpmr.org

Brown University Warren Alpert Medical School
Box G-A
Providence, RI 02912
Telephone: 401/863-3330
Web site: www.med.brown.edu

The Joint Commission
One Renaissance Boulevard
Oakbrook Terrace, IL 60181
Telephone: 630/792-5000
Fax: 630/792-5005
Web site: www.jointcommission.org

The University of Utah School of Medicine
Department of Neurology
30 North 1900 East, #3R210
Salt Lake City, UT 84132
Telephone: 801/585-6387
Web site: www.medicine.utah.edu/neurology
To be eligible to request clinical privileges in EMG, an applicant must meet the following minimum threshold criteria:

➤ Basic education: MD or DO

➤ Minimum formal training: Successful completion of an ACGME- or AOA-accredited postgraduate training program in physical medicine and rehabilitation or neurology or an accredited fellowship program in clinical neurophysiology or an ACGME-accredited electrophysiological medicine preceptorship.

➤ Required previous experience: Applicants for initial appointment must demonstrate current competence and evidence of the performance and interpretation of at least 200 EMGs in the previous 12 months. If training in EMG was not part of the formal residency program, the applicant must have completed hands-on training in EMG under the supervision of a qualified physician preceptor.

➤ References: A letter of reference must come from the director of the applicant’s physical medicine and rehabilitation or neurology fellowship program or from the chief of physical medicine and rehabilitation or neurology at the institution where the applicant was most recently affiliated.

➤ Reappointment: Reappointment should be based on unbiased, objective results of care, according to the organization’s existing quality assurance mechanism. Applicants must demonstrate that they have maintained competence by showing evidence that they have successfully performed at least 200 EMG procedures annually over the reappointment cycle, based on the results of ongoing professional practice evaluation outcomes.

In addition, continuing medical education related to EMG should be required.

I understand that by making this request, I am bound by the applicable bylaws or policies of the hospital, and hereby stipulate that I meet the minimum threshold criteria for this request.

Physician’s signature: _______________________________________________________

Typed or printed name: _____________________________________________________

Date: ____________________________________________________________________
Electromyography

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