



CIGNA MEDICAL COVERAGE POLICY

The following Coverage Policy applies to all plans administered by CIGNA Companies including plans administered by Great-West Healthcare, which is now a part of CIGNA.

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Subject **Electromyography Studies**

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Hyperlink to Related Coverage Policies

Gait Analysis
Nerve Conduction Velocity Studies Including
Late Response(H-reflex and F-wave)
Somatosensory Evoked Potentials
Spinal Ultrasound

INSTRUCTIONS FOR USE

Coverage Policies are intended to provide guidance in interpreting certain **standard** CIGNA HealthCare benefit plans as well as benefit plans formerly administered by Great-West Healthcare. Please note, the terms of a participant's particular benefit plan document [Group Service Agreement (GSA), Evidence of Coverage, Certificate of Coverage, Summary Plan Description (SPD) or similar plan document] may differ significantly from the standard benefit plans upon which these Coverage Policies are based. For example, a participant's benefit plan document may contain a specific exclusion related to a topic addressed in a Coverage Policy. In the event of a conflict, a participant's benefit plan document **always supercedes** the information in the Coverage Policies. In the absence of a controlling federal or state coverage mandate, benefits are ultimately determined by the terms of the applicable benefit plan document. Coverage determinations in each specific instance require consideration of 1) the terms of the applicable group benefit plan document in effect on the date of service; 2) any applicable laws/regulations; 3) any relevant collateral source materials including Coverage Policies and; 4) the specific facts of the particular situation. Coverage Policies relate exclusively to the administration of health benefit plans. Coverage Policies are not recommendations for treatment and should never be used as treatment guidelines. Proprietary information of CIGNA. Copyright ©2009 CIGNA

Coverage Policy

CIGNA covers needle electromyography (NEMG) studies (including single fiber) as medically necessary when it is conducted and interpreted at the same time as nerve conduction velocity (NCV) studies, in evaluating ANY of the following medical conditions:

- radiculopathies
- plexopathies
- neuropathies
- nerve compression syndromes
- neuromuscular junction disorders
- myopathies

CIGNA covers intraoperative monitoring* (IOM) of electromyographic responses as medically necessary when ALL of the following conditions are met:

- There is significant risk of nerve or spinal cord injury during a surgical procedure, such as the following (this list may not be all inclusive):
 - monitoring of the cranial nerves during head and/or neck surgery (e.g., resection of skull base tumors, thyroid tumor surgery, neck dissections)
 - monitoring of facial nerve function during surgery (e.g., acoustic neuroma, microvascular decompression of the facial nerve for hemifacial spasm, parotid tumor resection)

- monitoring of nerve root function during spinal procedures (e.g., pedicle screw placement, mechanical spinal distraction)
- brachial or lumbar plexus surgery
- the planned surgery poses a potential risk of significant damage to an essential nervous system structure
- IOM is performed by either a licensed physician trained in clinical neurophysiology (e.g., neurologist, physiatrist) or a trained technologist who is practicing within the scope of his/her license/certification as defined by state law or appropriate authorities and is working under the direct supervision of a physician trained in neurophysiology.
- IOM is interpreted by a licensed physician trained in clinical neurophysiology, other than the operating surgeon, who is either physically in attendance in the operating suite or present by means of a real-time remote mechanism for all electroneurodiagnostic (END) monitoring situations and is immediately available to interpret the recording and advise the surgeon.
- Monitoring is conducted and interpreted real-time (either on-site or at a remote location) and continuously communicated to the surgical team.

***Note: IOM for these indications consists of a physician monitoring not more than three cases simultaneously.**

CIGNA does not cover the following electromyographic studies because they are considered experimental, investigational or unproven (this list may not be all-inclusive):

- macro electromyography (EMG)
- surface electromyography studies (e.g., surface EMG [SEMG], surface scanning EMG, high-density SEMG, HD-sEMG)
- paraspinal SEMG
- needle electromyography studies performed without nerve conduction velocity studies and/or late response studies for any indication, other than intraoperative monitoring

General Background

Electrodiagnostic studies are frequently used to evaluate a subset of patients with suspected neuromuscular disorders and include needle electromyography and other nerve stimulation tests such as nerve conduction studies. Surface electromyography has been utilized by some clinicians. Electrodiagnostic testing may provide an important means of diagnosing conditions attributable to nerve, muscle or neuromuscular junction weakness such as myopathies (muscle weakness), radiculopathies (nerve root disease), plexopathies (peripheral neuropathy), neuropathies (nerve disease), neuromuscular junction disorders, and nerve compression syndromes.

Sensitivity and specificity reports for electrodiagnostic testing methods (in general) vary. A clearly established measure of comparison is lacking in the medical literature, making comparisons across studies difficult. Some studies have compared results with clinical examination findings, imaging studies such as magnetic resonance imaging, computed tomography, myelography, or the observation of nerve root compression during surgery. Interobserver differences, the variety of tests employed, the presence of symptoms that may influence patient outcomes (e.g., pain), the presence of abnormal imaging studies in asymptomatic patients, and the subjectivity of the surgeon's interpretation may all lead to variances in sensitivity and specificity results. Despite these variances however, electrodiagnostic testing is commonly used to assist in diagnosing disorders involving the nerves, muscles and neuromuscular junction.

Electromyography (EMG)

EMG is the study and recording of skeletal muscle reactions to electrical impulses and is also referred to as needle EMG. It is an invasive procedure performed to exclude, diagnose, describe and follow diseases of muscle and the peripheral nervous system. According to the American Academy of Neurology (AAN), "Needle EMG (NEMG), in combination with nerve conduction studies, is the gold standard methodology for assessing the neurophysiologic characteristics of neuromuscular diseases" (Pullman, et al., 2000). Generally, the term EMG is often used to encompass nerve conduction studies which measure the action potentials that result from

peripheral nerve stimulation. Nerve conduction studies (NCS), also referred to as nerve conduction velocity studies, aid in evaluating a differential diagnosis and complements the EMG studies. EMG is used to assess the integrity of upper motor neurons, lower motor neurons, neuromuscular junction and the muscle tissue using a needle electrode. EMG should always be performed by a physician who is specially trained in electrodiagnostic medicine (neurologist, physiatrist, clinical neurophysiologist) with real-time interpretation, and is part of the complete electrodiagnostic examination (AANEM, 2004).

Except in limited circumstances, the evidence in the published peer-reviewed scientific literature, textbooks and statements by the AANEM indicates that both NCS and NEMG are required to diagnose peripheral nervous system disorders. Circumstances under which NCS and EMG should not be performed together include, but are not limited to, limited follow-up studies of neuromuscular structures that have undergone previous electrodiagnostic evaluation, the current use of anticoagulants, the presence of lymphedema, or when a patient cannot tolerate the NEMG procedure. In addition, the AANEM indicates that for suspected carpal tunnel syndrome, the extent of the NEMG examination depends on the results of the NCSs and the differential diagnosis considered for the individual patient (AANEM, 2004).

EMG reports should include documentation of the muscle tested, the presence and type of spontaneous activity and the characteristics of the voluntary unit potentials

Single Fiber EMG: Single fiber EMG uses a very highly selective electrode that can focus on a restricted number of muscle fibers. It is utilized to study neuromuscular jitter and muscle fiber density. Fiber density may be increased in neuromuscular disorders such as myasthenia gravis. Jitter is a measure of variation in neuromuscular transmission times and may be increased in some neuromuscular disorders (Barboi and Barkhaus, 2004; Sanders, 2004). Single fiber EMG has many uses; however, it is most useful to confirm diagnosis for disorders of the neuromuscular junction in suspected myasthenia gravis when other tests are inconclusive or negative (Gooch and Pullman, 2004).

Macro EMG: Macro EMG is less selective when compared to standard NEMG or single-fiber EMG and is primarily used in investigational settings. It is a method of analyzing the motor unit quantitatively. A surface electrode is used for reference, and motor unit action potentials (MUAP) are measured from a macro needle. Authors suggest that macro EMG evaluates a large recording area compared to other needle electrodes and is considered representative of the entire MUAP area (Barboi and Barkhous, 2004).

Surface EMG (SEMG): In contrast to NEMG, SEMG, also referred to as surface scanning EMG, is a non-invasive, computer-based technique that records the electrical impulses using electrodes placed on the surface of the skin overlying the nerve at rest (i.e., static) and during activity (i.e., dynamic). The procedure studies the topography of the motor unit action potential (MUAP) and is assessed by computer analysis of the frequency spectrum, amplitude or root mean square of the electrical action potential. The SEMG differs from the NEMG with respect to technical requirements and electrical properties. SEMG electrodes measure from a wide area of muscle, have a relatively narrow frequency band (range 20 to 500 Hz), have low-signal resolution, and are highly susceptible to movement artifact (Pullman, 2000). The proposed use for this type of EMG is to aid in the diagnosis of neuromuscular disorders and low back pain, and to aid in assessing the prognosis of disorders involving muscle lesions. The technology has also been used to monitor bruxism (i.e., grinding and clenching of teeth). The electrical activity of muscle may be recorded with surface EMG, although spontaneous electrical activity and voluntary motor units cannot be (Lange and Trojaborg, 2000). Although not widely used as a diagnostic tool, high-density SEMG (HD-sEMG) is a multichannel SEMG that records the input of multiple electrodes placed on one muscle and is being studied as a possible method of detecting single MU characteristics (Drost, et al. 2006). Nonetheless, the clinical utility of surface EMG testing outside of the investigative setting has not been proven in the peer-reviewed scientific literature.

Paraspinal EMG: Paraspinal EMG scanning, a type of surface scanning EMG, also referred to as paraspinal SEMG, has been investigated as a method of assessing the paraspinal muscles of patients which provide support to the spinal column. Impairment of the paraspinal muscles may lead to abnormal motion and pain. The paraspinal SEMG is performed using a single electrode or an array of electrodes placed on the skin surface with recordings that are typically made at rest, in various positions, or after physical activity. The diagnostic utility of paraspinal EMG is not known, and its role in patient management has not been established.

Dynamic EMG: There are two types of dynamic EMG: SEMG using electrodes taped to the skin, and fine-wire EMG (FWEMG) using fine wires inserted into the muscle. During this procedure, electrodes are attached to the patient, and an EMG signal is recorded during physical activity (e.g., a gait cycle). Simultaneous measurements or observations are made of the motions measuring electrical potential generated by a muscle when it is activated. This information is then used to assess gait cycles (i.e., gait analysis) of patients with upper motor neuron diseases such as cerebral palsy.

U.S. Food and Drug Administration (FDA): EMG devices, (i.e., needle or cutaneous electrodes), are neurological devices and are approved by the FDA as Class II medical devices.

Literature Review: Evidence in the peer-reviewed, published scientific literature, textbook sources and professional society recommendations indicate that electrodiagnostic testing (electromyography [EMG] and nerve conduction studies [NCS]) is clinically useful in diagnosing various neuromuscular disorders.

There is insufficient evidence in the peer-reviewed, published scientific literature and textbook sources to permit conclusions regarding the clinical utility of macro EMG or paraspinal EMG.

The limited data available have not demonstrated SEMG to be comparable to or of superior diagnostic value to NEMG for the evaluation of patients with neuromuscular disorders. Few published studies compared the diagnostic utility of SEMG to NEMG, and the evidence does not allow strong conclusions regarding improved health outcomes. Furthermore, definitive patient selection criteria have not been established for SEMG. Technology assessments evaluating the utility of SEMG have provided mixed conclusions (Meekins, et al., 2008; Pullman, et al., 2000; Haig, et al., 1999). In a 1999 assessment (Haig, et al., 1999), the AANEM stated that there were no clinical indications for the use of SEMG in the diagnosis and treatment of disorders of nerve or muscle. The AANEM surface EMG task force (Meekins, et al., 2008) re-evaluated the diagnostic utility of and additional value of SEMG for neuromuscular disease. The task force concluded that further research is needed; however SEMG may be useful for detecting the presence of neuromuscular disease, although there was insufficient data to support the utility for distinguishing between neuropathic and myopathic conditions for the diagnosis of specific neuromuscular disorders. They also reported that SEMG may be useful for additional study of fatigue associated with post-poliomyelitis syndrome and electromechanical function in myotonic dystrophy. Both of these recommendations were based on retrospective trials and were considered "Level C" recommendations, defined as "possibly effective, ineffective or harmful for the given condition in the specified population." Pullman and colleagues (2000) conducted a assessment (approved by the American Academy of Neurology [AAN]) and concluded SEMG is unacceptable as a clinical tool in the diagnosis of neuromuscular disease and low back pain, although there are some applications in which SEMG is utilized rather than NEMG (e.g., for the neurophysiologic analysis of movement disorders such as tremor, myoclonus, dystonia, dyskinesia) and may be useful for evaluating gait and posture.

Professional Societies/Organizations: The AANEM has published guidance for the performance of EMG testing. The AANEM recommends that a typical EMG exam include: development of a differential diagnosis based upon appropriate history and physical, completion of indicated nerve conduction studies (recording and studying of electrical responses from peripheral nerves or muscles), and the completion of indicated needle EMG studies for selected muscles. The needle EMG studies are interpreted in real-time as they are being performed. In addition, the AANEM recommends only one attending physician performs and supervises all components of the electrodiagnostic testing and that the testing occur on the same day. Additionally, both EMG and NCS are required for a clinical diagnosis of peripheral nervous system disorders (AANEM, 2004). EMG results reflect on the integrity of the functioning connection between a nerve and its innervated muscle and also on the integrity of a muscle itself. Performance of one does not eliminate the need for the other. The position of the AANEM regarding the performance and interpretation of electrodiagnostic studies states that the performance of or interpretation of NCS separately from the needle EMG component of the testing should clearly be the exception (AANEM, 2006).

The AANEM provides specific recommendations for reporting needle EMG and NCV results. According to the AANEM, the recommendation for documentation of nerve conduction and EMG testing should include (but are not limited to) a description of the patient's clinical problem (demographics, reason for referral), the electrodiagnostic tests performed (techniques, distances, lab reference values, and temperature monitoring), all relevant data derived from these tests (nerves/muscles tested, numerical values for latencies and action potential), and the diagnostic interpretation of the data, including limitations. Complete NCV test measurements

should also include amplitude measurements, normal reference values and criteria for abnormalities (AANEM, 2005).

Intraoperative Monitoring

Intraoperative EMG monitoring is commonly used to monitor the integrity of neural pathways during high-risk neurosurgical, orthopedic, and other surgeries that may result in injury to the nervous system. This type of monitoring is performed in the operating room where the goal is to improve patient safety by identifying nerve impairment early so permanent deficits do not result in injuries to the CNS pathways, thus improving surgical outcomes.

Intraoperative EMG monitoring is often performed with somatosensory evoked potentials. SSEP and EMG monitoring combined allows for an intraoperative evaluation that is both sensitive to damage and specific with regards to predicting outcome. SSEPs have low sensitivity to predict damage but high specificity whereas EMG has high sensitivity to nerve root function but low specificity in terms of predicting a persistent neurological deficit (Gunnarsson, et al., 2004).

Interpretation of IOM of EMG signals primarily relies on the presence or absence of muscle activity in general and not on the specific section of the muscle that is reacting. IOM is distinct from clinical diagnostic needle electromyography and nerve conduction studies (AANEM, 2008). According to the AANEM position statement for IOM, while the electrode placement for IOM can be performed by a technologist under the supervision of a trained physician, diagnostic needle electromyography should be performed personally by a qualified physician.

The AANEM and the AAN published guidance for intraoperative monitoring. According to a position statement by the AANEM (2008) regarding the role of the intraoperative monitoring team, during intraoperative monitoring baseline tracings should be obtained prior to the surgical intervention. Monitoring should continue until closing of the surgical procedure, but may be terminated earlier upon discretion of the surgeon. A logbook should be completed for each patient and include the time of the procedure, the time of each surgical manipulation of the central or peripheral nervous system, and the name, dose and times of anesthetics administered which may affect the central or peripheral nervous system or muscle.

The intraoperative monitoring team should consist of surgeons who have a fundamental background in neurophysiology, a monitoring team with a fundamental background in intraoperative monitoring, and anesthesiologists. In addition, according to the AANEM (2008), the IOM team must include a trained clinical neurophysiologist (MD or DO).

Monitoring must be performed by qualified personnel acting within the scope of his/her license/certification as defined by state law or appropriate authorities. According to a guideline by the AAN (2008), it is expected that a specifically trained technologist or non-physician monitorist, preferably with credentials from the American Board of Neurophysiologic Monitoring or the American Board of Registration of Electrodiagnostic Technologists (ABRET), will be in continuous attendance in the operating room, with either the physical or electronic capacity for real-time communication with the supervising physician. Although credentialing varies among professional organizations, the AANEM and AAN both provide guidance that the monitoring technologist should be under the direct supervision of a clinical neurophysiologist (AAN, 2008; AANEM, 2008).

Typically the physician acts as a remote backup, with the actual intra-operative monitoring being performed in the operating room by a technologist. Some operating rooms have a central physician monitoring room, where a physician may simultaneously monitor cases. The number of procedures being monitored by the clinical neurophysiologist physician is determined by the nature of the surgical procedure. However, monitoring more than three cases simultaneously is not recommended (AAN, 2008). The severity of the case being monitored may determine the location of the neurophysiologist; they may be located in the operating room, in the same building, monitoring real-time recordings from a remote location, or at a location from which the operating room is accessible within minutes to view the recording procedure.

When performing intraoperative monitoring, the electroneurodiagnostic technologist should monitor only one surgical procedure at a time; multiple monitoring could result in restricted surgical efficiency, prolonged anesthesia, and possible compromise of judgment (American Society of Electroneurodiagnostic Technologists [ASET], 2005).

Real-time monitoring allows for timely intervention to prevent risk of damage. Consequently, it is imperative that either the physical (on-site) or electronic capacity (off-site, remote location) for real-time communication exists between the monitoring team and surgeon.

Indications: Evidence in the published literature (Kinney and Slimp, 2007; Crum and Strommen, 2007, Liem, 2006; Edwards and Kileny, 2005; Lehman 2004; Holland, 2002) and textbook sources (Mahla, et al., 2005; Yingling and Ashram, 2005), indicate assessment of intraoperative EMG responses are recommended for patients undergoing surgical procedures that result in significant risk of damage to nerve structures. However, evidence is not conclusive regarding the impact on surgical and health outcomes. Nonetheless, intraoperative monitoring may provide information that allows for immediate intervention thus preventing or minimizing postoperative neurological deficits. Examples of surgical procedures where there is significant potential risk for nerve injury and where intraoperative EMG monitoring may be recommended include the following (this list may not be all inclusive):

- surgeries that place the facial nerve at risk for injury (e.g., acoustic neuroma, microvascular decompression of the facial nerve for hemifacial spasm, parotid tumor resection)
- other head and/or neck surgery that places the cranial nerves at risk for injury (e.g., resection of skull base tumors, thyroid tumor surgery, neck dissections)
- brachial or lumbar plexus surgery
- spinal surgery, for nerve root monitoring (e.g., pedicle screw placement, mechanical spinal distraction)

Summary

Evidence in the peer-reviewed, published scientific literature, textbook sources and professional society recommendations indicates that electrodiagnostic testing (electromyography [EMG] and nerve conduction studies [NCS]) is useful in diagnosing various neuromuscular disorders when the results of the testing will impact patient management. It is the recommendation of the American Association of Neuromuscular and Electrodiagnostic Medicine (AANEM) that electrodiagnostic testing/consultations, including those performed intraoperatively, are conducted by physicians who have a comprehensive knowledge of neurological and neuromusculoskeletal diseases, and in the application of neurophysiologic techniques for evaluation of those disorders. There is insufficient evidence in the literature to support the use of surface electromyography (SEMG), high-density SEMG, macro EMG or paraspinal SEMG at this time. Well-designed clinical trials are needed to demonstrate the diagnostic utility of these procedures. The scientific literature supports that intraoperative EMG monitoring is indicated for monitoring the integrity of neural pathways during high-risk neurosurgical, orthopedic, and other surgeries that may result in injury to the nervous system.

Coding/Billing Information

Note: This list of codes may not be all-inclusive.

Covered when medically necessary:

CPT®*	Description
92265	Needle oculoelectromyography, 1 or more extraocular muscles, 1 or both eyes, with interpretation and report
95860	Needle electromyography; one extremity with or without related paraspinal areas
95861	Needle electromyography; 2 extremities with or without related paraspinal areas
95863	Needle electromyography; 3 extremities with or without related paraspinal areas
95864	Needle electromyography; 4 extremities with or without related paraspinal areas
95865	Needle electromyography; larynx
95866	Needle electromyography; hemidiaphragm
95867	Needle electromyography; cranial nerve supplied muscle(s), unilateral
95868	Needle electromyography; cranial nerve supplied muscles, bilateral
95869	Needle electromyography; thoracic paraspinal muscles (excluding T1 or T12)
95870	Needle electromyography; limited study of muscles in one extremity or non-limb

	(axial) muscles (unilateral or bilateral), other than thoracic paraspinal, cranial nerve supplied muscles, or sphincters
95872	Needle electromyography using single fiber electrode, with quantitative measurement of jitter, blocking and/or fiber density, any/all sites of each muscle studied
95920	Intraoperative neurophysiology testing, per hour (List separately in addition to code for primary procedure)

ICD-9-CM Diagnosis Codes	Description
334.2	Primary cerebellar degeneration
335.20	Amyotrophic lateral sclerosis
351.0	Bell's palsy
352.6	Multiple cranial nerve palsies
353.0 – 353.9	Nerve root and plexus disorders
354.0 – 354.9	Mononeuritis of upper limb and mononeuritis multiplex
355.0 – 355.9	Mononeuritis of lower limb and unspecified site
357.0	Acute infective polyneuritis
358.00 - 358.9	Myoneural disorders
356.9	hereditary and idiopathic peripheral neuropathy; unspecified
723.4	Other disorders of cervical region, brachial neuritis or radiculitis NOS
724.4	Other and unspecified disorders of back; thoracic or lumbosacral neuritis or radiculitis, unspecified
728.85	Other disorders of muscle, ligament, and fascia; spasm of muscle
728.87	Other disorders of muscle, ligament, and fascia; muscle weakness (generalized)
781.3	Lack of coordination
781.4	Transient paralysis of limb
782.0	Disturbance of skin sensation
	Multiple/varied codes.

Experimental/Investigational/Unproven/Not Covered:

HCPCS Codes	Description
S3900	Surface electromyography (EMG)

ICD-9-CM Diagnosis Codes	Description
	All codes

*Current Procedural Terminology (CPT®) ©2008 American Medical Association: Chicago, IL.

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Policy History

<u>Pre-Merger Organizations</u>	<u>Last Review Date</u>	<u>Policy Number</u>	<u>Title</u>
CIGNA HealthCare	7/15/2008	01111	Electromyography Studies

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