



# 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.

**Subject Nerve Conduction Velocity Studies Including Late Response (H-reflex and F-wave)**

**Effective Date ..... 7/15/2009**  
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## Hyperlink to Related Coverage Policies

Electromyography Studies  
 Quantitative Sensory Testing (QST)  
 Somatosensory Evoked Potentials

### 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 nerve conduction velocity (NCV) studies as medically necessary when they are conducted and interpreted at the same time as needle electromyography (NEMG) studies, to confirm the diagnosis of ANY of the following medical conditions:**

- motor neuron diseases
- myopathies
- radiculopathies
- plexopathies
- neuropathies
- nerve compression syndromes
- neuromuscular junction disorders
- neurotrauma

**CIGNA covers nerve conduction velocity (NCV) studies when performed alone for ANY of the above indications, as medically necessary in ANY of the following situations:**

- as follow-up studies of neuromuscular structures that have undergone previous electrodiagnostic evaluation
- current use of anticoagulants

- presence of lymphedema
- carpal tunnel syndrome
- the individual cannot tolerate the NEMG procedure

**CIGNA does not cover any of the following electrodiagnostic tests because each is considered experimental, investigational or unproven:**

- nerve conduction velocity (NCV) studies performed without needle electromyography, other than when performed for follow-up testing, with current use of anticoagulants, the presence of lymphedema, for carpal tunnel syndrome, or if the individual cannot tolerate the NEMG procedure
- nerve conduction studies where the interpretation is delayed and not completed at the time of testing
- automated or portable hand-held noninvasive nerve conduction testing (e.g., NC-stat System, Brevio<sup>®</sup> nerve conduction monitoring system)

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## 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. 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 interpretations 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. Sensitivity and specificity data for automated/portable devices, used instead of or as an adjunct to standard nerve conduction testing, is insufficient to draw conclusions regarding predictive value.

### Nerve Conduction Studies

Nerve conduction studies (NCS), also referred to as nerve conduction velocity studies, are performed to diagnose disorders of the peripheral nervous system. The nerve is stimulated with surface electrodes placed on the skin over the nerve in various locations, although in some situations needle electrodes may be used. A mild electrical stimulus is applied to the nerve in two or more points. Recording of the electrical response to stimulation of the nerve between these points along its route is conducted and compared to normal responses. The study measures speed (conduction velocity and/or latency), amplitude (size) and the shape of neurologic response for detecting demyelination and axon loss.

NCS are routinely performed with needle electromyogram (NEMG), enabling the presence and extent of peripheral nerve pathology to be determined (Katirji, 2002; North American Spine Society [NASS], 2003; Aminoff, 2003; Asbury, 2004; American Association of Neuromuscular and Electrodiagnostic Medicine [AANEM], 2004). EMG studies measure the electrical activity of muscles. When performed together, they can be extremely helpful in detecting whether the pathology originates in the proximal or distal root ganglia and whether the neuromuscular dysfunction relates to peripheral nerve disease.

Both EMG and NCS are required for a clinical diagnosis of peripheral nervous system disorders (AANEM, 2004). For example, radiculopathies cannot be definitively diagnosed by NCS alone; EMG is performed to confirm the radiculopathy. 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.

Abnormal nerve conduction results are caused by nerve damage or destruction and include conduction slowing, conduction blockage, lack of responses and/or low amplitude responses. Routinely, a physician assesses the results of the degree of myelination or axonal loss; however, it may be performed by a trained technologist under the direct supervision of a physician. Direct supervision implies that a physician is in close proximity to the patient undergoing testing, is immediately available to provide the trained technician with assistance and direction if necessary, and is responsible for determining the nerve conduction studies that are appropriate.

Another type of NCS is referred to as late response (H-reflex and F-wave testing) and is usually performed on nerves more proximal to the spine. The H-reflex involves conduction from the periphery to and from the spinal cord. The H-reflex study involves the assessment of the gastrocnemius/soleus muscle complex in the calf, and is usually performed bilaterally due to the need to assess symmetrical results in determining abnormalities. The F-wave study is a late response similar to the H-reflex. F-wave studies are used to assess the proximal segments of the motor nerve function, and are performed in combination with the examination of motor nerves. Both studies are helpful in diagnosing conditions of radiculopathies, plexopathies, polyneuropathies, and proximal mononeuropathies (AANEM, 2004). Late response studies are additional studies complementary to NCV and are performed during the same patient evaluation.

**Professional Societies/Organizations:** The AANEM has published guidance for the performance of nerve conduction studies. According to the AANEM a typical nerve conduction examination includes: development of a differential diagnosis based upon appropriate history and physical exam, the NCV study (recording and studying of electrical responses from peripheral nerves or muscles) and the completion of indicated needle EMG studies to evaluate the differential diagnosis and to complement the nerve conduction study.

The minimum standards recommended by the AANEM for NCV testing include the following:

- The testing is medically indicated.
- It is performed using equipment that provides assessment of all parameters of the recorded signals (equipment designed for screening purposes is not acceptable).
- The test is performed by a physician, or by a trained technician under the direct supervision of a physician.
- The EMG must be performed by a trained physician.
- One physician supervises and performs all components of the exam.

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).

In a position statement published by the AANEM regarding the performance and interpretation of electrodiagnostic studies (AANEM, 2006), the AANEM states, "The performance of or interpretation of NCS separately from the needle EMG component of the testing should clearly be the exception. Nerve conduction studies performed independent of needle EMG may only provide a portion of the information needed to diagnose muscle, nerve root, and most nerve disorders. When the NCS is used on its own without integrating needle EMG findings, or when an individual relies solely on a review of NCS data, the results can be misleading and important diagnoses may be missed. Moreover, individuals who interpret NCV data without patient interaction or who rely on studies that have delayed interpretation, who have interpretation made off-site, and who interpret results without complementary information obtained from EMG studies are not meeting the standards outlined in the AANEM policy recommendations. "

Except in limited clinical situations, both nerve conduction studies (NCS) and needle electromyography (NEMG) are required to diagnose peripheral nervous system disorders. According to the AANEM 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 needle EMG procedure. In addition, the AANEM indicates that for suspected carpal tunnel syndrome, the extent of the needle EMG examination depends on the results of the NCSs and the differential diagnosis considered for the individual patient (AANEM, 2004).

### **Automated Nerve Conduction Testing**

Proponents of automated nerve conduction tests suggest that they can be used in a variety of clinical settings, including a physician's office, without the need for specialized training or equipment, theoretically obtaining results within minutes. Portable devices have been developed to provide nerve conduction studies at the point of care (e.g., primary care setting), particularly for carpal tunnel evaluation and evaluation of diabetic peripheral neuropathy, as an alternative to or as an adjunct to other conventional testing methods. Manufacturers state these devices have computational algorithms, provide delivery of stimulus, measure and analyze the patient's response, and provide a detailed report of study results.

One device, the NC-stat System (NEUROMetrix<sup>®</sup> Inc., Waltham, MA) is a hand-held, noninvasive, automated nerve conduction testing system that has been proposed as an alternative to conventional nerve conduction testing. The device has been marketed for use in an office or clinic setting, to assess nerves of the upper and lower extremities assisting in the diagnosis of peripheral nerve disorders such as carpal tunnel syndrome, diabetic peripheral neuropathy, and sciatica. The manufacturer suggests that data can be analyzed and readily available within minutes and then transmitted to the physician via email, internet or as a faxed document. A computerized system interprets the data. The proposed benefits of the device are ease of use and rapid results.

Another device proposed for automated testing of peripheral nerves is the Brevio nerve conduction monitoring system (Neurotron Medical, Inc., West Trenton, NJ). According to the manufacturer, the device calculates latency and amplitude for sensory, motor, and f-wave responses using a single noninvasive neuro-sensor for testing performed on the patient. Similar to the NC-stat device, when testing is performed, the results can be immediately sent to a printer in the office or through a Web service for an electronic report.

**U.S Food and Drug Administration (FDA):** Several nerve conduction measurement devices have received approval through the FDA 510(k) process for marketing in the U.S as point of care devices. These devices are regulated as Class II devices and are subject to controls. Examples of FDA approved devices include, but are not limited to, the NC-stat System (NEUROMetrix, Inc., Waltham, MA); the Brevio (Neurotron Medical, Inc., West Trenton, NJ); and the Virtual Medical Systems VT 3000 (Scientific Imaging, Inc., Larkspur, CO).

**Literature Review:** Evidence evaluating the diagnostic utility of the Brevio and Virtual Medical Systems VT 3000 nerve conduction monitor systems is lacking.

Evidence evaluating the diagnostic utility of the NC-stat System consists mainly of case series, case control studies and retrospective reviews. Some of these studies compare results obtained using automated devices with results obtained from standard diagnostic testing (NCV testing and EMG), other studies did not have a comparison to conventional testing. Most of the published clinical studies have evaluated use of the NC-stat device for assessment of median and ulnar nerves (Megerian, et al., 2007; Kong, et al., 2006; Vinik, et al., 2004); other published studies evaluated use of the device for disorders such as lumbosacral radiculopathies (Fisher, et al., 2008) and sensorimotor polyneuropathy in diabetic patients (Perkins et al., 2008). In some of these studies a strong correlation has been demonstrated when comparing NC-stat with reference standards (Perkins, et al., 2006; Kong, et al., 2006). The diagnostic accuracy for other conditions, such as those involving the lower extremities, has not been sufficiently demonstrated in the literature.

Data regarding diagnostic performance, sensitivity and specificity of the automated NCV testing devices compared to standard testing is inconsistent and does not lead to strong conclusions; the studies are not well-designed, involve small populations and the results cannot be generalized. In some studies authors have reported high sensitivity and specificity when examining NC-stat accuracy for carpal tunnel syndrome compared to controls (Leffler, et al., 2000; Rotman, et al., 2004), other authors however have reported NC-stat is no more sensitive or specific than a traditionally performed distal motor latency for the diagnosis of carpal tunnel syndrome (Katz, 2006). In 2008 Armstrong and colleagues published the outcomes of a cohort study comparing the results obtained with the NC-stat device to traditional nerve conduction studies for carpal tunnel screening

(n=33). All correlations were significant. The authors reported sensitivity, with respect to the traditional results, ranged from 93.8% to 100% and specificity ranged from 84.6% to 94.1%. Nonetheless, the authors did not address limitations such as lack of needle EMG testing and did not evaluate the clinical relevance to the results (Armstrong, et al., 2008).

Despite some reports of high sensitivity and specificity, the clinical utility of automated NCV testing for diagnosing peripheral nerve disorders has not been clearly demonstrated. There is insufficient evidence to support improvement in health outcomes such as accurate diagnosis and successful treatment, as a result of point of service testing. Diagnostic value has not been clearly established and few studies evaluate the effect of automated testing on clinical management (i.e., treatment). A technology assessment conducted by the Washington State Department of Labor and Industries (2006) concluded that the scientific evidence does not show NC-stat to be equivalent to conventional methods for nerve conduction testing. Authors generally agree that further studies are needed to determine the role automated testing has as a component of clinical care. Furthermore, some concerns remain among specialists regarding lack of standard EMG testing and incomplete assessment when using automated NCV testing devices. The AANEM does not have a formal position statement or policy addressing NC-stat or similar devices; however, the Association recommends electrodiagnostic studies be performed by properly trained physicians and that interpretation of nerve conduction study data alone, absent face-to-face patient interaction and control over the process, provides substandard care (AANEM, 2006).

**Number of Services Recommended**

Table 1 summarizes the recommendations of the AANEM regarding the reasonable maximum number of studies per diagnostic category necessary for a physician to arrive at a diagnosis for 90% of patients with that final diagnosis (AANEM, 2004).

**Table 1 Number of Services Recommended:**

Indication	Needle Electromyography (EMG) CPT™ Codes 95860-95864 and 95867-95870	Nerve Conduction Studies (NCS) CPT™ Codes 95900,95903, 95904		Other Electromyographic Studies CPT Codes 95934, 95936, 95937	
		Motor NCS with and/or without F Waves	Sensory NCS	H-Reflex	Neuromuscular Junction Testing (Repetitive Stimulation)
Carpal Tunnel (unilateral)	1	3	4	n/a	n/a
Carpal Tunnel (bilateral)	2	4	6	n/a	n/a
Radiculopathy	2	3	2	2	n/a
Mononeuropathy	1	3	3	2	n/a
Polyneuropathy/Mononeuropathy Multiplex	3	4	4	2	n/a
Myopathy	2	2	2	n/a	2
Motor Neuropathy (e.g., ALS)	4	4	2	n/a	2
Plexopathy	2	4	6	2	n/a
Neuromuscular Junction	2	2	2	n/a	3
Tarsal Tunnel Syndrome (unilateral)	1	4	4	n/a	n/a

Tarsal Tunnel Syndrome (bilateral)	2	5	6	n/a	n/a
Weakness, fatigue, cramps, or twitching (local)	2	3	4	n/a	2
Weakness, fatigue, cramps, or twitching (general)	4	4	4	n/a	2
Pain, numbness, or tingling (unilateral)	1	3	4	2	n/a
Pain, numbness, or tingling (bilateral)	2	4	6	2	n/a

### Summary

A large body of evidence in the peer-reviewed, scientific literature indicates that nerve conduction velocity studies and needle electromyography are routinely performed to aid in the diagnosis of neuromuscular disorders. The diagnostic accuracy of these tests and improvement in health outcomes as a result of treatment have been demonstrated in the medical literature. Some published evidence has shown a correlation of automated portable nerve conduction test results with standard testing. However, the diagnostic utility of portable automated nerve conduction testing and subsequent improvement in health outcomes has not been clearly demonstrated in the medical literature. Concerns remain regarding misdiagnosis, lack of specialist interpretation and absence of needle EMG studies. The role of automated/portable hand-held devices for nerve conduction testing when used in clinical practice has not been established.

### Coding/Billing Information

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

#### Covered when medically necessary:

CPT®* Codes	Description
95900	Nerve conduction, amplitude and latency/velocity study, each nerve; motor, without F-wave study
95903	Nerve conduction, amplitude and latency/velocity study, each nerve; motor, with F-wave study
95904	Nerve conduction, amplitude and latency/velocity study, each nerve; sensory
95934	H-reflex, amplitude and latency study; record gastrocnemius/soleus muscle
95936	H-reflex, amplitude and latency study; record muscle other than gastrocnemius/soleus muscle

ICD-9-CM Diagnosis Codes	Description
138	Late effects of acute poliomyelitis
192.2	Malignant neoplasm of spinal cord
192.3	Malignant neoplasm of spinal meninges
225.3	Benign neoplasm of spinal cord
333.2	Myoclonus
333.3	Tics of organic origin
333.6	Idiopathic torsion dystonia
333.7	Symptomatic torsion dystonia
333.82	Orofacial dyskinesia

333.83	Spasmodic torticollis
336.9	Spinal cord myelopathy
335.20	Amyotrophic lateral sclerosis
335.21	Progressive muscular atrophy
335.22	Progressive bulbar palsy
335.24	Primary lateral sclerosis
337.0	Idiopathic peripheral autonomic neuropathy
337.3	Autonomic dysreflexia
340	Multiple sclerosis
352.6	Multiple cranial nerve palsies
353.5	Neuralgic amyotrophy
354.0	Carpal tunnel syndrome
357.82	Critical illness polyneuropathy
358.00-358.1	Myasthenia gravis
710.4	Polymyositis
721.0	Cervical spondylosis without myelopathy
721.1	Cervical spondylosis with myelopathy
721.41	Spondylosis with myelopathy, thoracic region
721.42	Lumbosacral myelopathy, lumbar region
722.4	Degeneration of cervical intervertebral disc
722.51	Degeneration of thoracic or thoracolumbar intervertebral disc
722.52	Degeneration of lumbar or lumbosacral intervertebral disc
723.0	Spinal stenosis in cervical region
952.00	C1-C4 level spinal cord injury, unspecified
952.10	T1-T6 level spinal cord injury, unspecified
952.2	Lumbar spinal cord injury without spinal bone injury
952.3	Sacral spinal cord injury without spinal bone injury
952.4	Cauda equina spinal cord injury without spinal bone injury
952.8	Multiple sites of spinal cord injury without spinal bone injury

**Experimental/Investigational/Unproven/Not Covered:**

CPT* Codes	Description
95999 <sup>†</sup>	Unlisted neurological or neuromuscular diagnostic procedure

**†Note: Experimental, investigational or unproven and not covered when used to report automated or portable hand-held noninvasive nerve conduction testing/devices.**

HCPCS Codes	Description
S3905	Non-invasive electrodiagnostic testing with automatic computerized hand-held device to stimulate and measure neuromuscular signals in diagnosing and evaluating systemic and entrapment neuropathies

ICD-9-CM Diagnosis Codes	Description
	All codes

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

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## Policy History

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<u>Pre-Merger Organizations</u>	<u>Last Review Date</u>	<u>Policy Number</u>	<u>Title</u>
CIGNA HealthCare	7/15/2008	0117	Nerve Conduction Velocity Studies Including Late Response (H-reflex and F-wave)

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