Clinical Practice Guideline: **Current Perception Threshold (CPT)/Sensory Nerve Conduction Threshold (sNCT)**

Date of Implementation: **February 9, 2006**

Effective Date: **November 20, 2025**

Product: **Specialty**

GUIDELINES

American Specialty Health – Specialty (ASH) considers current perception threshold (CPT)/Sensory Nerve Conduction Threshold (sNCT) testing unproven because the effectiveness and clinical applicability of this testing in diagnosing and/or managing diabetic peripheral neuropathy or other diseases has not been established.

Patients must be informed verbally and in writing of the nature of any procedure or treatment technique that is considered experimental/investigational or unproven, poses a significant health and safety risk, and/or is scientifically implausible. If the patient decides to receive such services, they must sign a Member Billing Acknowledgment Form (for Medicare use Advance Beneficiary Notice of Non-Coverage form) indicating they understand they are assuming financial responsibility for any service-related fees. Further, the patient must sign an attestation indicating that they understand what is known and unknown about, and the possible risks associated with such techniques prior to receiving these services. All procedures, including those considered here, must be documented in the medical record. Finally, prior to using experimental/investigational or unproven procedures, those that pose a significant health and safety risk, and/or those considered scientifically implausible, it is incumbent on the practitioner to confirm that their professional liability insurance covers the use of these techniques or procedures in the event of an adverse outcome.

HCPCS Codes and Descriptions

HCPCS Code	HCPCS Code Description
G0255	Current perception threshold/sensory nerve conduction test, (SNCT), per limb, any nerve

DESCRIPTION/BACKGROUND

Quantitative sensory testing (QST) is not a nerve conduction study and is not electromyography. It is proposed as a non-invasive technique for assessing nerve damage by measuring the pressure threshold felt in the skin. QST was developed to measure sensory stimuli, thermal stimuli or vibratory stimuli. Current perception threshold (CPT)

testing is a method of QST. Current perception threshold (CPT) testing (also known as sensory nerve conduction threshold testing) is the process of determining and quantifying the threshold of sensory perception by sensory nerves to transcutaneous stimulation.

By testing an area of the skin that corresponds to a specific nerve, the extent of nerve damage can be determined by the amount of pressure needed for a person to feel the touch of the testing device. Each area is tested several times and pressure threshold measurements are stored in a computer. The test is pain-free and uses no electrical stimulation; only touch. Another distinction between a nerve conduction test and quantitative sensory testing is that the former is performed in a laboratory setting, while QST is performed in an office setting. CPT/sNCT testing has been studied for a wide range of clinical applications such as evaluation of peripheral neuropathies, detection of carpal tunnel syndrome, spinal radiculopathy, evaluation of the effectiveness of peripheral nerve blocks, quantification of hypoesthetic and hyperesthetic conditions and differentiation of psychogenic from neurological disorders. Examples of the devices cleared by the Food and Drug Administration (FDA) include the following: AXON-II NCSs System (PainDx, Inc., Laguna Beach, CA), Neurometer® Current Perception Threshold (Neurotron, Inc., Baltimore, MD) and the Medi-Dx 7000™ (Neuro Diagnostic Associates, Inc., Laguna Beach, CA). Given their clearance level, the manufacturers were not required to present evidence of efficacy to support a premarket approval application (PMA). These devices have been used to detect metabolic, toxic, acquired, hereditary, compression, traumatic, and other peripheral neuropathies as well as sensory impairments resulting from central nervous system pathology. However, the effectiveness and clinical applicability of CPT testing in diagnosing and/or managing a disease has not been established.

According to manufacturers, CPT/sNCT evaluation provides the practitioner with a means to obtain a differential diagnosis and quantitative evaluation of conditions resulting in sensory nerve impairments. Proponents also claim the CPT evaluation can be used to assess and document the patient's response to therapy. An evaluation with this device uses sensors connected to a computer that allegedly measure the conduction and functional integrity of various sensory nerve fibers (types A through C). The unit emits three painless transcutaneous electrical frequencies (5 Hz, 250 Hz, and 2,000 Hz) through a pair of electrodes to quantify neuroselective CPT values. The evaluations are based on the patient's sensory response and comparisons with proposed standardized ranges of normal CPT values and ratios.

A CPT evaluation using the Neurometer® typically takes 10 minutes per region with 2 to 6 regions analyzed on average. However, the Neurometer CPT also has a Rapid Screening Mode that enables large groups to be quickly assessed for neuropathies (less than 3 minutes per person) to determine if complete testing is necessary. Manufacturers also propose that abnormally low CPT measures indicate a hypersensitive nerve function, often associated with inflamed, irritated, or regenerating nerves (hyperesthetic conditions). Abnormally

high CPT measures are believed to indicate a significant loss of nerve conduction, reflecting a hypoesthetic condition or neuropathy. Proponents believe this sensitivity enables the CPT device to accurately differentiate various inflammatory conditions such as arthritis and sprains/strains from true neuropathic conditions. Additionally, proponents believe such sensitive nerve measurements can accurately detect metabolic, toxic, acquired, hereditary, compression, traumatic, and other peripheral neuropathies as well as sensory impairments resulting from central nervous system pathology.

EVIDENCE REVIEW

In 1999, the American Association of Electrodiagnostic Medicine (AAEM) published a technology review of the Neurometer Current Perception Threshold device. The opinions stated in the assessment, however, may reflect those of the author and not necessarily the association. Most of the published articles were studies correlating the performance of the CPT to results obtained from standard nerve conduction studies within populations of affected individuals with known diseases. According to the technology assessment, a fundamental problem is the absence of an appropriate standard against which to measure CPT. Another problem with the technique is that it elicits multiple measures, and any abnormality detected is considered significant. Also, there is a tendency in the literature to arbitrarily assign various degrees of deviation from a normal population as grades of severity, with little additional information given. The literature review found no studies on the effect of sNCT on patient management. Some studies compared sNCT to a nerve conduction study (NCS). Each study had serious methodological flaws and specificity often was not or could not be determined. In general, the studies evaluated a small number of subjects, and none masked the individuals performing the electrodiagnostic studies.

Griffioen et al. (2018) sought to quantify and compare peripheral somatosensory function and sensory nerve activation thresholds in persons with chronic pain following lower extremity fractures with a cohort of persons with no history of lower extremity fractures. A total of 14 cases and 28 controls participated in the study. Authors suggest that patients with chronic pain following lower extremity fractures may experience hypoesthesia in the injured leg, which contrasts with the finding of hyperesthesia previously observed in other chronic pain conditions but is in accord with patients with nerve injuries and surgeries. The authors stated that this study had several drawbacks. First, the sample size was small (n = 14 cases of fractures). Second, these investigators performed the testing in subjects at different time-points following injury. CPT results should be interpreted with caution, as several subjects had inconsistent responses resulting in a small sample size. Third, some of the subjects took medication for their pain, which could have affected the results. Furthermore, these researchers had no information on the extent of nerve damage associated with the injuries; thus, it was possible that some of the subjects might have had sub-clinical nerve injuries. The authors tried to lessen the effects of this limitation by waiting to test patients until at least 6 months after injury, when one would expect the majority of subtle nerve injuries to have resolved.

Cho et al. (2018) examined the diurnal sensory dysfunction in primary RLS/WED using the CPT test, compared to healthy controls. A total of 30 primary RLS/WED subjects and 30 healthy controls were enrolled. The severity of RLS/WED and sleep problems were evaluated in all subjects. The Neurometer system for the CPT test was used and they applied 3 different parameters (2,000 Hz, 250 Hz, and 5 Hz) to stimulate both big toes. The CPT test was performed twice, once during the asymptomatic daytime period and again in the evening, when the patients were symptomatic. The authors concluded that RLS patients showed a lower CPT in the evening. These preliminary findings need to be validated by well-designed studies. However, use of CPT is not considered clinically relevant. An UpToDate review on Clinical features and diagnosis of restless legs syndrome/Willis-Ekbom disease and periodic limb movement disorder in adults, (Ondo, 2018) does not mention quantitative sensory testing / current perception threshold testing as a diagnostic tool.

Zhang et al. (2021) quantitatively evaluated sensory nerve function in patients with CAI and healthy controls using current perception threshold (CPT) measurements, as well as the influence of sex, age, and body mass index (BMI) on CPT values and the relations between CPT frequencies. Fifty-nine subjects with CAI and 30 healthy controls participated in this study. CPT values at the anterior talofibular ligament region were recorded on the injured and uninjured sides in CAI patients and on both sides in the healthy control group. Between group differences were compared. The influence of sex, age and BMI on CPT values was evaluated. Correlations between different frequencies were also studied. There were no significant differences in age, sex, height, weight or BMI between the CAI and healthy control groups. The CPT values did not show a significant difference by sex. The CPT values did not significantly correlate with age or BMI. Compared to the control group, the CAI group had significantly higher CPT values on the injured and uninjured sides under 250 Hz and 5 Hz electrical stimuli; the difference between the groups was significant ($p < 0.01$), and the effect size were large. No significant difference was observed under 2000-Hz stimuli. There were correlations between CPT values at different frequencies ($p < 0.01$), especially 250 Hz and 5 Hz. Authors concluded that the present study revealed increased sensory thresholds in 250-Hz- and 5-Hz-related sensory nerve fibers in the injured and uninjured ankles of patients with CAI. This increase may indicate dysfunction of A-delta and C fibers. Sex, age and BMI did not significantly impact CPT values. There were correlations between CPT values at different frequencies, especially 250 Hz and 5 Hz.

The available scientific evidence is not adequate to demonstrate the accuracy of sNCT or the accuracy of sNCT as compared to NCS. Unlike NCS, sNCT does not assess the integrity of motor nerves, which is important in evaluating some patient populations, such as diabetics. In addition, it is not evident that sNCT offers any diagnostic advantages over a history and physical examination in determining the presence of a neuropathy.

The Centers for Medicare & Medicaid Services (CMS) concluded that the scientific and medical literature do not demonstrate that the use of sNCT to diagnose sensory neuropathies in Medicare beneficiaries is reasonable and necessary.

- Available scientific evidence is not adequate to demonstrate the accuracy of this procedure
- Not appropriate as a substitute for nerve conduction studies
- Does not offer any diagnostic advantage over a history and physical examination for the presence of a neuropathy

Zhao et al. (2025) investigated nerve fiber dysfunction in type 1 diabetes (T1D) patients and identified risk factors for diabetic peripheral neuropathy (DPN). It also evaluated the relationship between current perception threshold (CPT) tests and nerve conduction velocity (NCV), and assessed CPT's diagnostic accuracy for early DPN detection. This study enrolled 110 patients with T1D and 26 healthy controls. The incidence of DPN in 110 T1D patients was 78%, with no significant difference between disease duration subgroups (78.3% vs. 78.0%). Neurological abnormalities were significantly more common in the lower extremities compared to the upper extremities (67.27% vs. 49.09%, $P < 0.05$). Multivariate logistic regression analysis revealed that a waist-to-hip ratio (WHR) greater than 0.85 was an independent risk factor for DPN. Patients with a disease duration >5 years demonstrated significantly higher 2000Hz abnormality rates (68.09% vs. 46.15%, $P < 0.05$) and more severe neurological lesions (57.45% vs. 35.90%, $P < 0.05$). In contrast, those with disease duration ≤5 years exhibited elevated 5Hz abnormality rates (30.77% vs. 10.64%, $P < 0.05$) with predominantly milder lesions (56.41% vs. 31.91%, $P < 0.05$). Statistical analyses demonstrated a significant association between CPT and NCV, with moderate diagnostic consistency. ROC curve analysis demonstrated that CPT exhibited moderate diagnostic accuracy in detecting DPN at the 5Hz. Authors concluded that CPT showed moderate diagnostic accuracy for early unmyelinated (C) fibers detection, routine CPT screening in high-risk groups (central obesity/short disease duration) enables timely intervention to prevent irreversible damage.

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