

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

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

6 **Product:** **Specialty**

9 **GUIDELINES**

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

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

30 **HCPCS Codes and Descriptions**

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

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 32 **DESCRIPTION/BACKGROUND**

33 Quantitative sensory testing (QST) is not a nerve conduction study and is not
 34 electromyography. It is proposed as a non-invasive technique for assessing nerve damage
 35 by measuring the pressure threshold felt in the skin. QST was developed to measure
 36 sensory stimuli, thermal stimuli or vibratory stimuli. Current perception threshold (CPT)
 37 testing is a method of QST. Current perception threshold (CPT) testing (also known as
 38 sensory nerve conduction threshold testing) is the process of determining and quantifying
 39 the threshold of sensory perception by sensory nerves to transcutaneous stimulation.

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

21
22 According to manufacturers, CPT/sNCT evaluation provides the practitioner with a means
23 to obtain a differential diagnosis and quantitative evaluation of conditions resulting in
24 sensory nerve impairments. Proponents also claim the CPT evaluation can be used to assess
25 and document the patient's response to therapy. An evaluation with this device uses sensors
26 connected to a computer that allegedly measure the conduction and functional integrity of
27 various sensory nerve fibers (types A through C). The unit emits three painless
28 transcutaneous electrical frequencies (5 Hz, 250 Hz, and 2,000 Hz) through a pair of
29 electrodes to quantify neuroselective CPT values. The evaluations are based on the
30 patient's sensory response and comparisons with proposed standardized ranges of normal
31 CPT values and ratios.

32
33 A CPT evaluation using the Neurometer[®] typically takes 10 minutes per region with 2 to 6
34 regions analyzed on average. However, the Neurometer CPT also has a Rapid Screening
35 Mode that enables large groups to be quickly assessed for neuropathies (less than 3 minutes
36 per person) to determine if complete testing is necessary. Manufacturers also propose that
37 abnormally low CPT measures indicate a hypersensitive nerve function, often associated
38 with inflamed, irritated, or regenerating nerves (hyperesthetic conditions). Abnormally
39 high CPT measures are believed to indicate a significant loss of nerve conduction,
40 reflecting a hypoesthetic condition or neuropathy. Proponents believe this sensitivity
41 enables the CPT device to accurately differentiate various inflammatory conditions such
42 as arthritis and sprains/strains from true neuropathic conditions. Additionally, proponents

1 believe such sensitive nerve measurements can accurately detect metabolic, toxic,
2 acquired, hereditary, compression, traumatic, and other peripheral neuropathies as well as
3 sensory impairments resulting from central nervous system pathology.

4 **EVIDENCE REVIEW**

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

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

40 Cho et al. (2018) examined the diurnal sensory dysfunction in primary RLS/WED using
41 the CPT test, compared to healthy controls. A total of 30 primary RLS/WED subjects and
42 30 healthy controls were enrolled. The severity of RLS/WED and sleep problems were

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

11
12 Zhang et al. (2021) quantitatively evaluated sensory nerve function in patients with CAI
13 and healthy controls using current perception threshold (CPT) measurements, as well as
14 the influence of sex, age, and body mass index (BMI) on CPT values and the relations
15 between CPT frequencies. Fifty-nine subjects with CAI and 30 healthy controls
16 participated in this study. CPT values at the anterior talofibular ligament region were
17 recorded on the injured and uninjured sides in CAI patients and on both sides in the healthy
18 control group. Between group differences were compared. The influence of sex, age and
19 BMI on CPT values was evaluated. Correlations between different frequencies were also
20 studied. There were no significant differences in age, sex, height, weight or BMI between
21 the CAI and healthy control groups. The CPT values did not show a significant difference
22 by sex. The CPT values did not significantly correlate with age or BMI. Compared to the
23 control group, the CAI group had significantly higher CPT values on the injured and
24 uninjured sides under 250 Hz and 5 Hz electrical stimuli; the difference between the groups
25 was significant ($p < 0.01$), and the effect size were large. No significant difference was
26 observed under 2000-Hz stimuli. There were correlations between CPT values at different
27 frequencies ($p < 0.01$), especially 250 Hz and 5 Hz. Authors concluded that the present
28 study revealed increased sensory thresholds in 250-Hz- and 5-Hz-related sensory nerve
29 fibers in the injured and uninjured ankles of patients with CAI. This increase may indicate
30 dysfunction of A-delta and C fibers. Sex, age and BMI did not significantly impact CPT
31 values. There were correlations between CPT values at different frequencies, especially
32 250 Hz and 5 Hz.

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

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

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

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