

Utility of Current Perception Threshold Testing in the Evaluation and Treatment of Neuropathy and Neuropathic Pain

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Abstract

This short communication article was intended to update the utility and application of current perception threshold (CPT) testing in evaluation of people with neuropathy through an evidence-informed overview. Limited number of studies reported on the use of CPT in trigeminal neuralgia, diabetic peripheral neuropathy, myelo-optic neuropathy, post-herpetic neuralgia and uremic neuropathy. CPT was advantageous compared to nerve conduction studies due to its fiber-specific diagnostic properties, acceptable reliability and excellent validity for a myriad of peripheral neuropathic conditions.

Keywords: Neurometer; Current perception threshold; Sensory examination; Neuro-anesthesia; Neuro-analgesia.

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Trigeminal neuralgia

Liao et al [1] studied 49 patients with trigeminal neuralgia (TN) of whom 13 were acute and 36 were chronic, for their responses to blink reflex study and current perception threshold (CPT) testing to compare the painful facial areas and contra-

lateral non-painful areas. Significantly decreased CPTs (5 Hz) were noted in the acute stage, but increased CPTs were seen in the chronic stage on the painful side when compared with the contra-lateral non-painful side. Such findings were not present for CPTs at 250 Hz (Adelta) and 2000 Hz (Abeta) examinations.

Diabetic peripheral neuropathy

Matsutomo et al [2] used the Neurometer to measure current perception threshold (CPT) at 2000, 250 and 5 Hz and investigated peripheral neuropathy in 116 patients with type 2 diabetes mellitus and 38 healthy controls. "The CPT at 2000 Hz was found to be higher in diabetic patients than in controls, and showed a significant negative correlation with motor and sensory nerve conduction velocities. At 250 Hz, CPT showed a significant positive correlation with the vibration perception threshold. At 5 Hz, the change in systolic blood pressure in the Schellong test in patients with hypoesthesia tended to be less than in those with normal sensation or hyperesthesia.

Pitei et al [3] assessed the ability of the Neurometer to distinguish between different types of nerve fiber damage by using different frequencies (2000 Hz, 250 Hz, and 5 Hz) of electric stimulus (high frequencies for large fibers and low frequencies for small fibers) and compared those results with

standard sensory tests of vibration perception threshold (VPT) and thermal perception threshold (TPT) in 51 patients with diabetic neuropathy and 28 non-diabetic control subjects. "CPT in neuropathic patients could be distinguished from controls at all three frequencies in both feet and hands. The best correlation was found between CPT at 2000 Hz and VPT in the feet suggesting a degree of neuro-selectivity. Internal correlations between CPT at the three frequencies showed the weakest correlation between CPT at 2000 Hz and 5 Hz, suggesting also that possibly different types of fibers were examined. CPT reproducibility was better in control, than in neuropathic subjects, although the coefficient of variation was comparable to that

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of standard tests of sensory function, VPT and TPT.

Rendell et al [4] conducted detailed clinical neurological examinations (standardized assessment of symptoms and physical testing of light touch, pain, vibratory, and thermal sensation was performed to get total symptom score and physical score) on 44 non-diabetic volunteers and 59 diabetic subjects. "CPT correlations with the physical score gave r values of .55 for 5 Hz, .60 for 250 Hz, and .62 for 2000 Hz (n = 618). Correlations with the symptom score were not as strong: r = .45 for 5 Hz, .46 for 250 Hz, and .51 for 2000 Hz.

Post-herpetic neuralgia

Sakai et al [5] evaluated CPT to clarify the role of peripheral sensory nerves in the production of allodynia and ongoing pain, which was performed by a series of 2,000-, 250-, and 5-Hz stimuli. "CPTs at all frequencies in the ipsilateral area were significantly higher than those in the contra-lateral area. There were significant and inverse correlations between the intensity of allodynia and CPTs at all frequencies.

Myelo-optico-neuropathy

Suzuki et al [6] reported the first CPT examination findings of sensory disturbance in subacutemyelo-optico-neuropathy (SMON) who experienced serious neurological symptoms, including dysesthesia, sensory loss, motor weakness, and visual impairment. 10 SMON patients and 10 age-matched controls were studied using CPT and the study found following findings; "The CPTs to 250 Hz and 2,000 Hz stimulations near the external malleolus were significantly higher and the CPT to 5 Hz stimulation was significantly lower in the SMON group than in the control group.

Uremic neuropathy

Weseley et al [7] studied 34 dialysis patients with end-stage renal disease and their findings proved that the measurement of current perception threshold (CPT) was equally effective to nerve conduction tests (NCT) in defining peripheral nerve function, with marginal superiority of the CPT examination findings.

Limited number of studies reported on the use of CPT in trigeminal neuralgia, diabetic peripheral neuropathy, myelo-optic neuropathy, post-herpetic neuralgia and uremic neuropathy. CPT was advantageous compared to nerve conduction studies due to its fiber-specific diagnostic properties, acceptable reliability and excellent validity for a myriad of peripheral neuropathic conditions.

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