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A New Point-of-Care, Hand-Held Nerve Conduction Measuring Device for the Accurate Diagnosis of Diabetic Peripheral Neuropathy

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There are currently no objective and reproducible measures to diagnose diabetic peripheral neuropathy (DPN) in the context of the busy clinic. A point-of-care hand-held device, DPNCheck™ (NeuroMetrix, MA, USA) that measures both Sural Sensory Conduction Velocity (SV) and Sural Amplitude (SA) in less than 5 min. was compared with conventional electrophysiology equipment (CEE), monofilament testing (MF) and Neuropathy Composite Score (NCS).

Methods: 35 subjects [15 with diabetes- DM (9 DPN, 6 No-DPN), 20 healthy volunteers (HV)] underwent detailed assessments (monofilament test, vibration detection thresholds, sural, common peroneal and tibial nerve conduction studies using standard procedures). Neuropathy was diagnosed using the Neuropathy Composite Score (NCS) and Toronto Consensus Criteria. Each subject had SV and SA measured antidromically using the hand held device for comparison.

Results: DPNCheck™ overall had excellent agreement with CEE [DPNCheck™-SV and CEE-SV($r=0.82$; $p<0.0001$) and DPNCheck™-SA and CEE-SA ($r=0.53$; $p=0.001$)]. DPNCheck™-SV ($r=-0.76$; $p<0.0001$) and SA ($r=-0.69$; $p<0.0001$) had similar correlation values with overall NCS. Area under the ROC curve for DPNCheck™ measured SA [0.88(0.71-0.97)] and SV [0.92(0.78-0.98)] was similar to MF [(0.85(0.67-0.94))] for diagnosing DN. However, sensitivity and specificity of DPNCheck™ (SA: sensitivity 88.9, specificity 86.4; SV: sensitivity 88.9, specificity 90.9) was more favourable compared with MF (sensitivity 66.7, specificity 100).

Conclusions: DPNCheck™ is an objective, non-invasive hand-held device that provides an accurate measure of DPN. It could be the preferred method of screening for DPN in a busy diabetic clinic due to quantitative output, excellent agreement with gold standard NCS and better sensitivity than the 10 g monofilament test.