

Thermal Threshold: Research Study on Small Fiber Dysfunction in Distal Diabetic Polyneuropathy

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Abstract

Objective:

The most commonly used technique for diagnosis of diabetic neuropathy (DN) is nervous conduction (NC). Our hypothesis is that the use of the thermal threshold (TT) technique to evaluate small fiber damage, which precedes large fiber damage, could enable earlier diagnosis and diminish false negatives.

Research Design and Methods:

The study involved 70 asymptomatic patients with type 2 diabetes mellitus (T2DM) all being treated with oral hypoglycemic medication, and having negative metabolic control levels with glycosylated hemoglobin A1c greater than 7% and less than 8%. Diabetic neuropathy was their only evident complication. All other complications or other causes of neuropathy were discarded. Their time of evolution was 1 to 48 months since date of diagnosis of diabetes. Both thermal threshold and sensory and motor nervous conduction were determined in upper and lower limbs.

Results:

Nervous conduction was found normal in 81% and altered in 19% of patients (large fiber neuropathy). Thermal threshold was normal in 57% and altered in 43% of patients (small fiber neuropathy). In those with normal TTs, no case with an altered NC was found ($p < 0.001$). Patients with altered TTs could have normal (57%) or altered NC (43%). Thus, NC showed a high frequency of false negatives for DN (57% of 30 cases).

The frequency of small fiber neuropathy found with the TT test was higher than that of large fiber neuropathy found with the NC test ($p < 0.001$) and was found at an earlier age.

Conclusions:

The TT test demonstrated a higher frequency of neuropathy than the NC test in clinically asymptomatic T2DM patients. We suggest that small fiber should be studied before large fiber function to diagnosis distal and symmetrical DN.

J Diabetes Sci Technol 2012;6(1):177-183

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Abbreviations: (CI) confidence interval, (DM) diabetes mellitus, (DN) diabetic neuropathy, (DSPN) distal symmetrical polyneuropathy, (EMG) electromyography, (NC) nervous conduction, (SD) standard deviation, (SFN) subclinical small fiber neuropathy, (T2DM) type 2 diabetes mellitus, (TT) thermal threshold

Keywords: diabetic neuropathy, thermal threshold, nervous conduction

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