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LETTER TO THE EDITOR

Response to 'Focus on nerve fiber type: A diagnostic strategy for diabetic polyneuropathy'

We thank Dr Fustes[1] for his interesting and informative insights on our commentary[2]. He stated that the development of a simple neurophysiological test to evaluate small fiber neuropathy (SFN) is desired, because currently available methods of assessing SFN are not suitable for clinical routine. He also introduced three reports. The first showed that a concentric surface electrode (CSE) could selectively stimulate skin nociceptive fibers (particularly Aδ fibers), the second showed that CSE-stimulated pain-related evoked potential was elicited through Aδ fibers and the final report showed that a loss of pain-related evoked potential indicated an advanced stage of small nerve fiber damage in patients with mixed or small-diameter polyneuropathy. Thus, he concluded that pain-related evoked potential with CSE will undoubtedly be useful for diagnosis of SFN.

We agree with the author's opinion. This letter has been written to inform that research is underway in Japan to ascertain whether determining the pain threshold of Aδ fibers using selective stimulation by CSE is useful as a method for detecting SFN.

In 2002, Inui *et al.*[3] showed that a new concentric electrode for intraepidermal electrical stimulation (IES electrode) made it possible to selectively stimulate cutaneous Aδ fibers, thus being capable of determining the pain threshold of nociceptive Aδ fibers. In 2009, a measuring system consisting of an IES electrode and an electrical stimulator was commercialized, and it is now used in daily clinical practice as a simple portable peripheral nerve testing device, PNS-7000 (Nihon Kohden, Tokyo, Japan), that might be able to detect sensory SFN.

In 2016, Kukidome *et al.*[4] measured the pain threshold of Aδ fibers on the foot dorsum in 120 diabetes patients and 76 individuals without diabetes using the PNS-7000 system. The Aδ pain threshold was higher in diabetes patients compared with control participants. In diabetes patients, the Aδ pain threshold in patients with diabetic polyneuropathy diagnosed by two or more neurological abnormalities (symptoms, decreased Achilles tendon reflex [ATR] and elevated vibration threshold) was significantly higher than in patients without diabetic polyneuropathy. Using the same method, Suzuki *et al.* also reported that the Aδ pain threshold elevated significantly in the order of the healthy control group, diabetes group with normal neurological findings, diabetes group with reduced ATR and/or decreased ankle vibration sensation. At the 2019 American Diabetes Association Scientific Meeting, we presented the results of measuring the Aδ pain threshold by the same method in 656 local residents including 23 newly diagnosed and 66 known diabetes patients. The results showed that the Aδ pain threshold was less affected by aging, but significantly increased in participants with painful symptoms, and that the Aδ pain threshold was significantly increased in not only known, but also in newly diagnosed, diabetes patients.

Therefore, this method is promising as a simple diagnostic method to identify SFN. However, there is a problem in that there was a considerable variation in the normal values used in each study. There are many issues to be solved in the future, such as the integration of IES electrodes and inspection procedures, and the establishment of computer-based inspection automation.

DISCLOSURE

The authors declare no conflict of interest.

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