



## Letter to the Editor

## Reply to “Conduction studies on the sural nerve”



We read with great interest the letter by Burke (Burke, [this issue](#)) which comments on our recent paper “Normative reference values for the dorsal sural nerve derived from a large multicenter cohort” published in *Clinical Neurophysiology Practice* (Krøigård et al., 2021). We thank the author for reminding us of the study first introducing dorsal sural nerve conduction studies (NCS) (Burke et al., 1974). We have been wondering why this useful test has not yet been included in clinical routine. We believe one reason may be the lack of reliable normal material. This was the motivation for our study. In our paper, we also provide to the readers a Spreadsheet (see Krøigård et al., 2021, Supplementary Data 1) which presents normal limits based on the age and height of a subject. We still advise each laboratory to establish their own normal material. However, in case this is not possible, we hope our study may accelerate the use of dorsal sural nerve in the electrodiagnosis of particularly polyneuropathy.

We appreciate the historical background of sural NCS using surface electrodes and near-nerve needle technique (NNT) (Burke, [this issue](#)). We agree that NNT is almost exclusively being used in Denmark. This technique is unpleasant and time consuming but has the advantage of recording a sensory nerve action potential (SNAP) in the majority of patients, and technical issues such as oedema that can cause an absent response can be overcome. In a recent study (Tankisi et al. 2019), absent responses using NNT was only found in 6 nerves of the 626 nerves in 313 patients (0.01%) while an absent response was often seen using surface recordings in patients with polyneuropathy (18%). However, in all patients with absent surface sural NCS recordings, near-nerve recordings were abnormal. Thus, absent responses with surface electrodes are related to pathology rather than technical issues. In another study (Kural et al., 2017) of 68 patients with confirmed clinical follow-up polyneuropathy diagnosis, the sensitivity of NNT was 77% while for surface recordings it was only 60%. However, dorsal sural NCS showed a sensitivity of 72%, close to NNT. Therefore, we are confident recommending dorsal sural NCS as an alternative to sural NCS using NNT. Another disadvantage of NNT may be false positive results due to anatomical variation in the sural nerve. A distal formation of the sural nerve by the union of the medial sural cutaneous nerve and the peroneal communicating branch combined with orthodromic near-nerve recording from one of the branches may result with a false abnormal result. This is less common with antidromic surface recordings in which increasing the stimulus intensity may compensate the anatomical variation (Tankisi et al., 2014).

We agree with Burke (Burke, [this issue](#)) on the importance of correct identification of the SNAP onset latency with visual inspection of the cursor placement as described previously (Tankisi et al., 2020). All sensory potentials assessed in our study were inspected

visually to ensure correct positioning of cursors. In case of incorrect placement by the computer algorithm, cursors were adjusted manually in concordance with cursor placement as depicted in Figure 2 (Krøigård et al., 2021). This had not been made entirely clear in our original description. We also agree with Burke on the methodological considerations regarding sensory NCS. The discrepancy between the lowest dorsal sural SNAP amplitude in our study (Krøigård et al., 2021) (1  $\mu$ V) and Burke and co-workers (Burke et al., 1974) (1.5  $\mu$ V) may be caused by the technological achievement of signal averaging during these years. Accordingly, the difference in absent responses may also be due to signal averaging. Further studies by other groups should examine this possibility and a coincidental abnormality, which may be seen in elderly populations.

Regarding using small amplitudes in a clinical setting, it is important to recognize that sensory potentials are log-normal distributed, recorded with needle (Nielsen, 1973) as well as with surface electrodes (Andersen, 1985) and as such correlated with age and height, which provided more exact reference values.

Overall, we appreciate Burke's interest and valuable comments on our study. We hope our response can clarify the raised concerns.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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