Utility of transcutaneous electrical nerve stimulation in neurologic pain disorders

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Transcutaneous electrical nerve stimulation (TENS) has now been used over 40 years in the treatment of pain. In 1967, Wall and Sweet successfully treated patients with “chronic cutaneous pain”; this proved to be the beginning for the increasing and widespread use of TENS in different nociceptive and neuropathic pain syndromes. The scientific basis for this treatment was presumed to be Wall and Melzack’s gate control theory, which stated that large nerve fiber activation, as applied by TENS, could modulate pain sensations conducted in small fiber nerves, by gating or blocking the transmission within central nociceptive pain pathways. Recent research and clinical observations in some patients, such as those with delayed analgesia or persisting anesthesia after stimulation, has made it clear that the gate control theory cannot explain all effects of TENS; nevertheless, the lack of a solid scientific rationale has not hindered the implementation of TENS in pain therapy.

In this issue of Neurology, Dubinsky and Miyasaki, representatives of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology, present the results of a concise meta-analytic evidence-based review of TENS’ efficacy in painful neurologic disorders. There are 3 main results: first, probable efficacy could be substantiated in the treatment of painful diabetic neuropathy only (level B); second, TENS cannot be recommended in chronic low back pain (level A); and third, the number of controlled trials is low and the intertrial comparisons are weakened by heterogeneous trial designs, treatment paradigms, and efficacy parameters.

These conclusions may heat up the discussion on the usability of TENS and may be viewed as supporting the critics who questioned the value of TENS in pain therapy. However, absence of evidence is not evidence of absence. The clinical impact of meta-analyses is always limited by the quantity and quality of conducted trials. This becomes true in particular when talking about nonpharmacologic treatment options like TENS. Moreover, Nnoaham and Kumbang already stated that there seem to be no attempts to improve our knowledge in the last years.

TENS is still in use and has a longstanding role as a treatment option that also has been implemented in treatment guidelines. Thus, there seems to be considerable empirical evidence that, at least in some patients, TENS is useful. The advantages are obvious in these instances: it appears to be a safe treatment modality, with a fast onset of analgesia in responding patients, usually without notable adverse effects and lacking interactions with other treatments. Only a few contraindications exist. TENS is an easy to handle device with a favorable benefit to risk ratio that can be discontinued easily if it is not efficacious. All these are desired properties when treating pain.

Dubinsky and Miyasaki also translate the results of their work into a call for further trials and present clearcut recommendations for their conductions. These include the determination of “optimum” pain-relieving stimulation paradigms. Further, they call for trials in TENS-naive patients in randomized sham-controlled trials and in well-defined neurologic pain syndromes. Moreover, for the pain community it will be necessary to search for predictors of response to improve TENS therapy. To accomplish this, it may be useful to stratify patients with regard to the possible mechanisms of different pain syndromes, as detectable by (for example) quantitative sensory testing and pain questionnaires. Based on the presumed mode of action of TENS therapy, we could hypothesize that patients with extended nerve fiber degeneration and predominant deafferentation pain may show a poorer or lack of response than those with preserved nerve function and predominant sensitization pain processes.

This updated evidence-based review is valuable in providing the limits of our evidence base. Nevertheless, it is not unreasonable to take a practical
position that, in spite of the relatively weak scientific and clinical evidence, TENS still represents a valuable therapeutic alternative in neurologic pain disorders. Taking the favorable benefit-risk ratio when compared with other pain relieving methods into account, TENS remains a valuable part in the armamentarium of pain therapy.

DISCLOSURE
Dr. Binder has received travel expenses for lectures and educational activities not funded by industry and has received honoraria for speaking engagements and educational activities from Grünenthal, Allergan, Inc., and Pfizer Inc. Dr. Baron serves on scientific advisory boards, as a consultant, and on speakers’ bureau for Pfizer Inc., Genzyme Corporation, Grünenthal, Mundipharma International, Allergan, Inc., Sanofi Pasteur, Medtronic, Inc., Eisai Inc., UCB, Eli Lilly and Company, and Astellas Pharma Inc.; has received travel expenses for lectures or educational activities not funded by industry; serves as an Associate Editor of Pain and on the editorial advisory boards of Nature Reviews Neurology and European Journal of Pain; and has received research support from Pfizer Inc., Genzyme Corporation, Grünenthal, the German Ministry of Research, and DFG, Deutsche Forschungsgemeinschaft.

REFERENCES