INTRODUCTION
Transcutaneous electrical nerve stimulation (TENS) is a non-invasive treatment for chronic pain that has no major side effects. Conventional TENS is delivered through surface electrodes at a frequency and intensity that produces a strong, nonpainful sensation. The resulting stimulation of large diameter, deep tissue afferents produces pain relief by decreasing central excitability and increasing central inhibition.

In traditional practice, TENS electrodes are applied to the painful area. Alternative sites are recommended if localized placement is undesirable due to skin irritation or allodynia, or impractical as in the case of phantom limb pain. Stimulation proximal to the pain, distal to central inhibition.

The widespread analgesic effects of TENS form the mechanistic basis for fixed-site high-frequency TENS (FS-TENS). In this approach, the stimulator is designed for a predetermined location rather than for co-localization with the patient’s pain. A single target site enables discreet devices that are suitable for frequent use and are compatible with activity and sleep. FS-TENS has been shown to be effective in chronic lower extremity and low back pain.

In this study, we evaluated whether FS-TENS has widespread effects by comparing outcomes in subjects with and without pain in the area of electrical stimulation.

METHODS
Data previously collected from 130 subjects with chronic pain using an FS-TENS placed on the upper calf was analyzed (Gozani 2016). Iclusion criteria were age≥40 years and low back pain (LBP) or lower extremity pain (LEP). Subjects completed a baseline demographic, medical history and pain (Brief Pain Inventory, BPI-SF) questionnaire. At baseline (Table 1), the groups differed in pain sites (LEP 1.9±1.0 vs. +LEP 4.0±2.1, p<0.01), painful conditions (1.6±0.82 vs. 2.3±1.3;p=0.02), LBP (100% vs. 79.4%, p=0.01), upper extremity pain (44.0% vs. 69.8%, p=0.02), and interference with walking (5.2±2.9 vs. 6.6±2.5, p=0.04) and sleep (5.6±2.5 vs. 7.1±2.4, p=0.03).

At 60-days, there were no statistically significant differences in PGIC (“improved/much improved”, 84.0% vs. 79.4%, p=0.62), reduction in analogs use (“decreased a-lot/decreased a-little”, 60.0% vs. 69.8%, p=0.38), and baseline to endpoint changes in pain intensity or interference (Table 2).

RESULTS
Follow-up data was available for 88 subjects; 25 -LEP and 63 +LEP. At baseline (Table 1), the groups differed in pain sites (-LEP 1.9±1.0 vs. +LEP 4.0±2.1, p<0.01), painful conditions (1.6±0.82 vs. 2.3±1.3;p=0.02), LBP (100% vs. 79.4%, p=0.01), upper extremity pain (44.0% vs. 69.8%, p=0.02), and interference with walking (5.2±2.9 vs. 6.6±2.5, p=0.04) and sleep (5.6±2.5 vs. 7.1±2.4, p=0.03).

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CONCLUSIONS
FS-TENS does not require pain at the site of stimulation to be effective. This result suggests that the analgesic effects of FS-TENS are related to segmental and extra-segmental circuits, likely involving descending pain inhibition.

References