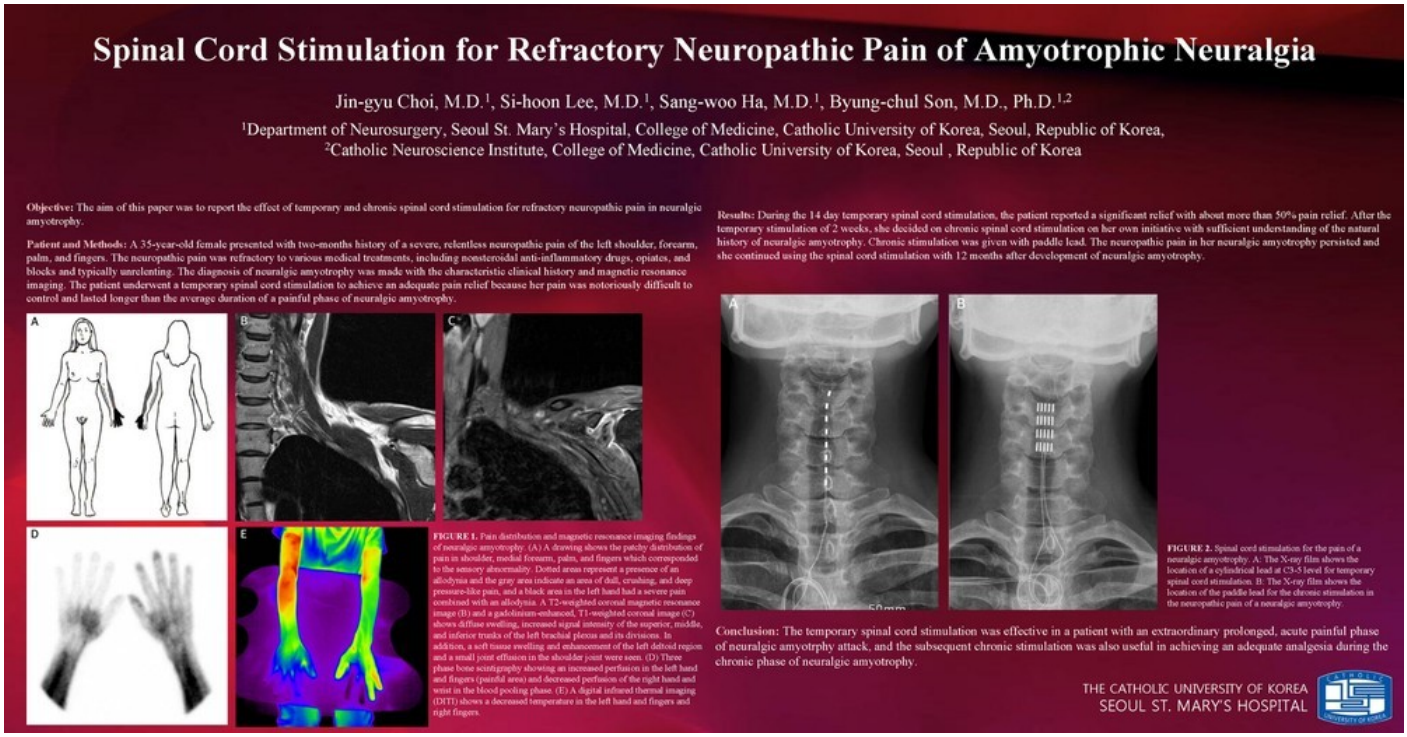
Medical PEMF Studies

PAIN

Pulsed magnetic field therapy in refractory neuropathic pain secondary to peripheral neuropathy: electrodiagnostic parameters--pilot study.



1. Neurorehabil Neural Repair. 2004 Mar;18(1):42-6.

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CONTEXT: Neuropathic pain (NP) from peripheral neuropathy (PN) arises from ectopic firing of unmyelinated C-fibers with accumulation of sodium and calcium channels. Because pulsed electromagnetic fields (PEMF) safely induce extremely low frequency (ELF) quasirectangular currents that can depolarize, repolarize, and hyperpolarize neurons, it was hypothesized that directing this energy into the sole of one foot could potentially modulate neuropathic pain.

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OBJECTIVE: To determine if 9 consecutive 1-h treatments in physician's office (excluding weekends) of a pulsed signal therapy can reduce NP scores in refractory feet with PN.
DESIGN/SETTING/PATIENTS: 24 consecutive patients with refractory and symptomatic PN from diabetes, chronic inflammatory demyelinating polyneuropathy (CIDP), pernicious anemia, mercury poisoning, paraneoplastic syndrome, tarsal tunnel, and idiopathic sensory neuropathy were enrolled in this nonplacebo pilot study. The most symptomatic foot received therapy. Primary endpoints were comparison of VAS scores at the end of 9 days and the end of 30 days follow-up compared to baseline pain scores. Additionally, Patients' Global Impression of Change (PGIC) questionnaire was tabulated describing response to treatment. Subgroup analysis of nerve conduction scores, quantified sensory testing (QST), and serial examination changes were also tabulated. Subgroup classification of pain (Serlin) was utilized to determine if there were disproportionate responses.

INTERVENTION: Noninvasive pulsed signal therapy generates a unidirectional quasirectangular waveform with strength about 20 gauss and a frequency about 30 Hz into the soles of the feet for 9 consecutive 1-h treatments (excluding weekends). The most symptomatic foot of each patient was treated.
RESULTS: All 24 feet completed 9 days of treatment. 15/24 completed follow-up (62%) with mean pain scores decreasing 21% from baseline to end of treatment ($P=0.19$) but with 49% reduction of pain scores from baseline to end of follow-up ($P<0.01$). Of this group, self-reported PGIC was improved 67% (n=10) and no change was 33% (n=5). An intent-to-treat analysis based on all 24 feet demonstrated a 19% reduction in pain scores from baseline to end of treatment ($P=0.10$) and a 37% decrease from baseline to end of follow-up ($P<0.01$). Subgroup analysis revealed 5 patients with mild pain with nonsignificant reduction at end of follow-up. Of the 19 feet with moderate to severe pain, there was a 28% reduction from baseline to end of treatment ($P<0.05$) and a 39% decrease from baseline to end of follow-up ($P<0.01$). Benefit was better in those patients with axonal changes and advanced CPT baseline scores. The clinical examination did not change. There were no adverse events or safety issues.

CONCLUSIONS: These pilot data demonstrate that directing PEMF to refractory feet can provide unexpected shortterm analgesic effects in more than 50% of individuals. The role of placebo is not known and was not tested. The precise mechanism is unclear yet suggests that severe and advanced cases are more magnetically sensitive. Future studies are needed with randomized placebo-controlled design and longer treatment periods.

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