

High frequency non-invasive stimulation over the spine: Effects on mood and mechanical pain tolerance in normal subjects

A.D. Towell^{1,2}, D. Williams² and S.G. Boyd¹

¹*Department of Clinical Neurophysiology, Great Ormond Street Hospital For Children NHS Trust, Great Ormond Street, London and* ²*Department of Psychology, University of Westminster, London, UK*

Towell, Williams and Boyd investigated the effects of non-invasive high frequency (625Hz) stimulation over the spine on mechanical pain tolerance and subjective mood, having noted a change in mood in the patients being treated with TSE. Sixty healthy subjects were divided equally into three groups receiving either high intensity (250V), low intensity (3.4V) or sham electrical stimulation directly over the spinal cord for 30 minutes.

A TSE device was used to stimulate over the spinal cord via electrodes placed at C7 (anode) and T12 (cathode). The TSE output was calibrated on a five point scale with a maximum output voltage of 250 V. Subjects were instructed that, during treatment, they might experience some tingling and pulling sensations in the vicinity of their back but that this would not harm them. The controls of the TSE unit were hidden from the subject. In all groups, the intensity of stimulation was gradually increased over a couple of minutes to reach either intensity 5 (250V), intensity 2 (3-4V) or sham (no battery). Subjects were treated for 30 minutes once the desired level of stimulation had been reached. The Nowlis Mood Adjective Checklist and mechanical pain tolerance were recorded.

In a second experiment, twenty different subjects (12 male; age range 19 to 37 years) were tested and randomly assigned to one of two groups; ten were given high intensity TSE across the left shoulder joint and were compared with ten subjects receiving sham stimulation in the same region. Mechanical pain tolerance and mood were tested before and after TSE treatment

Following high intensity stimulation, subjects felt “significantly more elated, leisurely and less tense” and, contrary to reports on patients with clinical pain, had lower mechanical pain tolerances.

These findings contrasted with the lack of any significant differences in mood or mechanical pain tolerances in a second study where 20 subjects received either high intensity or sham stimulation across the left shoulder joint.

The results indicate that decreases in mechanical pain tolerance are independent of changes in mood following non-invasive high frequency, high intensity cutaneous stimulation but that both effects are dependent on that stimulation being applied over the spine. The results of the present single-blinded study, taken together with the double-blinded study of Macdonald and Coates (1995), argue against the effects of TSE being purely placebo.

Summary of Results - High frequency non-invasive stimulation over the spine

- Mean change values of emotions following TSE.
- Positive values represent an emotion being felt more strongly.
- Following high intensity TSE, subjects felt significantly more elated (***) = $p < 0.001$), leisurely (* = $p < 0.05$) and less tensed up (** = $p < 0.01$)

Stimulus Intensity	Response											
	angry	tensed up	playful	elated	concentration	tired	energetic	kindly	sad	skeptical	self centred	leisurely
Experiment 1												
High	-0.15	-0.75**	0.15	0.6***	-0.55	0	-0.05	0.2	-0.4	-0.25	0	0.75*
Low	-0.05	-0.3	0	0.35	-0.25	0.1	-0.35	-0.2	-0.2	-0.05	-0.05	0.25
Sham	-0.15	-0.3	-0.1	0	-0.25	-0.05	0.1	0	-0.05	-0.15	-0.05	0.2
Experiment 2												
High	0.1	-0.01	-0.1	-0.05	-0.05	0	0	0.1	0.1	-0.2	-0.1	0
Sham	0.1	-0.2	0	-0.1	-0.1	-0.1	0.1	0.05	0	0.1	0	-0.1