Spinal Direct Current Stimulation (s-DCS): clinical and neurophysiological effects on pain in Multiple Sclerosis

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E. Berra[1], E. Alvisi[2], M. Berlangieri[2], I. Callegari[2], R. De Icco[2], M. Avenali[2], M. Fresia[1], R. Bergamaschi[3], C. Tassorelli[1,2], M. Grasso[4], M. Rovaris[5], A. Perrotta[6], G. Sandrini[1,2]

1 Department of Neurology and Neurorehabilitation, C. Mondino National Neurological Institute, Pavia, Italy
2 Department of Brain and Behavioural Sciences, University of Pavia, Pavia, Italy
3 Interdepartment Research Center for Multiple Sclerosis , C. Mondino National Neurological Institute, Pavia, Italy
4 Department of Neurorehabilitation - IRCCS Santa Lucia - Rome
5 Multiple Sclerosis Unit - IRCCS S. Maria Nascente, Don Gnocchi Foundation - Milan
6 Department of Neurology - IRCCS Neuromed Neurological Institute - Pozzilli

Background and Aim

Central neuropathic pain represents one of the most common symptoms in Multiple Sclerosis (MS), that seriously affects health-related quality of life. First evidences obtained by animal, neurophysiological and clinical studies suggested potential efficacy of Transcranial Direct Current Stimulation (t-DCS) in neuropathic pain treatment. Spinal DCS (s-DCS) modulates Nociceptive Withdrawal Reflex (NWR), an objective and sensitive tool to explore pain processing at the Spinal Level. However, few data are available about clinical efficacy of s-DCS in treatment of neuropathic pain in MS. The aim of the study is to investigate s-DCS clinical efficacy in treatment of central neuropathic pain in MS patients.

Methods

60 MS patients with central neuropathic pain were enrolled randomly assigned to two group: Anodal Spinal Direct Current Stimulation or Sham Stimulation, in a double-blind, placebo controlled study design. 30 patients underwent 10 daily 20-minutes sessions of anodal s-DCS (2mA); 30 patients underwent 10 daily 20-minutes sessions of sham treatment. Clinical efficacy was evaluated before treatment (T0), after 10 days of treatment (T1) and one month after the end of treatment (T2), using following clinical scales: Neuropathic Pain Symptoms Inventory Scale (NPSI), for pain, Ashworth Scale for spasticity and Fatigue Severity Scale (FSS). Nociceptive Withdrawal Reflex (NWR) was recorded in T0, T1, T2.

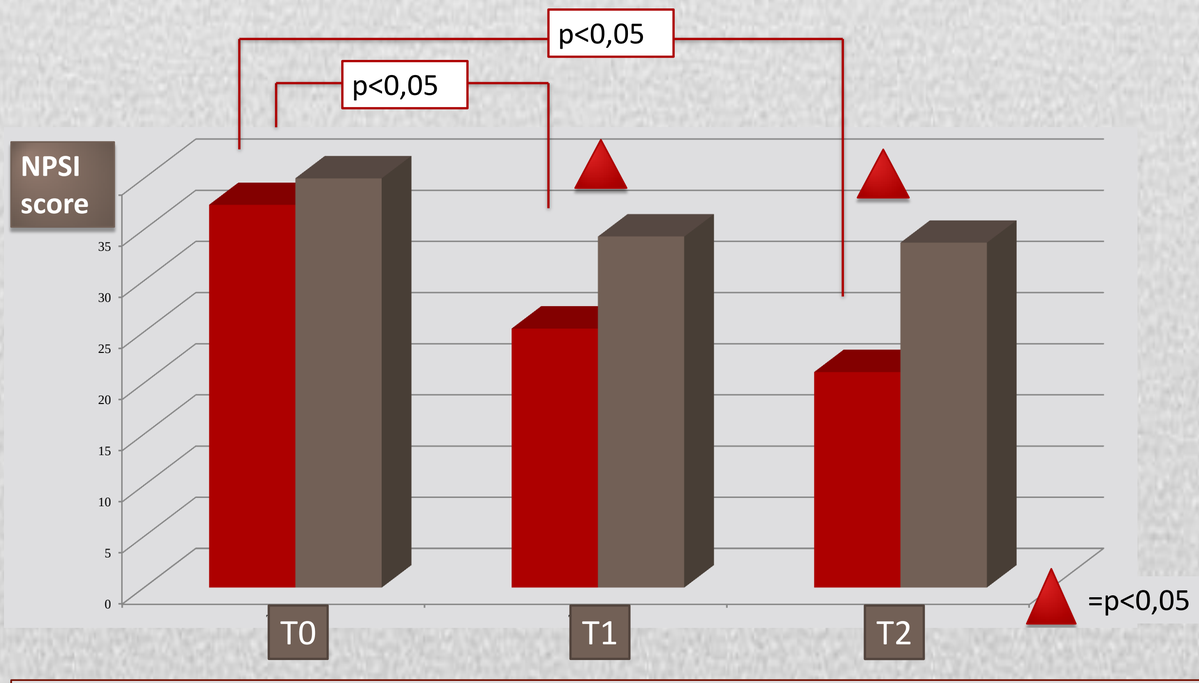
Results

s-DCS group showed a significant clinical improvement in neuropathic pain with a reduction of NPSI score, also one month after the end of treatment. No significant improvement was shown in sham group. No significant improvement was detected in clinical scales for spasticity or fatigue in both groups.
No significant changes were detected in NWR threshold (Rth).
Only in s-DCS group, we found a significant correlation between the increase of NWR threshold (Rth) and the NPSI score reduction between T0 and T1.

Clinical Scales	S-DCS group			P-value	Control group			P-value
	T0	T1	T2		T0	T1	T2	
NPSI	37,4	25,3	21,0	0,03	40,0	34,3	33,7	Ns
FSS	41,8	41,1	37,6	Ns	49,0	47,2	48,5	Ns
Ashworth	1,7	1,8	1,8	Ns	1,2	1,5	1,2	Ns

NWR	S-DCS group			P-value	Control group			P-value
	T0	T1	T2		T0	T1	T2	
Rth	20,6	20,4	22,2	Ns	17,4	17,4	17,2	Ns

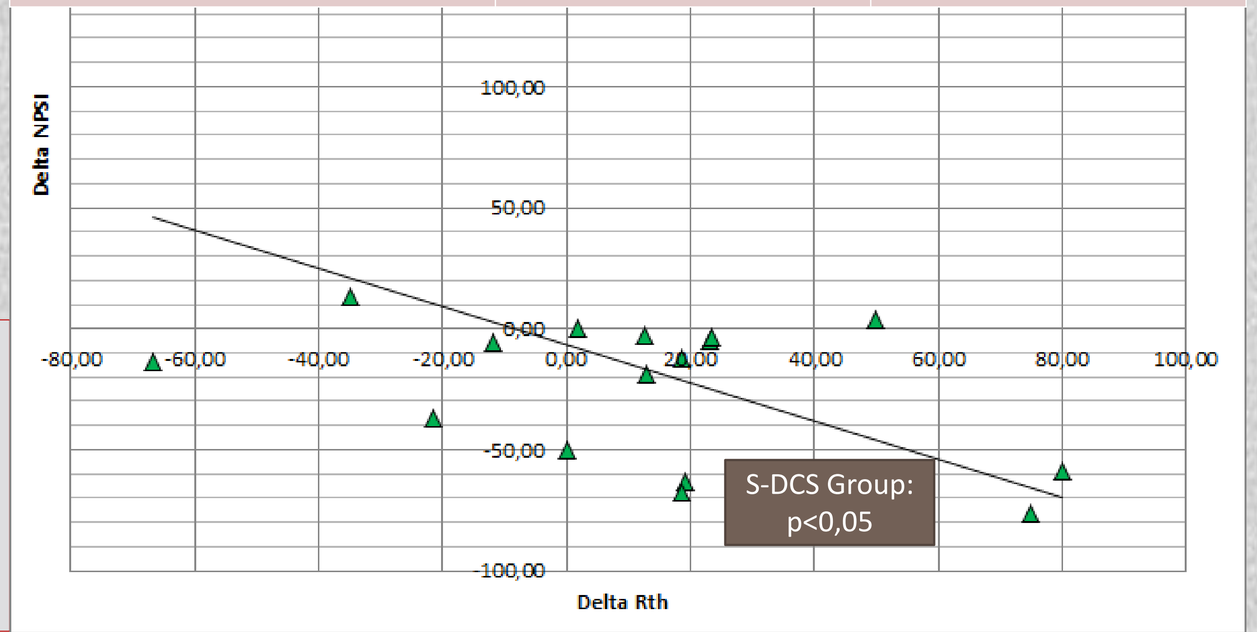
Table 1. Clinical scale scores and NWR threshold (Rth) in s-DCS and Control groups at T0, T1 and T2. Only in the s-DCS group we observed a significant decrease in NPSI score at T1 and T2 when compared to T0 (p<0,05). Ns= no statistically significant difference



Graphic 1. Comparison of NPSI scores recorded at T0, T1 and T2 in s-DCS group (RED) and control group (GREY).

Table 2. Pearson correlation between the increase of NWR threshold (Rth) and the NPSI score reduction from T0 to T1.is significant only in s-DCS group

Pearson Correlation Coefficient	S-DCS Group	Control Group
Delta Rth/NPSI T0-T1	-0,557 (p<0,05)	-0,241 (Ns)



Summary/Conclusions

A 10-day course of s-DCS seems to have clinical efficacy in the treatment of central neuropathic pain in MS patients. The beneficial effect is maintained also one month after the end of treatment.

References:

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