Methods

associate tDCS stimulation with physical therapy of the upper limb, in order to

Objectives

petition. tDCS is easy to perform, its cost is low, and the feasibility of a

stroke, and can promote the injured hemisphere in the interhemispheric com-

posed in pilot studies for the treatment of different deficiencies following

Hemiparesis; Stroke; Cerebral stimulation; tDCS; Prehension

b Hôpital Henry-Gabrielle, Saint-Genis-Laval, France

Hôpital Henry-Gabrielle, Saint-Genis-Laval, France

Corresponding author.

Keywords: Transcranial magnetic stimulation; Brain plasticity

Transcranial magnetic stimulation (TMS) is a technique for noninvasive brain stimulation used in humans. The sudden change of a magnetic field can induce an electric current in nerve tissue and depolarize the axons of neurons in the motor cortex. This technique was first used to study the plasticity of the motor cortex with the production of brain mapping and to quantify the excitability of different brain areas. More recently, repetitive transcranial magnetic stimulations (rTMS) have demonstrated their ability to modulate cortical plasticity. rTMS is applied to repeated stimulation at a variable frequency from 1 to 50 Hz for periods of 1–30 min. The nature of the resulting post-effects of this stimulation depends on the frequency, intensity and temporal organization of stimulus. Stimuli applied at a frequency of 1 Hz are most often responsible for a sustained decrease in the excitability of the motor cortex, whereas higher frequencies lead to an opposite result. Because rTMS can modulate brain activity, it has been used at least in a single session in many diseases. The results of these studies open the most opportunities for the use of this new therapeutic tool in neurorehabilitation. Nevertheless there are studies in a single session mostly on intermediate standards (electrophysiology) and not on clini-

ical criteria. The extension of this method of brain stimulation thus requires further, multicenter double-blind randomized versus sham trials to study their influence on clinical criteria of recovery. As such it is essential that teams of physical medicine and rehabilitation may be involved in this validation for the passage of what is still an experimental concept to an actual therapeutic application.


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Place of rTMS in rehabilitation

P Marque

CHU Rangueil, Toulouse, France

Keywords: Transcranial magnetic stimulation; Brain plasticity

Transcranial magnetic stimulation (TMS) is a technique for noninvasive brain stimulation used in humans. The sudden change of a magnetic field can induce an electric current in nerve tissue and depolarize the axons of neurons in the motor cortex. This technique was first used to study the plasticity of the motor cortex with the production of brain mapping and to quantify the excitability of different brain areas. More recently, repetitive transcranial magnetic stimulations (rTMS) have demonstrated their ability to modulate cortical plasticity. rTMS is applied to repeated stimulation at a variable frequency from 1 to 50 Hz for periods of 1–30 min. The nature of the resulting post-effects of this stimulation depends on the frequency, intensity and temporal organization of stimulus. Stimuli applied at a frequency of 1 Hz are most often responsible for a sustained decrease in the excitability of the motor cortex, whereas higher frequencies lead to an opposite result. Because rTMS can modulate brain activity, it has been used at least in a single session in many diseases. The results of these studies open the most opportunities for the use of this new therapeutic tool in neurorehabilitation. Nevertheless there are studies in a single session mostly on intermediate standards (electrophysiology) and not on clinical criteria. The extension of this method of brain stimulation thus requires further, multicenter double-blind randomized versus sham trials to study their influence on clinical criteria of recovery. As such it is essential that teams of physical medicine and rehabilitation may be involved in this validation for the passage of what is still an experimental concept to an actual therapeutic application.


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Transcranial direct current stimulation associated with physical therapy after stroke: Feasibility of a prospective, randomised, double blinded, sham controlled study

M Kandel a,t, J M Beis a, V Ganis a, M Prestin i,a, J Paysant a, S Jacquen-Courtois b

a Institut régional de médecine physique et de réadaptation, direction technique, 75, boulevard Lobau, CS 34209, 54042 Nancy, France

b Hôpital Henry-Gabrielle, Saint-Genis-Laval, France

Corresponding author.

Keywords: Hemiparesis; Stroke; Cerebral stimulation; tDCS; Prehension

Introduction.– Transcranial direct current stimulation (tDCS) has been proposed in pilot studies for the treatment of different deficiencies following stroke [1,2]; the presented results were very encouraging, especially for studies with repeated sessions [2]. In fact, tDCS can modulate plasticity following stroke, and can promote the injured hemisphere in the interhemispheric competition. tDCS is easy to perform, its cost is low, and the feasibility of a blinded study is much easier with tDCS than with other cerebral stimulation methods.

Objectives.– To evaluate the feasibility of a study for stroke patients, that would associate tDCS stimulation with physical therapy of the upper limb, in order to evaluate its effects on the affected upper limb function.

Methods.– Prospective, randomised, sham controlled, double blinded study. The upper limb function evolution (Jebson Taylor Test, Fugl Meyer, Box and Block test, Grip strength) and the autonomy (FIM) in two groups of stroke patients was evaluated. The real or sham stimulation was performed daily during a physical therapy session for 10 consecutive days.

Results.– Six patients were included. 1 patient could easily determine he had a real stimulation; 1 patient did not tolerate the stimulation and withdrew from the experiment. No other adverse reaction was noticed. All the included patients had better performances after the intervention. The stimulations were easy to perform and did not perturb physiotherapy session.

Discussion–Conclusion.– Feasibility of a study with enough power is demonstrated. The number of patients has to be increased in order to statistically compare performance in the two groups.

References


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