



**Service Priorities and Programmes
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Low-frequency repetitive transcranial magnetic stimulation suppresses corticomotor excitability and promotes motor performance of paretic arm in chronic stroke patients

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Introduction

Repetitive transcranial magnetic stimulation (rTMS) is a novel technology that is thought to improve the motor relearning of the paretic arm in stroke patients by optimizing plastic changes in the cortex when it was given in combination with physical training. Interhemispheric inhibition through transcallosal connections appears to be dysfunctional in chronic stroke patients. This may result in an excessive inhibitory drive from unaffected motor cortex over its damaged homologous counterpart, with negative consequences on synaptic plasticity for motor relearning. Low-frequency rTMS may help to modulate this imbalanced activity between motor cortices and hence facilitate the motor relearning after stroke.

Objectives

To evaluate the effects of low-frequency rTMS on unaffected primary motor cortex followed by physiotherapy task-orientated training on corticomotor excitability and motor performance of the paretic arm in chronic stroke patients.

Methodology

Two chronic unilateral subcortical stroke patients with mild-to-moderate motor deficits in the paretic arm received daily application of continuous train of 1,500 stimuli of rTMS given at a frequency of 1 Hz at an intensity of 90% resting motor threshold for 25 minutes on 10 consecutive weekdays. The stimulation site was the primary motor hand area of unaffected hemisphere. Following rTMS application, participants received 45-minute physiotherapy task-orientated arm training. Corticomotor excitability was probed by measuring the amplitude of motor evoked potential (MEPs) on the contralateral first dorsal interosseous muscle. Motor performance of the paretic arm was tested by: 1) Fugl-Meyer motor assessment of upper extremity (FMA), 2) Action Research Arm Test (ARAT), 3) Box and Block test (BBT), 4) Finger Tapping Test, and 5) Motor Activity Log at the time points of before, immediately after and

1-week after completing treatment.

Result

The amplitude of MEPs decreased by 25.3% after 10 sessions of rTMS. This MEPs suppression outlasted the end of stimulation for 1 week. The motor performance of the paretic arm improved on completion of treatment. On average, the FMA and ARAT demonstrated 6.7% and 10.2% improvement respectively. The BBT improved by 39.4%, and the frequency of index finger tapping increased by 17.5%. An increased amount of use on the paretic arm was also reported. No adverse effect was encountered. Low-frequency rTMS suppresses the motor cortex excitability in the stimulated unaffected hemisphere and enhances the effect of physiotherapy task-orientated arm training, thus promotes motor performance of the paretic arm in chronic stroke patients.