

REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION (RTMS) FOR CHILDREN WITH CEREBRAL PALSY

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Introduction: Repetitive transcranial magnetic stimulation (rTMS) is a non-invasive and painless method of brain stimulation due to its ability to directly modulate corticospinal and interhemispheric motor pathways. The focused magnetic field penetrates deep into the brain tissue depending on the shape of the inducer. Neuronal activity is stimulated in the target brain area by changing the dynamics of its excitability. Low frequency (\leq 1Hz) rTMS reduces cortical excitability, while high frequency (\geq 5Hz) increases cortical excitability. Synaptic plasticity can lead to a rise in (LTP) or decrease (LTD) in the strength of synaptic connections, which is activated by different forms of rTMS. Childhood is a period of life characterized by the assimilation of enormous volume of new and unfamiliar activities. During early childhood there is an output of many new synapses, with synaptic connections being cleared around the 15th month and depending on their activity are redefined in later childhood and adolescence. Cerebral palsy (CP) is a developmental disability limiting achievement and development of certain functions such as motor, communicative, cognitive, etc. rTMS applied in CP suggests the potential for neuroplastic changes in a condition historically defined as a permanent or static diagnosis of motor deficit.

Material and methodology: 12 observations were made from February 2021 to June 2022. 12 patients, girls and boys aged 3 years 3 months to 17 years with diagnoses hemiparesis (G80.1) and CPPPE (F80), 27 therapeutic courses of 10 treatments for 2 weeks, between 1 and 5 courses per child. The therapy was performed with Neurosoft MS/D - magnetic stimulator with liquid cooling and a "bent butterfly inductor type". The location of the stimuli was determined according to the diagnosis, and their frequency was determined by the principles of CNS neuromodulation by rTMS, as well as by the frequency EEG analysis and the presence of interhemispheric asymmetry.

Results: All children tolerated the procedures uneventfully. No adverse events, such as headache, seizures or syncope were observed. In some of the children with motor impairment, there was improvement in hand function, such as strength and dexterity and/or in gait, such as endurance and coordination. In some of the children with speech disorders, there was an emergence of new words, more complex words and self-control, and making sentences of 2 or more words.

Conclusion: The results obtained are in agreement with the results of most studies. rTMS is a new, safe method of direct neuromodulation that detects unexpected opportunities to unlock some motor or speech-cognitive skills in CP.