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**ABSTRACT BOOK**

# **Traumatic Brain Injury. Change of treatment paradigms**

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# THE REORGANIZATION OF FUNCTIONAL CONNECTIVITY UNDER TRANSCRANIAL MAGNETIC STIMULATION IN UNCONSCIOUS PATIENTS WITH SEVERE BRAIN INJURY

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The study aimed to reveal changes of functional connectivity after transcranial magnetic stimulation (TMS) in unconscious patients with severe brain injury. The features of wavelet-synchrony and Granger causality were analyzed in 14 patients with severe traumatic brain injury (sTBI). The patients were in an unresponsive state (vegetative state) or minimally conscious state.

The study of resting-state EEG and-ERPs for simple tones and naturalistic stimuli (music) was conducted before and after the diagnostic and therapeutic rhythmic

TMS of the premotor cortex area. In some cases, additional studies were carried out after 3rd and 5th sessions of stimulation. The duration of a TMS course was determined by a neurologist and did not exceed 10 sessions. A total of 38 studies of biopotentials were analyzed.

EEG and ERPs were recorded from 32 electrodes. Functional connectivity was calculated based on wavelet analysis and the Granger causality method using the Brain Connection (Russia) and Brainstorm (Matlab). The obtained

data were compared to the results of patients' clinical examination.

Negative clinical dynamics after therapeutic TMS concurred with decreasing wavelet synchrony and emerging "short" connectivity between the frontal pole and neighbouring areas.

Positive neurological changes concurred with increasing wavelet synchrony and emerging "long"

intra- and interhemispheric connectivity between the anterior (frontal and temporal) and posterior (parietal and / or occipital) areas of the cortex. We suppose that it is one of the necessary conditions for restoring a higher-level consciousness and for recovering voluntary types of mental activity in patients.

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