
МАТЕРИАЛЫ КОНФЕРЕНЦИИ
И ШКОЛЫ

THE CNS DEVELOPMENT AND THE DYNAMICS OF THE GENERALIZED
INDICES OF MULTI-CHANNEL EEG IN SCHOOLCHILDREN
FROM THE NORTH REGION (LONGITUDINAL STUDY)

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The study of the individual dynamics of EEG maturation during childhood is of particular importance when studying the development of the central nervous system in children living in the severe natural conditions of the North. When comparing EEG data in children and adolescents of different ages (by the method of “cross sections”), a pattern of heterochronous maturation of certain cortical areas is revealed, which makes it difficult to assess the level of brain maturity as a whole. The aim of the work was to compare the individual age dynamics of the generalized characteristics of the spatial and temporal organization of multichannel EEG in schoolchildren living in the northern region of the Russian Federation (Arkhangelsk region). EEG was recorded in 30 students of a rural school. The duration of observation for each student was from 5 to 8 years, the number of EEG records varied from 5 to 11. Based on the EEG, the temporary structure function (SF) was calculated in 16-dimensional (by the number of leads) space. We used the normalized parameters pS and pT ($0 \leq pS, pT \leq 1$) characterizing the generalized spatial and temporal connectivity of the EEG (Trifonov and Panasevich, 2018). The extreme values (0 and 1) of these parameters correspond to the completely deterministic

and “random” temporal and spatial organization of the EEG as a whole. It was revealed that the pT value tends to increase as the child grows older. An increase in pT – a decrease in the temporal connectivity of the EEG – may reflect an increase in the plasticity and mobility of neurodynamic processes in students from junior to senior classes. The pS value, on the contrary, shows a tendency to decrease with the age of the child. This fact can be interpreted as an increase in the determinate component in the spatial organization of the EEG and an increase in the stability of spatial relationships between EEG processes with age. Evaluation of the spectral power of the SF showed that the dominant frequency of the EEG tends to increase as the child grows older. Among the examined students were identified students with pronounced rearrangements of the SF frequency spectrum from examination to examination, which can characterize the imbalance of subcortical-cortical influences due to increased loads on the mechanisms of regulation of physiological functions in the process of seasonal adaptation in the North.

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