CHANGE OF EEG COHERENCE AFTER RESULTS OF THE COURSE OF NEUROTHERAPY BY CHILDREN 5-11 YEARS

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EEG coherence changes were studied as a result of a ten-fold training course aimed at increasing the power of the EEG signal in the alpha-rhythm range and decreasing in the theta-wave range. 10 children with increased anxiety and reduced indices of voluntary attention took part in the studies. EEG from 16 scalp electrodes was recorded before and after the course of biofeedback sessions. For comparative analysis, the Wilcoxon test was used. Statistically significant changes in the indices at the level $p < 0,05$ were considered. At $0,05 < p < 0.10$, the changes were considered as a statistical trend.

It was revealed that a statistically significant ($p < 0,05$) increase in the coherence coefficients of the wide spectrum of patients correlated with the improvement of the patients' state was observed as a result of the tenfold rate of alpha/theta training of the EEG of the sensorimotor zone of the right hemisphere (C4) of the brain aged 5–11 years rhythms between the frontal and parietal-temporal divisions of the left hemisphere. Among the most pronounced changes in the EEG coherence detected by comparing the EEG recordings before the last and first biofeedback sessions when the children were still (eyes closed), attention should be paid to the statistically significant increase in medians of this indicator in the beta and gamma bands in the short the right hemisphere pair P4-C4 – by 20,4 % ($p = 0,017$) and 16,7 % ($p = 0,047$), respectively. In the short pairs of the left hemisphere, there was also a significant increase in coherence. Thus, in the pair O1-P3, an increase in coherence in the theta range was observed at 15,9 % ($p = 0,047$); in the alpha range, coherence growth of 14,8 % was manifested in the trend ($p = 0,074$), in beta and gamma- the ranges of coherence values increased by 14,3 % ($p = 0,022$) and 17,3 % ($p = 0,013$), respectively. In the pair F3-Fp1, there was a tendency for a significant increase in the studied parameter in the theta range by 4,1 % ($p = 0,093$), in the alpha range the increase was 34,9 % ($p = 0,028$), in the beta and gamma ranges the increase in coherence by 17,0 % and 12,0 % did not reach statistical significance and manifested itself in the trend ($p = 0,074$ and $p = 0,093$, respectively).

Long intra-hemispheric connections also showed a number of changes. Thus, in the right-hand hemisphere pair O2-FP2, there was a tendency to decrease coherence in the beta band by 12,6 % ($p = 0,093$). In the left hemisphere, the P3-Fp1 pair showed statistically significant increases in coherence in the theta range by 9,8 % ($p = 0,037$), in beta and gamma-by 15,1 % ($p = 0,028$) and 17,6 % ($p = 0,047$), respectively.

Analysis of interhemispheric connections allowed to reveal a tendency to increase in coherence for the F4-F3 pair in the alpha range by 2,7 % ($p = 0,074$); in the T6-T5 pair, the coherence was reduced in the beta and gamma bands by 9,0 % ($p = 0,059$) and 10,0 % ($p = 0,059$), respectively.

The EEG-BOS course, which includes 10 sessions, leads to long-term positive changes in the functional state of the brain, which is reflected in a change in not only the

power spectra, but also the coherence of the EEG rhythms. The results indicate the advisability of applying coherence to assess the nature of the changes in the spatio-temporal pattern of the EEG.

***Keywords*:** neurotherapy, EEG, coherence, children, anxiety, attention.

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