

CHANGE OF BIOELECTRIC ACTIVITY OF THE BRAIN OF PATIENTS BY COGNITIVE VIOLATIONS

Kizhevato E.A., Omelchenko V.P.

Rostov State Medical University

The electroencephalography (EEG) is widely used in researches of diseases of nervous system within 80 years, however clinical value of the factors revealed at its research and displaying cognitive functions, remains rather interesting and discussed [3]. This work is devoted to the analysis of changes of bioelectric activity of a brain at cognitive violations at patients with diabetic and discirculatory encephalopathy. Now it is possible to carry out an assessment of violations of cognitive functions not only by means of cognitive tasks and psychological tests, but also at electrophysiological research. Thus, actually is not only EEG, but also additional methods of its analysis, which would increase informational content of this research.

The purpose of this work - demonstration of opportunities of computer EEG as tool of an assessment of cognitive functions at patients of diabetic and discirculatory encephalopathies. And also detection of features of EEG which are peculiar for patients with diabetic and discirculatory encephalopathies.

90 people took part in our research: patients with diabetic encephalopathy, patients with discirculatory encephalopathy and control group. In group of patients diabetic encephalopathy was the 20 woman and 10 men. In group of patients discirculatory encephalopathy was the 12 woman and 18 men. Average age of patients with diabetic encephalopathy mattered $58,9 \pm 4,3$ ($p > 0,95$) years. Average age of patients with discirculatory encephalopathy mattered $69,1 \pm 2,6$ ($p > 0,95$) years. The control group was made by healthy faces of 18-29 years which total number was 30 people (16 women and 14 men).

Record of bioelectric activity of a brain (Background record: state weakened, eyes are closed) was carried out on the 16-channel electroencephalograph "Entsefalan-131-03". Research carried out on the basis of chair of medical and biological physics of the Rostov state medical university.

For a clinical assessment of a psychological state of patients symptoms often shown on an appointment were chosen: decrease in mood, alarm, general weakness, headache, mode wakefulness dream, complaints to bad memory, decrease in mental abilities. As screening research used psychological tests: "5 words" (D.Dubois, 2002); Shulte's test; test of drawing of hours [2].

In EEG analysis at first carried out a visual assessment at which it was established that shift of frequency of bioelectric activity towards slow waves took place. Also suppression of alpha rhythms at patients with encephalopathies was observed.

For an assessment of the organization of the main rhythm of rest used absolute and rated values of a range of EEG. Absolute ranges built on absolute

values of power of signals, and rated reflected the relative power of a signal (value of power of a signal to total power). Assignments of occipital, frontal, temporal areas of a brain were the most informative for research. Fourier's analysis and creation of ranges carried out by means of the MS Excel program.

The spectral analysis showed that cognitive violations were reflected in parameters α - and δ -rhythm. Than power α - rhythm is lower and is higher at δ -rhythm, especially pathological processes in a brain at patients with diabetic and discirculatory encephalopathies are expressed. Spectral characteristics of alpha activity, according to literature, poorly correlate with I.Q., but the alpha rhythm is derivative cognitive activity therefore decrease in its power in comparison with control group can be considered as reflection of lower cognitive activity. This indicator can become especially interesting, in connection with its specificity for cognitive functions.

Following the results of the conducted research it is possible to draw a conclusion that in EEG find reflections of change of cognitive activity that is shown in differences of EEG at patients with diabetic and discirculatory encephalopathies and healthy faces. Especially significant changes are received in alpha and delta ranges.

The references:

1. E.A. Kizhevatoa, V.P. Omelchenko Tree-dimensional localization of pathological activity of brain in patients with dyscirculatory encephalopathy // Biomedicine Radioengineering/ – №4 . – 2014. – 92
2. E.A. Timoshenko, V.P. Omelchenko Application of the discriminant analysis for classification of EEG of patients with diabetic encephalopathy and healthy examinees // Electronic journal “Engineering journal of Don” – №4. – V.I. – 2012. - <http://www.ivdon.ru/en>
3. S.P. Markin Violation of cognitive functions in medical practice: Methodical grant. : [The electronic document] – URL: <http://medi.ru/doc/g241818.htm>
4. Gnezditsky V. V. Return problem of EEG and clinical electroencephalography (mapping and localization of sources of electric activity of a brain). Taganrog: Publishing house Taganrog Radiotech. Univer., 2000. 640 p.