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Comparison of latent components for cognitive evoked potentials from patients with depressive disorder and healthy subjects

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Currently, a major problem in diagnosis of mental activity is the lack of objective instrumental criteria markers of mental disorders. At the same time long known EEG method widely used in neurological practice in the last two decades has opened a new way. There are new opportunities for functional data analysis and identifying the source of the EEG signal that allows fundamentally different possibilities for comparing the parameters of patients with mental disorders and healthy subjects, in order to understand neurophysiological basis of clinical disorders. In our study we used the method of independent components (ICA) for cognitive evoked potentials (ERP). It is based on the assumption that the sources of the signals are statistically independent despite the components are generated simultaneously by different sources. In our work we used a modified test of GO-NOGO paradigm. The essence of the paradigm is in equally probable and random presentation of the conditions for two categories, for one of which (Go stimulus) subject must respond for example by pressing a button and on the other (NOGO stimulus) should not react. In this ERP study 5 latent components with the largest amplitude and the largest difference (in terms of statistical significance) between groups of patients with depressive disorder and normative group. Also we have found violations of the selected five components in different ages groups of depressive patients from healthy subjects. This suggests that a specific pattern of changes in these parameters of the brain functioning is the same in patients of all ages and given the high statistical significance of differences with normative data can be regarded as a physiological marker of the disease. The ICA method for event-related potentials in medical practice potentially will facilitate diagnosis and improve its accuracy.

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