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ELECTROENCEPHALOGRAPHY IN PSYCHOLOGY: THE MEANING AND METHODS OF ITS USE

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Abstract: The article reflects the problems of effective use of potential opportunities, research of biological objects, list of basic skills, processing and interpretation of results of electroencephalography (EEG) examinations)
Keywords: electroencephalography (EEG), psychology, diagnostics, brain activity, bioelectric regulation, cognitive activity, neurophysiology.

Today, one of the most widely used and available in neurology and neurosurgery for the diagnosis of changes in the functional state of the brain is electroencephalography (EEG) .

What are the advantages of EEG? Some of them are obvious: EEG is quite easy to use, cheap, and does not involve exposure to the subject (non-invasive). EEG can be registered near the patient's bed and used for monitoring the stage of epilepsy, long-term monitoring of brain activity. It also shows one of the main parameters of the nervous system – the property of rhythm, which reflects the consistency of different brain structures. Therefore, when recording an electrical (as well as magnetic) encephalogram, the neurophysiologist has access to the actual mechanisms of processing brain information. This helps to detect the pattern of processes involved by the brain, showing not only "where" but also "how" information is processed in the brain. This capability makes EEG a unique and certainly valuable diagnostic method.

Electroencephalographic examinations reveal how the human brain uses its functional reserves.

The example of equipment can be a 41-channel electroencephalograph "Neuron-Spektr-5"

It is applied in the following spheres: routine EEG studies, epileptological EEG monitoring, polysomnography and scientific research.

It has some dignities:

Any electrode can be assigned as a reference, and bipolar leads can be recorded without installing any additional reference electrodes.

The next example is electroencephalograph " ENCEPHALAN"

Electroencephalographs "ENCEPHALAN" allow you to conduct:

1. study of super-slow brain activity;
2. study of cerebral circulation;
3. mutual comparison and analysis of synchronously recorded EEG, REG, SMA, and polygraphic signals in various combinations;
4. somnological studies with the possibility of video monitoring;
5. assessment of the state of the autonomic nervous system based on mathematical analysis of heart rate;
6. psychophysiological studies related to evaluating the effectiveness of operator activity in conditions of time deficit and regulated complexity of tasks.

Electroencephalograph (EEG) is a method for recording spontaneous bioelectric activity of the brain. Simultaneous excitation or inhibition of large groups of neurons in the cortex creates an electric field that can be recorded by electrodes located on the scalp. Rhythms of different frequencies and amplitudes are registered in the EEG, they have a characteristic spatial organization and reactivity to various external stimuli. The normal organization of rhythms is disturbed in various diseases of the central nervous system. There are pathological forms of activity. EEG is prescribed for a wide range of neurological disorders and is an indispensable tool in the diagnosis of epilepsy.

A standard study ("routine EEG") lasts at least 20 minutes. Currently, electrodes are usually used, built into a special elastic cap, which is selected according to the size of the patient's head. Additionally, an ECG electrode can be applied.

The main part of the recording is performed in a state of relaxed wakefulness (sitting or lying down, with closed eyes). The study includes functional tests – eye opening, rhythmic photostimulation, hyperventilation (deep breathing for 3 minutes). These samples allow you to detect activity that is not recorded in a normal background record.

The EEG procedure (neurofeedback) is a type of biofeedback, the essence of which is to provide the subject with the opportunity to learn how to influence the indicators of their own electroencephalogram. The EEG technique makes possible arbitrary regulation of the bioelectric activity of the brain. EEG parameters, in turn, have general normative characteristics that are caused by both environmental and hereditary factors, and well reflect the performance of cognitive activity. In addition, it generally allows you to assess, monitor and correct the condition of a person who is in extreme environmental conditions, performing complex operator activities or having certain functional disorders . Numerous studies on the topic of neurobiological control have shown that the ability to arbitrarily regulate using EEG is determined not only by motivation and training, but also by some individual characteristics. In addition, a number of studies have shown that, for example, the properties of the nervous system and temperament are due to heredity and play a crucial role in determining the individual style of performance.[1] This once again proves that the ability to learn is also caused by genetic features of the mechanisms of self-regulation of brain activity. But, despite the above mehtioned facts, the number of people who are not able to control the parameters of bioelectric activity of the brain, according to various data, can reach 30 %. In connection with this fact, there was a problem of identifying psychological characteristics of the individual that affect the effectiveness of arbitrary regulation in the process of EEG training. An unambiguous solution to this problem has not been found yet. This type of information allows more accurate and individualized selection of neurobiological control protocols for the needs of patients, and will also facilitate the selection of candidates for working with biotechnical systems related to EEG indicators, such as the brain–computer interface. In addition, data

on the psychological properties of the individual in this perspective can be used to assess the effectiveness of arbitrary regulation during EEG training for people with different personality profiles.

Characteristic changes in the EEG, which have differential diagnostic value, have been established only in a few brain diseases accompanied by mental disorders.

Since even the most elementary behavioral and mental acts and their violations are associated with a complex system of neurophysiological processes, they, of course, can not be reflected in any specific electrical processes of certain areas of the brain and the analysis of the functional organization of the brain as a whole system comes to the fore. The most studied relationships of individual characteristics of electrical activity reflect the physiological processes of the brain in various mental states, the impact of drugs with a single introduction and course treatment of patients.[2] Achievements in this direction allow us to classify mental states, select the most effective psychopharmacological agents, monitor the treatment process, and use EEG during autogenic training.

REFERENCES

1. Lychev V.A. Instrumental and radiological research methods. – 2013.
2. Psychological predictors of voluntary regulation in terms of EEG biofeedback training. A. S. Centenary In 2016.
3. Possibilities of using neurobiological control to improve the functional abilities of the brain. Jos Yu. S. Menshikova I.A. – 2018.
4. Maksimenko A.A. Comparative analysis of psychological characteristics of healthy people and people suffering from cardiovascular diseases [Electronic resource] // Intellectual resources – to regional development. – 2019. – Vol.5, – No.1. – Pp. 134-138. – URL:https://elibrary.ru/item.asp?id=38566588.
5. Ustinova E.A. Age boundaries of the adolescent period [Electronic resource] // Intellectual resources – to regional development. – 2019. – Vol.5, – No.1. – Pp. 148-151. – URL:https://elibrary.ru/item.asp?id=38566591.