

METHODS TO ASSESS PSYCHOEMOTIONAL STATE OF A PERSON

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Good health is essential to human welfare. At present, a great number of diseases are known to be caused by stress. Emotional state of a person has a significant impact on health due to the direct and inverse relationship between all systems and organs of a human body and emotional state of a person. Emotional stress is one of the urgent health and social problems. Emotional stress is a real danger to health, because it often causes sudden cardiac death, myocardial infarction, hypertensive crisis, violation of cardiac and cerebral circulation, and gastric ulceration. In addition, emotional state can greatly affect the functioning of the body systems [1].

Psychoemotional state is a special form of a human psychological state with the dominance of emotional responses. Emotional displays are essential to response to real-life situations, because they regulate health and functional state of the body. Emotional deficits reduce the activity of the central nervous system, and may cause performance decrement. Excessive impact of the emotiogenic factors can precipitate mental stress or even mental disturbance. Preparedness for the activity favorable for mental health requires optimal emotional stimulation.

The objective methods, which are independent of the opinion of a person being examined, are the most effective to assess psychoemotional state. These methods enable to investigate electrophysiological parameters reflecting psychoemotional state of a person. Currently, there are a lot of methods to detect and record the electrophysiological parameters of a person. The adequate choice of the method and the appropriate use of its results are essential to successfully conduct psychophysiological research. The research is crucial for both medicine and engineering.

Electrocardiography (ECG), electromyography (EMG), electroencephalography (EEG), electrooculography (EOG), and galvanic skin response (GSR) are the basic methods of recording electrophysiological parameters. These methods allow recording muscles stimulation, palpitation, the blood outflow from the skin surface, brain activity, etc. According to the research conducted by the psychological services, these methods allow recording changes in the emotional state.

Electrocardiogram is a method for recording potential differences in the electric field of the heart, which occur during the heart activity. Recording is performed using the electrocardiograph. The averaging of all vectors of action potentials occurring at a certain moment of the heart's activity influences the ECG results. The deflections from the normal ECG shape can be found in one or more leads, and this greatly helps to diagnose the heart failure.

Electroencephalography is a method focused on brain research using the recording of the electrical potential differences arising during the brain activity. EEG characterizes some states of a person (calmness, stress, excitement) because different parts of the brain respond to different emotional states [3, p. 125].

GSR is a sensitive indicator of emotional state. It is determined by the changes in the bioelectric parameters of the hand skin (potential differences and impedance). GSR is caused by vibrations of pre-secretory sweat gland activity, controlled by the central nervous system. The factors of emotional and mental activity primarily influence GSR. Since the GSR amplitude depends on the problem and environmental conditions, it is used to assess the emotional stress of a person.

Electromyography (EMG) is a method of research of bioelectric potentials arising in skeletal muscles in the excitation of muscle fibers; recording the electrical activity of muscles. EMG recording allows revealing the intention to start movement a few seconds before the movement. Moreover, myogram serves as an indicator of muscular tension. For example, when a person is experiencing strong emotions, he is excited, and when he is calm or tired, his muscles are relaxed.

Electrooculography (EOG) is a graphical recording of potential differences arising from changes in the eye movements. The anterior pole of a human eyeball is electrically positive and the back one is negative, therefore, there is a potential difference between the bottom and cornea of the eye which can be measured. The eye movements cause changes in the position of poles. The arising potential difference characterizes the direction, amplitude, and velocity of the eye movements.

In contrast to the objective methods of assessment psychoemotional state of a person, the subjective methods are carried out using specialized tests. The tests of Luscher, Tsung, Spielberg-Hanina, and Hamilton scale should be considered. Typically, the indicated tests are implemented as computer programs which enable to automate the process of testing. The applied testing methods fall into two groups: obvious and unobvious testing. The first group involves the direct presentation of questions, drawings and

other visual images to the person. The second one implements unobvious presentation of the test information. The typical example is the Luscher color test which is based on the fact that the choice of color often reflects the bent of the person under examination to a certain activity, mood, functional state, and his most stable personality traits. The Spielberg-Hanina test consisting of 40 questions is used for self-assessment of anxiety and trait anxiety. The Hamilton scale is designed to accurately measure the severity of alarm symptoms using common psychometric tests. The Zung scale and Akhmedzhanov scale are designed for self-assessment of depressive states, state close to depression, and for screening diagnostic in mass health examination. In addition, the Izard method can be also used to diagnose the dominant emotional state using the scale of importance of emotions. The method is designed for self-assessment of the intensity and frequency of ten basic emotions according to the Izard scale [4].

The above mentioned subjective methods show the advantages of the testing methods under consideration. The scales are applied to more objectively assess psychoemotional state of a person. The disadvantage of the considered methods is the difficulty of questions adapting to the individual characteristics of the testee, because the concept of major life events has significant social background.

The improvement of resolution means to assess psychoemotional state of a person is currently very important. The laboratory No. 63, Institute of Nondestructive Testing, Tomsk Polytechnic University, plans to combine objective and subjective methods to more precisely investigate psychoemotional state of a person. For objective methods, the laboratory is developing medical nanosensors to pick-up biopotentials with higher stability of electric potential, stable contact and polarization potentials, and lower interference and impedance. The existing methods of assessment of psychoemotional state of a person, which combine subjective and objective testing methods, are to be used in examining patients.

Thus, the following conclusions summarize the findings of the current review:

1. The change of psychoemotional state of a person is strongly dependent on his physical state.
2. The developed nanosensors enable to more accurately assess psychoemotional state of a person.

References

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