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**System prediction of physiological changes in the body**

*The system was developed for selection of extreme activities operators based on the assessment and forecasting of physiological changes in their body. To increase the assessment process efficiency and to implement the function of forecasting the psychophysiological changes in operator's organism had been used the classification of operators' temperament and methods of blood parameters analysis processing*

Countries of the world are making a great efforts and committing finances for qualitative professional selection extreme activities operators (EAO) [1]. The EAO professional suitability assessment can be implemented in such laps as: preparing, monitoring before performing professional duties, monitoring the operators' rehabilitation process. And besides, it is found that the main feature of EAO's professional activity is heightened state of mind and organism's physiology in adaptation under the complex changes of extreme environmental conditions [1, 2].

As a result of the research, including the specified insulation of EAO, was found that the main characteristic of their professional activities is training state of psycho and physiology of the organism for adaptation to complex changes in the extreme environmental conditions [3]. Given the above, special attention to the development of biotechnical systems for professional recruiting of EAO given to assessment of psychophysiological bodies parameter call rigidity that characterize of EAO opportunity to effectively adaptation to extreme environmental conditions.

It is also found, that EAO's adaptation process is revealed in dynamics of changes in informational and energy field (IEF) parameters of limbic lobe [4]. The main parameters of IEF are sufficiently appeared without bias in cerebral cortex (CC) biorhythm signals (energy field). Mentioned process occurs by ascending neural pathways and also by features of vestibular apparatus functioning process (informational field) in histamine-energy paths. It is found, that it is possible in organism's detached and transient process to assess the dynamics of IEF parameters of EAO's limbic lobe using the designed innovated complex, which like instrument consists of a kephaloencephalograph and complex software.

Native [6,7] and foreign [1,2,5] scientists are working with problem of physiological selection and IT development for professional selection of extreme activities operators.

The study aims to develop and computerize biotechnical systems for quantitative assessment of the integral index of psychophysiological health status (PHS) and forecasting parameters change of operators extreme activities IEF.

To achieve this aims the following tasks solved:

- developed algorithm for professional recruiting of EAO;

- the mathematical processing of physiological parameters IEF of EAO was proposed;

- developed a decision support system for professional recruiting and forecasting of physiological changes in the body of EAO;

-approved developed biotechnological system on EAO.

**Algorithm for professional recruiting of EAO**

To achieve the study aims developed hardware and software for biotechnical system. Psychophysiological state assessment algorithm of EAO for their professional recruiting and forecasting consists of two phases: assessment of mental suitability and assessment of physiological suitability. Presented biotechnical system includes the following methods and approaches to collecting and processing parameters of EAO IEF:

- collecting and processing of social and anthropometric data;

- collecting and processing results of the classification of operators by type of temperament;

- collecting and processing of electroencephalographic data;

- collecting and processing of kephalographic data;

- collecting and processing of biological blood tests;

- the integration of the results of processing the data to determine the level of suitability of the operator;

- PHS forecasting based on the collected and processed data.

For registration information about human IEF, the biocybernetics and aerospace medicine department has developed novel device - kephaloencephalograph, which is a combination of existing devices: kephalograph and electroencephalograph.

However, in order to differentiate OEA for close individual psychophysiological characteristics of an organism operators classified into 36 subgroups according to the type of temperament (Q). This approach allows to create high-quality database which increases the efficiency of forecasting functions specified biotechnical system for each of the operators subgroups.

In addition to determining the type of temperament subgroups, calculation of psycho suitability level (S), which is used during the PHS assessment.

The algorithm calculation of psycho suitability level (S) provided with three psychological tests, and two anthropometric indicators that allow for the:

congenital and acquired psycho characteristics of OEA;

acquired psycho capabilities for adaptation (level of rigidity);

acquired physiological capabilities for adaptation;

quality control and correction of operators answers during the tests.

As a result of experimental research realized the following results of data processing obtained. Table 1 shows the results of psychological recruiting realized with representatives of a group of EAO professions - Antarctic winterers of Academic Vernadsky station. The results showed the effectiveness of the method of psycho suitability level (S) calculation, which was confirmed by the results of electroencephalographic processing and identification with kephalograph coefficient and blood parametrs.

Through iterative simulation with Monte Carlo merhod calculated normalized interval assesments of parameters of electroencephalogram and blood, witch allow to assessment PHS of OEA organism and implement profession recruiting.

The present approach is tested on a small sample of experimental data, because that future research will be made adjustments for calculated normalized values of coefficient. However, statistical algorithm is designed for small sample of experimental data that in the future require changing of the developed software.

The present line of research is currently being tested in hospitals for evaluation psychophysiological readiness of operators that preparing to be donors and recipients for the transplantation of internal organs. Results of forecasting PHS donors and recipients can use during rehabilitation, for example, to improve the quality of selection of drugs. Also developed biotechnical system currently being tested for professional recruiting of aviation personal.

The quality of EEG studies influenced by various external factors. Therefore, to improve the quality of the collected data experiment must to comply with strict rules implementing experimental research. Given the complexity of the algorithm may be situations when one of the studied parameters adopted two of the distribution of values that need attention of experimenter and manual selection of the distribution of the proposed application for further iterative modeling.

**Conclusions**

Developed system that by integral parameters for assesment and forecasting the state of information and energy fields of the human body is able to implement effective professional recruiting and forecast changes of psychophysiological health state of operators' extreme activities organism.

The developed method of professional recruiting of extreme activities operators that includes: classification of operators by type of temperament; quantitative calculating of kephaloencephalograph coefficient and biological analyzes of body.

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