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ADAPTATION INDEX AND FUNCTIONAL STATE OF CENTRAL NERVOUS SYSTEM IN MEDICAL STUDENTS DURING THE PERIOD OF INTENSIVE LEARNING ACTIVITY

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adaptation indicator, non-specific adaptation reaction, functional mobility of nervous processes, strength of nervous processes, types of adaptation reaction, level of reactivity, index of adaptation intensity.

ABSTRACT

In research, an assessment has been conducted of the adaptation potential indicators of medical students with different individual-typological features of higher integrative processes with the determination of the functional state of the CNS by the following quantitative criteria: functional level of the system, stability of the reaction and level of functional capabilities that were determined using simple visual motor reaction. The property of functional mobility was determined by the magnitude of the maximum speed for an unmistakable differentiation of positive and inhibitory stimuli. The adaptation score was calculated using the L.H. Harkavy with distribution by type of adaptive response of female students: Group 1 (2%) with stress response; Group 2 (17%) with a workout reaction; Group 3 (31%) with a calm activation reaction; Group 4 (47%) with an increased activation reaction and Group 5 (3%) with a reactivation reaction. During the initial stages of stress, an increase in excitation processes was observed. During the training reaction, a low level of immune system reactivity is reflected in the severity of inhibitory processes. With calm activation, inhibition processes intensified in the physiological range. With increased activation, the processes of excitation rather predominated over the processes of inhibition. During the reactivation reaction, excessive excitation processes prevailed.

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Introduction. Educational adaptation is the types of adaptation, which includes psycho-physiological components, is an important direction in scientific research. In assessing the effectiveness of adaptation to educational activities in a medical university, the following indicators

can be distinguished: current and examination progress; stability in the process of learning the functional state of the body of students (the absence of sharp changes in the ratio of psycho-physiological functions); lack of pronounced signs of fatigue in intellectual activity [1, 3]. Pavlov believed that the strength of the nervous system is characterized by its ability to withstand long-term and concentrated excitation for the action of an unusually strong, but short-lived stimulus, without going into a state of extreme inhibition. Thus, Pavlov pointed out two main areas of research into the limits of the efficiency of cortical cells, on the strength of nerve processes. One of them is the study of the ability of the higher parts of the central nervous system to withstand prolonged and reusable loads, the other is finding the limit of the intensity of the stimulus, which can cause extreme inhibition [4]. However, any sustainable adaptation to professional activity has for the organism its own supply of adaptation potential. One of all systems providing adaptation is the immune system. According to the scientific data, it is the leukocyte formula that is an integral indicator of the balance not only of the immune system, but also of all the homeostatic systems of the body [2]. The cause of leukocyte rearrangements is often the general mobilization of the protective mechanisms of the body, so it is successfully used to assess the nonspecific adaptation reaction [5]. Thus, currently relevant is the question of studying the relationship between the individual-typological features of higher human nervous activity, the functional state of the central nervous system and the adaptive capacity of the organism in conditions of intensification of intellectual activity.

Materials and methods. Totally 99 students of the 2nd year of Kharkiv National Medical University have been examined. The adaptation indicator was determined by the method developed by L. Kh. Harkavy (2005), by calculating the index of adaptation intensity as the ratio of the number of lymphocytes to the number of segmented neutrophils in the leukocyte formula. In accordance with the type of adaptive response, the students were divided into 5 groups: Group 1 (2%) with a stress response (S); 2nd group (17%) with a workout reaction (W); Group 3 (31%) with a calm activation reaction (C); Group 4 (47%) with an increased activation reaction (A) and Group 5 (3%) with a reactivation reaction (R). In all participants, the functional state of the central nervous system was assessed according to the following quantitative criteria: the functional level of the system, the stability of the reaction, and the level of functional capabilities, which were determined using the time of a simple visual-motor reaction. The property of functional mobility was determined by the maximum speed of the error-free differentiation of positive and inhibitory stimuli. The strength of the nervous processes was also assessed using a reflexometric variant of the "extinction with reinforcement" technique, followed by the calculation of the coefficient of the strength of the nervous processes. Statistical processing was performed using the Statistic for Windows 6.0. To assess the significance of differences between groups, Student's t-test was used ($p < 0.05$).

Results and its discussion. In the 1st experimental group, the content of lymphocytes is less than 21%, which was determined as a condition of acute stress with a slight decrease in the nonspecific resistance of the organism. In the central nervous system, there was a slight shift in the balance between the processes of excitation and inhibition towards the predominance of inhibition. In the 2nd experimental group, the content of lymphocytes ranged from 22% to 28%. In the central nervous system was observed the predominance of protective inhibition. According to the studied reaction of the training approaching stress in psycho-physiological parameters, namely, anxiety increases, efficiency decreases. In the 3rd experimental group, the content of lymphocytes ranged within 29% - 34% with high rates of nonspecific resistance of the organism, which is higher only with physiological increased activation and in the central nervous system with moderate predominance of physiological excitation. In this group, the predominance of excitation processes in the central nervous system was less pronounced than with increased activation. In the 4th experimental group, the content of lymphocytes was in range of 35% - 44% in the same time in the central nervous system a moderate predominance of the processes of physiological excitation to a significant predominance of the processes of excitation over the processes of inhibition was revealed. As the intensity of adaptation increased, the level of reactivity decreased and, as a result, the reaction of increased activation shifted towards the reactivation reaction. In the 5th experimental group, the content of lymphocytes was more than 45% and nervous processes are characterized by predominance of excitation. According to the functional state of the central nervous system, the reactivation reaction revealed indicators of the strength and balance of the processes of excitation and inhibition as a type of adaptation reaction opposite to stress.

Conclusions. As a result of the study, the functional state of the central nervous system turned out to be the most unfavorable for each adaptive response. During the initial stages of stress, an increase in excitation processes was observed. During the training reaction, a low level of immune system reactivity is reflected in the severity of inhibitory processes. With calm activation, inhibition processes intensified in the physiological range. With increased activation, the processes of excitation rather predominated over the processes of inhibition. During the reactivation reaction, excessive excitation processes prevailed.

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