ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

The Functional State Of Human Sensory Systems On The Background Of Regular Exercise.

Makhov AS, and Medvedev IN*.

Russian State Social University, st. V. Pika, 4, Moscow, Russia, 129226

ABSTRACT

The sensory system is a set of central nervous system structures that are connected by nerve paths to the receptor apparatus, whose function is to analyze the stimuli of different physical nature. As evolutionary development progresses, the main role in humans is assigned to the visual and auditory sensory systems. The human sensory systems are part of his nervous system, capable of perceiving information external to the brain, transmitting it to the brain and analyzing it. The effectiveness of physical exercise depends largely on the activity of the processes of perception and processing of sensory information. These processes determine the most rational organization of motor acts and the perfection of the tactical thinking of an athlete. A clear perception of space and spatial orientation of movements are provided by the functioning of the visual, auditory, vestibular and kinesthetic reception. Evaluation of time intervals and the management of temporal parameters of movements are based on proprioceptive and auditory sensations. Experimental shutdown of individual sensory afferents in athletes leads to a sharp decrease in marks for the exercise or to the complete impossibility of its performance. In contrast, providing additional information to an athlete during an exercise helps to quickly improve technical actions. Based on the interaction of sensory systems in athletes, complex representations are developed that accompany his activities in his chosen sport - the “feeling” of the surface and environment.

Keywords: physical activity, physiology, sensory systems, communication with the outside world, reception.

Corresponding author

ISSN: 0975-8585

INTRODUCTION

Interaction with the outside world is a very complex process that ensures the active adaptation of the body to external influences [1]. They are accompanied by a number of adaptive physiological changes in various systems of the body [2-4]. This is primarily noted in the brain, cardiovascular system, blood, and endocrine system [5,6]. As a result of these processes, the functionally most favorable state of these systems occurs, which allows the body to interact with the environment with a minimum of energy consumption [7,8].

It is believed that the sensory system is a combination of the structures of the central nervous system connected by nerve paths to the receptor apparatus [9]. Their function is the analysis of stimuli of different physical nature, which is completed by encoding an external signal [10]. As evolutionary development progresses, the main role in humans is fixed to the visual and auditory sensory systems [11,12]. They have the most differentiated structure of the receptor apparatus, a greater number of cortical fields occupied by the processing of acoustic and optical information [13].

Human sensory systems are part of his nervous system, capable of perceiving information external to the brain, transmitting it to the brain and analyzing it [14]. Getting information from the environment and your own body is a necessary and necessary condition for human existence [15]. Given the high biological significance of sensory systems, the goal was set in the work: to summarize the available information about the state of sensory systems during exercise.

Functioning analyzers at the cortical level

In the cerebral cortex, the complexity of information processing increases from its primary fields to its secondary and tertiary fields [16]. Thus, simple cells of the primary fields of the visual cortex are detectors of black and white boundaries of straight lines [17]. Complex and super-complex neurons of secondary visual fields highlight the length of the lines, their angles of inclination, the various outlines of the figures, the direction of movement of objects and the identification of familiar objects and people's faces [18,19].

The primary fields of the cortex analyze the stimuli of a certain modality coming from the specific receptors associated with them. These are the so-called nuclear zones of analyzers [20]. Their activity underlies the emergence of sensations. The secondary fields lying around them (the periphery of the analyzers) obtain the results of information processing from the primary fields and transform them into more complex forms [21]. In the secondary fields, the received information is comprehended, it is recognized, and the processes of perception of stimuli of a given modality are provided [22]. From the secondary fields of individual sensory systems, information enters the rear tertiary fields — associative low-neural zones, where the integration of signals of various modalities takes place. This allows you to create a solid image of the outside world with all its smells, sounds and colors. Here, on the basis of afferent messages from different parts of the right and left half of the body, complex representations of the person about the space pattern and body pattern are formed, which provide spatial orientation of movements and accurate addressing of motor commands to various skeletal muscles [23]. These zones are also of particular importance in storing the information received. Based on the analysis and synthesis of information processed in the posterior tertiary field of the cortex, in its front tertiary fields (anterior frontal region), goals, objectives and programs of human behavior are formed [24].

An important feature of the cortical organization of sensory systems is the on-screen or somatotopic representation of functions. Sensitive cortical centers of the primary fields of the cortex form a screen, as it were, reflecting the location of the receptors on the periphery. In the posterior central gyrus (general sensitive field), neurons of tactile, temperature and skin sensitivity are presented in the same order as the receptors on the surface of the body, resembling a copy of a man (homunculus); in the visual cortex - as if the screen of the retina receptors; in the auditory cortex - in a certain order, neurons reacting to a certain pitch of sounds. The same principle of spatial representation of information is observed in the switching nuclei of the diencephalon, in the cerebellar cortex. This greatly facilitates the interaction of various parts of the central nervous system [25,26].

The area of cortical sensory representation in its size reflects the functional significance of one or another part of afferent information. Thus, due to the special significance of the analysis of information from

the kinesthetic receptors of the fingers of the hand and from the speech-forming apparatus in humans, the territory of their cortical representation greatly exceeds the sensory representation of other parts of the body. Similarly, per unit area of the central fossa in the retina accounts for almost 500 times larger area of the visual cortex than the same unit of the periphery of the retina [27].

Higher parts of the central nervous system provide an active search for sensory information. This is clearly manifested in the activity of the visual sensory system. Special studies of eye movements have shown that the gaze does not fix all points of space, but only the most informative features that are especially important for solving a task at a given moment. So when playing sports, in which the main object, is the ball, attention during the game focuses on it, helps to improve concentration. The search function of the eye is part of a person's active behavior in the external environment, his conscious activity [28]. It is governed by the highest analyzing and integrating areas of the cortex, the frontal lobes, under the control of which there is an active perception of the external world. The cerebral cortex provides the widest interaction of various sensory systems and their participation in the organization of human motor actions, including in the process of his sports activities [29,30].

ACTIVITY OF SENSORY SYSTEMS IN THE COURSE OF MUSCLE ACTIVITY

The interaction of sensory systems in the process of mastering various motor actions largely determines the success of the learning process. With repeated repetitions of movements, combinations and special exercises, temporary connections are formed between the centers of individual sensory systems, contributing to the improvement of motor activity, bringing its individual elements to automatism. In this case, afferent impulsation from motor receptors to the nerve centers provides control of a specific motor activity [31].

The visual analyzer provides the perception of light, color, space; form, structure, amplitude of aesthetic parameters of movement. The auditory analyzer perceives sound stimuli (including verbal stimuli), which in some way contributes to the success of operational correction, for example, the rhythm of movement or coordination of actions in situational (game) types of muscle activity [32]. A tactile analyzer when performing physical exercises ensures the perception of sensations of touch, its place, duration, amplitude of movement, which is of particular importance when performing complex coordination exercises (for example, in gymnastics, acrobatics, diving, skating, skating, various types of struggle) [33]. The feeling of a partner, water, ice, ski, projectile - these sensations can not be obtained without the participation of a tactile analyzer, whose receptors are located in the skin. The vestibular sensory system forms the sensations of body position in space, the magnitude of linear and angular acceleration, is associated with the distribution of muscle tone (involuntary background muscle tension, which helps, in particular, maintain posture), provides diverse coordinated activity in many types of muscle activity [34]. Proprioceptive analyzer, leading to motor activity, allows you to determine the degree of muscle tension, the relative location of body links, speed and acceleration of movements, their amplitude, gives information about the movements performed [35].

The mechanisms of neurohumoral regulation provide constant monitoring of metabolism [36]. They regulate the intensity of metabolism in organs and tissues, adapting it to environmental conditions and the nature of human activity. The function of higher control over the metabolism belongs to the cerebral cortex. This is proved by the ability to produce conditioned reflexes that change the course of metabolic processes in the body [37].

For example, in the prelaunch state, when the body is preparing to perform intense physical activity, the adrenal glands secrete adrenaline, which, entering the blood, enhances the activity of the cardiovascular system. Under the action of adrenaline, glycogen of the liver and muscles is converted into glucose, which enters the bloodstream to supply the actively working muscles and other organs [38]. The increasing concentration of CO_2 in the blood during active muscle activity irritates the respiratory center, located in the medulla, thereby increasing the depth and frequency of respiration. Increased blood pressure causes dilation of blood vessels through the baroreceptors. Thus, changes in the composition of the blood, an increase in the volume of its circulation entail the reaction of nerve structures and change the functioning of a number of systems and formations of the body [39].

Physical exercise is becoming a kind of regulator, ensuring the management of life processes and maintaining the constancy of the internal environment. So, physical exercise should be considered as a rest and as a means of maintaining health [40].

Along with a reasonable combination of work and rest, normalization of sleep and nutrition, the rejection of bad habits, systematic muscular activity increases the mental, mental and emotional stability of the body. A person who has a mobile lifestyle, systematically engaged in physical exercise, can do a lot more work than a person who has a sedentary lifestyle [41].

CONCLUSION

The effectiveness of physical exercise depends largely on the activity of the processes of perception and processing of sensory information. These processes determine the most rational organization of motor acts and the perfection of the tactical thinking of an athlete. A clear perception of space and spatial orientation of movements are provided by the functioning of the visual, auditory, vestibular and kinesthetic reception. Evaluation of time intervals and the management of temporal parameters of movements are based on proprioceptive and auditory sensations. Vestibular irritation during turns, rotations, bends. significantly affect the coordination of movements and the manifestation of physical qualities, especially with low stability of the vestibular apparatus. Experimental shutdown of individual sensory afferents in athletes (performing movements in a special collar that excludes activation of cervical proprioceptors; when using glasses that cover the central or peripheral field of view) leads to a sharp decrease in marks for the exercise or to the impossibility of its performance. In contrast, providing additional information to the athlete (especially while driving) helps to quickly improve technical actions. On the basis of the interaction of sensory systems in athletes, complex representations are developed that accompany his activity in his chosen sport - the “feeling” of the surface and environment.

REFERENCES

[1] Tkacheva ES, ZavalishinaSYu. (2018) Physiological Features Of Platelet Aggregation In Newborn Piglets. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 36-42.
[2] Bikbulatova AA, Pochinok NB, Matraeva LV, Erokhin SG, Makeeva DR, Karplyuk AV.(2018)Formation Of International Practice Of Holding Competitions Of Professional Skills Among Professionals With Disabilities.Research Journal of Pharmaceutical, Biological and Chemical Sciences.9(5) : 296-302.
[3] ZavalishinaSYu. (2018) Functional Activity Of Plasma Hemostasis In Neonatal Calves With Iron Deficiency, Who Received Ferroglucin And Glycopin.Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1186-1191.
[4] Bikbulatova AA, Matraeva LV, Erokhin SG, Makeeva DR, Karplyuk AV. (2018) Methodical Foundations Of Carrying Out Competitions Of Professional Skill Among People With Disabilities. Research Journal of Pharmaceutical, Biological and Chemical Sciences.9(5) : 243-247.
[5] Vorobyeva NV, Mal GS, Skripleva EV, Skriplev AV, Skoblikova TV. (2018) The Combined Impact Of Amlodipin And Regular Physical Exercises On Platelet And Inflammatory Markers In Patients With Arterial Hypertension. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4) : 1186-1192.
[6] ZavalishinaSYu.(2018)Functioning Of Platelets In Milk And Vegetable Nutrition Calves. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 943-949.
[7] zavalishinaSYu.(2018)Deficiency Of Iron As A Cause Of Dysfunction In Calves And Piglets. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 978-983.
[8] ZavalishinaSYu. (2018) Functional Properties OfHemocoagulation In Calves Of Dairy Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) :1016-1022.
[9] ZavalishinaSYu. (2018) Functional Activity Of Anticoagulant System In Calves During Early Ontogeny.Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 837-843.
[10] ZavalishinaSYu.(2018)Functional Properties Of Fibrinolysis In Calves Of The First Year Of Life. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 870-876.
[11] ZavalishinaSYu.(2018)Physiological Features Of Coagulation In Calves Of Plant Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 899-904.

[12] ZavalishinaSYu. (2018) Functional Activity Of Thrombocytes In Newborn Calves.Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 919-924.
[13] ZavalishinaSYu. (2018) Physiology Of Vascular Hemostasis In Newborn Calves.Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1037-1044.
[14] ZavalishinaSYu. (2018) Functional Properties Of Anticoagulation And Fibrinolysis In Calves Of Plant Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1082-1087.
[15] ZavalishinaSYu. (2018) Functional Antiaggregatory Properties Of Blood Vessels In Calves During Transition From Dairy To Plant Type Of Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1110-1116.
[16] ZavalishinaSYu.(2018)Physiological Features Of Vascular Hemostasis In Calves Of Dairy-Vegetative Food. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1137-1143.
[17] ZavalishinaSYu. (2018) Functional Features Of Platelets In Newborn Calves With Iron Deficiency.Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1153-1158.
[18] Maksimov VI, ZavalishinaSYu, Parakhnevich AV, Klimova EN, Garbart NA, Zabolotnaya AA, KovalevYuI, NikiforovaTYu, Sizoreva EI.(2018)Physiological Dynamics OfMicrorheological Characteristics Of Erythrocytes In Piglets During The Phase Of Milk Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 454-459.
[19] Bikbulatova AA. (2018) Peculiarities of abnormalities of locomotor apparatus of children at preschool age with scoliosis of I-II degree living in Central Russia.Bali Medical Journal.7(3): 693-697. DOI:10.15562/bmj.v7i3.738.
[20] Bespalov DV, Kharitonov EL, ZavalishinaSYu, Mal GS, Makurina ON.(2018)Physiological Basis For The Distribution Of Functions In The Cerebral Cortex. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5): 605-612.
[21] Skorjatina IA (2018) Therapeutic Possibilities OfRosuvastatin In The Medical Complex In Relation To Disaggregation Vascular Control Over Erythrocytes In Persons With Arterial Hypertension And Dyslipidemia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 977-983.
[22] Apanasyuk LA, Soldatov AA. (2017) Socio-Psychological Conditions for Optimizing Intercultural Interaction in the Educational Space of the University. Scientific Notes of Russian State Social University. 16(5-144) : 143-150. doi: 10.17922/2071-5323- 2017-16-5-143-150.
[23] Bikbulatova AA, Andreeva EG. (2018) Achievement of psychological comfort in 5-6-Year-Old children with scoliosis against the background of daily medicinal-prophylactic clothes' wearing for half a year.Bali Medical Journal. 7(3): 706-711. DOI:10.15562/bmj.v7i3.947.
[24] Bikbulatova AA, Pochinok NB, Matraeva LV, Erokhin SG, Makeeva DR, Karplyuk AV. (2018) The Russian Historical Aspect Of The Development Of The International Federation Of Abilimpix. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) :329-335.
[25] Bikbulatova AA, Pochinok NB, Soldatov AA, Matraeva LV, Erokhin SG. (2018) Organization Of International Competitions Of Professional Skill Among People With Disabilities. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 379-387.
[26] Maksimov VI, ZavalishinaSYu, Parakhnevich AV, Klimova EN, Garbart NA, Zabolotnaya AA, KovalevYuI, NikiforovaTYu, Sizoreva EI. (2018) Functional Activity Of The Blood Coagulation System Against The Background Of The Influence Of Krezacin And Gamavit In Newborn Piglets WhoUnderwent Acute Hypoxia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 2037-2042.
[27] Tkacheva ES, ZavalishinaSYu.(2018)Physiological Aspects Of Platelet Aggregation In Piglets Of Milk Nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 74-80.
[28] Tkacheva ES, ZavalishinaSYu.(2018)Physiology Of Platelet Hemostasis In Piglets During The Phase Of Newborns. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 1912-1918.
[29] Skoryatina IA, ZavalishinaSYu. (2017) Ability to aggregation of basic regular blood elements of patients with hypertension anddyslipidemia receiving non-medication andsimvastatin.Bali Medical Journal. 6(3):514-520. DOI:10.15562/bmj.v6i3.553.
[30] Bikbulatova AA, Andreeva EG. (2018) Restoration Of The Profile Of Bioregulators Of Blood Plasma In People Of Second Adulthood With Osteochondrosis Of The Spine Against The Background Of Daily Wearing Of Medical And Preventive Clothing. Research Journal of Pharmaceutical, Biological and Chemical Sciences.9(4) : 413-419.
[31] Bikbulatova AA.(2018)Bioregulatory Effects Of The Daily Wearing Of Medical And Preventive Pants On The Body Of Pregnant Women Suffering From Habitual Miscarriages Of The Fetus. Research Journal of Pharmaceutical, Biological and Chemical Sciences.9(4) : 889-896.

[32] Bikbulatova AA, Karplyuk AV. (2018) Professional And Labor Orientation Of Persons With Disabilities In The Resource Educational And Methodological Center Of The Russian State Social University. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4) : 1648-1655.
[33] MaloletkoAN, Yudina TN.(2017) (Un)Making Europe: Capitalism, Solidarities, Subjectivities. Contemporary problems of social work. 3 (3-11) : 4-5.
[34] Glagoleva TI, ZavalishinaSYu, Mal GS, Makurina ON, Skorjatina IA. (2018) Physiological Features Of Hemo-coagulation In Sows During Sucking. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4):29-33.
[35] ZavalishinaSYu, Makurina ON, Vorobyeva NV, Mal GS, Glagoleva TI. (2018) Physiological Features Of Surface Properties Of The Erythrocyte Membrane In Newborn Piglets.Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4):34-38.
[36] Pozdnyakova ML, Soldatov AA. (2017) The Essential and Forms of the Approaches to Control the Documents Execution.Contemporary problems of social work. 3 (1-9): 39-46. doi: 10.17922/2412-5466-2017-3-1-39-46.
[37] Bikbulatova AA, Karplyuk AA, Parshin GN, Dzhafar-Zade DA, Serebryakov AG. (2018) Technique for Measuring Vocational Interests and Inclinations in High-School Students with Disabilities. Psikhologicheskayanaukaio brazovanie-psychological science and education. 23(2) : 50-58.doi: 10.17759/pse.2018230206.
[38] Makhova AV. (2018) Physiology Of The Hypothalamus In The Human Body. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(5) : 478-484.
[39] Alifirov AI, Mikhaylova IV. (2018) Physical Education Of Highly Qualified Chess Players. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4) : 1725-1730.
[40] Gusarov AV, Kornev AV, Kartashev VP, Nekrasova MV(2018) Effect Of Static Exercises With A Deflection On The Tone Of The SkeletalMusculature Of Middle-Aged Women. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4) : 1716-1724.
[41] Zhalilov AV, Mironov IS. (2018) Identification Of The Most Significant Shortcomings Of Sports Competitions In Sambo Among People With Hearing Impairment In A Separate Region Of Russia.Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(3) : 672-677.