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Morpho-Functional Organization Of Hypothalamus

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ABSTRACT

This article highlights the theory of critical stages in the development of integrative brain activity in the phylogenesis of the vertebrate brain, examines the quantitative parameters of temperature and their extreme fluctuations in natural conditions; considered that the duration and intensity of the increase, exposure to high temperatures leads to the development of hyperthermia; the facts of the negative effect of high temperature on physical performance are given, which leads to a violation of a number of body functions and the occurrence of stress reactions.

KEYWORDS

Hypothalamus, temperature, phylogenesis, hyperthermia, physical performance, integrative activity, heat load, stress response, individual adaptation.

INTRODUCTION

An evolutionary approach to ecological laws, physiological mechanisms of natural forms of adaptation, lability of functioning of a number of physiological systems in animals of a diffuse phylogenetic line and ecological specialization in the process of their adaptation to the environment of modern neurobiology is

essential in the field of research on the topic. From this point of view, the study of the comparative role of the regulatory and motivational characteristics of the organism and the amazing natural forms of adaptation of a number of vertebrates to experience adverse environmental conditions is a very urgent task

[2, 4]. Based on the fundamental views of E. Haeckel about evolution as a conjugate development of the organism and the environment, the theory of aromorphosis by A.N. Severov, the evolutionary theoretical provisions of L.Orbeli, the theory of the dominant A. A. Ukhtomsky [6], the ecological and evolutionary views of D.Biryukov, the theory of critical stages in the development of integrative brain activity in the phylogenesis of the vertebrate brain by A. I. Karolin and A. S. Batueva [1997], the development of these directions now forms a widely ramified research network [5]. It is known that among the environmental factors of the environment, temperature is an intensely influencing factor on the organism [Slonim, 1976, 1986]. The quantitative parameters of temperature and their extreme fluctuations in natural conditions have conditional values for maintaining homeostatic processes, under the influence of temperature, a significant tension of functional activity occurs, the electrical activity of organs changes, shifts occur in the regulation of metabolism and water-salt metabolism, and the harmony and neuropeptide status of the organism in various physiological ones is determined states [Nuriddinov 1991, Nuriddinov, Akhrorov 2010]. These works showed that the duration and intensity of the increase in exposure to high temperature leads to the development of hyperthermia, which is accompanied by a number of physiological and physicochemical changes that cause profound disturbances in the activity of functional systems. [5, 14-49]

THE MAIN RESULTS AND FINDINGS

Heat load causes losses, leads to a significant change in the volume of water and salts, the volume of electrolytes and blood composition, blood cells, loss of live weight and bioenergetics of the body [Gafurov BG, 1992, 1999].

Thus, the urgency of this problem is beyond doubt and has an extremely important

fundamental significance associated with the activity of the organism in extreme conditions. In Central Asia, this is evidenced by the facts of the negative effect of high] temperature on physical performance [Smirnov, 2012], which leads to a violation of a number of body functions and the emergence of stress reactions [Meerov, Ptennikova, 1988, Sulimov, 1993].

Changes in the level of functional activity of individual systems, due to the inclusion of mechanisms, contribute to an increase in heat transfer and thermogenesis. Of particular value in this regard are the statements of A.D. Slonim (1986), who, based on the teachings of A.A.Ukhtomsky (1966) refers to individual adaptation to environmental factors as the formation of a dominant functional system, to the natural development of systemic and structural homeostasis in the cells of the body that are part of it.

The concept of "motivation" means "to occupy a certain place in physiology and to be involved in explaining the facts about the higher nervous activity (HNI) of animals, disturbed at the dawn of the study of animals. As A.S. Batuev rightly writes, (1986), it becomes obvious that ignoring the incentive motives of purposeful behavior, some scientists have combined his analysis and are ultimately forced to resort to such concepts as attraction, "motivation", similar concepts of motivation. [3; 130-157]

From the point of view of a physiologist, motivation, as well as the encompassing circle, which include, in particular, appetite, hunger, satiety, thirst, are the mechanisms underlying the satisfaction of the biological needs of the body [Meerov, 1990]. According to the author's opinion, this approach allows to eliminate some of the ambiguity that arises when using physiological terms. This opinion is in good agreement with the ideas of I.P.Pavlov, A.A. Ukhtomsky (1966) about the dominant that determines the nature of behavior. Hence,

it can be assumed that the motivation of thirst is a typical example of a physiological dominant that arises in connection with a lack of water in the body and directs the corresponding search behavior. [7, 31-47]

The leading role in the creation of the subjective state of thirst is assigned to the structures of the hypothalamus, where osmoreceptors are located, an activating effect is formed, addressed to other signaling devices of the brain, up to the cerebral cortex. Taking into account the scattered and contradictory information concerning the central mechanisms of thirst, we consider it expedient to conduct a systematic study of the mechanisms of the participation of spilled hypothalamic nuclei in the formation of motivation for thirst in rats and cats, we studied behavioral reactions directed to meet the body's need for water. It seems important, using an objective electrophysiological method, to trace the specificity of the response of the lateral hypothalamus and the associated cortical regions in conditions of thirst on presentation of conditioned signals of different significance. For this purpose it was necessary to study the nature of changes in the electrically active data of the brain structures in free behavior and during the performance of the system of conditioned-reflex runs associated with food reinforcement of a different nature. [4; 167]

For the first time revealed a picture of the bioelectric activity of the posterolateral nuclei of the hypothalamus and the sensorimotor cortex of the brain of animals (rats, cats) kept on a salt diet; it was found that with momentary bilateral destruction of the posterolateral nuclei of the hypothalamus, conditioned reflex activities produced with difficulty, and absolute positive right-sided conditioned reactions are not formed at all.

CONCLUSION

It has been experimentally proven that with a normal diet, conditioned-reflex motions and receiving unconditional reinforcement (food) take place in a strictly defined stereotypy. A significant ease of the formation of conditioned reflex runs to fresh food than to salty food was noted. It was found that on the side of the unleavened reinforcement, the rats in the first samples ate grain of such a degree of salinity, which had previously been rejected when running to the salt trough. This is also evidenced by the fact that, against the background of strong and prolonged thirst, not only a decrease in the dynamics of the right-sided conditioned reflex with salty food reinforcement was noted, but also there was a disinhibition of differentiated inhibition by sound signals. This is also evidenced by the fact that, against the background of strong and prolonged thirst, not only a decrease in the dynamics of the right-sided conditioned reflex with salty food reinforcement was noted, but also the disinhibition of differentiated inhibition by sound signals.

All that has been said indicates that under conditions of a shift in the water-salt balance towards an increase in sodium chloride in the body and a lack of water, an adequate analysis of stimuli signaling the nature of food reinforcement was ensured due to mutually compatible activities external taste, internal viscerio-chemical receptors.

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