



PHYSIOLOGY OF THE AUTONOMIC NERVOUS SYSTEM

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ABSTRACT

The autonomic nervous system (ANS) is one of the most important regulatory systems of the human body, maintaining internal homeostasis and automatically controlling the activity of internal organs, blood vessels, and glands. It operates independently of consciousness, regulating cardiovascular, respiratory, digestive, endocrine, and excretory functions, and is also involved in the body's adaptive responses to changes in the external and internal environment..

The autonomic nervous system is responsible for regulating various physiological processes. This regulation is carried out without conscious control, i.e. offline. The ANS can be divided into 2 main groups: sympathetic system, parasympathetic system.

Disruption of the autonomic nervous system results in autonomic failure or disorder and can affect any organ system.

All functions of the body are divided into somatic (animal) and vegetative (autonomous). Somatic functions include the perception of external stimuli and motor reactions of skeletal muscles.

These reactions can be voluntarily evoked, enhanced or inhibited and are under the control of consciousness. Vegetative functions ensure metabolism, thermoregulation, the functioning of the cardiovascular, respiratory, digestive, excretory and other systems, growth and reproduction. Autonomic reactions, as a rule, are not controlled by consciousness.

The autonomic nervous system (ANS) is a complex of central and peripheral nervous structures that regulate the activity of internal organs and the necessary functional level of all body systems. More than 80% of diseases are associated with a disorder of this system.

Physiological significance:

1. Maintaining homeostasis - the constancy of the internal environment of the body.
2. Participation in the vegetative support of various forms of mental and physical activity.

General properties of the somatic and autonomic nervous system.

1. Reflex arcs are built according to the same plan - they have afferent, central and efferent links.

2. The reflex arc of somatic and autonomic reflexes may have a common afferent link.

The complex of studies of the autonomic nervous system includes two groups of methods: the first allows one to assess the condition of the suprasegmental part, the second allows one to assess the condition of the segmental part.

The autonomic nervous system (ANS) is the most important functional section of the nervous system, regulating the activity of internal organs, blood circulation, breathing, digestion, metabolism and many other processes that occur in the body without the participation of consciousness.

The study of the suprasegmental department includes the determination of autonomic tone, reactivity and support of activity. The condition of the segmental department is assessed by the level of functioning of the internal organs and physiological systems of the body.

In this case, it is determined which part of the autonomic nervous system (sympathetic or parasympathetic) is affected and which parts of it (afferent or efferent) are affected.

According to classical physiological concepts (I.P. Pavlov, V.M. Bekhterev, W. Cannon), the ANS is divided into two main sections - sympathetic and parasympathetic, the action of which is opposite, but complementary.

It ensures the constancy of the internal environment - homeostasis, which is the main condition for preserving life and adapting to changing environmental conditions.

The physiological significance of the ANS lies in its ability to coordinate the work of all organs and systems, ensuring their coordinated activity in response to internal and external stimuli. Its regulation is carried out through complex neurohumoral mechanisms, including the interaction of nerve impulses and biologically active substances - neurotransmitters, such as acetylcholine, norepinephrine, dopamine and serotonin. These mediators ensure the transmission of signals between nerve cells and target organs, forming the body's responses.

A feature of the ANS is its autonomy - it functions independently of conscious control, but at the same time closely interacts with the central nervous system (CNS), especially with the hypothalamus and cerebral cortex.

The hypothalamus acts as a higher autonomic center, which combines nervous and endocrine regulation, directing the activity of internal organs in accordance with the needs of the body.

Modern research has shown that the ANS plays a key role in the formation of emotional and stress reactions. Under conditions of emotional stress, the sympathetic system enhances the work of the heart, increases blood pressure and the level of catecholamines, ensuring rapid mobilization of the body. This mechanism, described by Cannon as "fight or flight," is preserved in humans as the most important evolutionary survival tool. However, chronic activation of the sympathetic system under prolonged stress leads to maladaptation - hypertension, tachycardia, decreased immunity. Equally important is the connection between the ANS and the endocrine system, especially through the hypothalamic-pituitary-adrenal axis. The joint work of these systems regulates metabolic processes, blood sugar levels, water-salt balance, and blood pressure.

The sympathetic system activates the body, preparing it for the "fight or flight response" - it increases the heart rate, dilates the bronchi, and increases blood glucose levels.

The parasympathetic system, on the contrary, helps restore energy - it reduces the heart rate, increases the secretion of the digestive glands and relaxes smooth muscles. The balance between these systems determines the physiological balance of the body.

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The physiology of the autonomic nervous system studies not only anatomical structures, but also functional interactions that ensure human adaptation to changing conditions.

The relevance of studying the ANS in the aspect of physiology is due to the increasing prevalence of diseases associated with disruption of its function: autonomic dysfunctions, neurocirculatory dystonia, stress and psychosomatic disorders.

For example, diagnosing autonomic tone helps assess the functional state of the heart, blood vessels, and digestive system and determine the effectiveness of the therapy.

In the context of physiology, the ANS is a universal adaptation system that ensures the interaction of the body with the external environment at the level of unconscious reactions. Her research allows us to better understand the mechanisms of maintaining homeostasis, stress resistance, sleep, wakefulness and psycho-emotional stability.

The autonomic nervous system is the most important element of regulation, ensuring the stability of the internal environment of the body and coordination of the work of internal organs.

Thus, the study of the autonomic nervous system in the aspect of physiology is of fundamental and applied importance for medical science, since it allows not only to reveal the patterns of regulation of internal organs, but also to develop new methods for the prevention and correction of functional disorders..

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