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Functional Aspects Of Body Resistance.

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Abstract

Resistance of an organism is a property to resist the action of pathogenic factors or immunity to the effects of damaging factors of the external and internal environment. In the course of evolution, the organism acquired certain adaptive mechanisms that ensure its existence under conditions of constant interaction with the environment. The basis of the organism's existence is the primary (hereditary) resistance - it is its resistance to the action of factors, determined by the peculiarities of the structure and function of organs and tissues inherited. There is a secondary (acquired) resistance - it is the resistance of the organism, which is formed after exposure to certain factors. An example is the development of immunity after infectious diseases. Acquired resistance to non-infectious agents is formed through training for hypoxia, physical exertion, low temperatures. There is also specific resistance - it is the body's resistance to the effects of a single agent. For example, the emergence of immunity after recovery from infectious diseases. The increased resistance of the organism after vaccination also belongs to this type of resistance. Nonspecific resistance is the body's resistance to the effects of several agents at once. It is impossible to achieve resistance to the whole variety of factors of external and internal environment. There is also general resistance - the resistance of the organism as a whole, to the action of various agents. There is also local resistance - it is the resistance of individual organs and tissues of the body to the local effects of various agents. In the general biological sense, resistance is the individual stability of living systems. The ability of an organism to resist the damaging effects of the habitat is ultimately determined by its stability as a whole, and therefore, all mechanisms that provide resistance are the basis of its viability.

Keywords: physiology, functioning, organism, resistance, health, development.

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INTRODUCTION

Resistance of an organism is the property of an organism to resist the action of pathogenic factors or immunity to the effects of damaging factors of the external and internal environment [1, 2, 3]. Resistance is the body's resistance to the action of pathogenic factors [4]. In the course of evolution, the body acquired certain adaptive mechanisms that ensure its existence under conditions of constant interaction with the environment [5]. The absence or insufficiency of these mechanisms can cause not only the disruption of life, but also the death of the individual. The resistance of the organism is manifested in various forms. The basis of the organism's existence is the primary (hereditary) resistance - it is the body's resistance to the action of factors, determined by the specific structure and function of organs and tissues inherited [6]. For example, the skin and mucous membranes are structures that prevent the penetration of microorganisms and many toxic substances into the body. They perform a barrier function [7]. Subcutaneous fatty tissue, having poor thermal conductivity, contributes to the preservation of endogenous heat. The tissues of the musculoskeletal system provide significant resistance to deformation during mechanical damage. Resistance can be divided into types that have their own characteristics. In this regard, the goal: to consider the types of resistance of the organism.

Absolute primary resistance - a classic example is hereditary resistance to a number of infectious agents ("hereditary immunity"). Its presence is explained by the molecular characteristics of the organism, which cannot serve as a habitat for a particular microorganism, or there are no cellular receptors necessary for fixing the microorganism, that is, there are receptor non-complementarity between the molecules of aggression and their molecular targets. In addition, the cells may not be substances necessary for the existence of microorganisms, or there are products in them that hinder the development of viruses, bacteria. Due to absolute resistance, the human body is not affected by many infectious diseases of animals (man's absolute immunity to cattle plague), and vice versa - animals are not susceptible to a large group of infectious pathologies of people (only man has gonorrhea) [8, 9].

Relative primary resistance is an opportunity, under certain conditions, the mechanisms of absolute resistance can change and then the body is able to interact with an earlier "ignored" agent. For example, poultry (chickens) under normal conditions do not suffer from anthrax. However, against the background of hypothermia, they manage to cause the disease. Camels, immune to the plague, fall ill after severe fatigue [10, 11].

There is a secondary (acquired, altered) resistance - it is the resistance of the organism, formed after a preliminary exposure to certain factors. An example is the development of immunity after infectious diseases. Acquired resistance to non-infectious agents is formed through training for hypoxia, physical stress, low temperatures (hardening) [12, 13].

Specific resistance is the body's resistance to the effects of a single agent. For example, the emergence of immunity after recovery from such infectious diseases as smallpox, plague, and measles. Increased resistance of the body after vaccination also belongs to this type of resistance [14]. Nonspecific resistance is the body's resistance to the effects of several agents at once [15]. Of course, it is impossible to achieve resistance to the entire diversity of factors of the external and internal environment - they are different in nature [16, 17]. However, if the pathogenetic factor is found in very many diseases (caused by various ethological factors) and its action plays one of the leading roles in their pathogenesis, then resistance to it is manifested to a greater number of effects [18]. For example, artificial adaptation to hypoxia greatly facilitates the course of a large group of pathology, since it often determines their course and outcome [19, 20]. Moreover, in some cases, the resistance achieved by such a technique can hamper the development of a disease, a pathological process [21, 22].

Active resistance is the resistance of the organism, provided by the inclusion of protective-adaptive mechanisms in response to exposure to agents. This may be the activation of phagocytosis, the production of antibodies, the migration of leukocytes. Resistance to hypoxia is achieved by increasing ventilation of the lungs, accelerating blood flow, and increasing the number of red blood cells in the blood [23]. Passive resistance is the body's resistance associated with its anatomical and physiological features, that is, it does not provide for the activation of protective reactions when exposed to agents [24, 25]. This resistance is provided by the barrier systems of the body (skin, mucosa, histohematogenic and hematolymphatic barriers), the

presence of bactericidal factors (hydrochloric acid in the stomach, lysozyme in saliva), hereditary immunity. Instead of the term “passive resistance”, the term “tolerance” is sometimes used [26]. There is a slightly different interpretation of the concept of "portability". During the action of two or more emergency factors, the body often responds to only one of them, and does not respond to the action of others [27]. For example, animals exposed to radial acceleration suffer a lethal dose of strychnine, they have a higher percentage of survival in conditions of hypoxia and overheating [28]. With shock, the response of the body to mechanical action is sharply reduced.

Total resistance is the resistance of the organism as a whole, to the action of an agent [29]. For example, general resistance to oxygen starvation ensures the functioning of its organs and systems through various protective-adaptive mechanisms activated at different levels of the organization of living systems [30]. This includes systemic reactions — an increase in the activity of the respiratory and cardiovascular systems; these are also subcellular changes — an increase in the volume and number of mitochondria [31]. All this ensures the protection of the body as a whole. Local resistance is the resistance of individual organs and tissues of the body to the effects of various agents. The stability of the mucous membranes of the stomach and duodenum to ulceration is determined by the state of the mucous-bicarbonate barrier of these organs, the state of microcirculation, and the regenerative activity of their epithelium. The availability of toxins in the central nervous system is largely determined by the state of the blood-brain barrier; it is impassable for many toxic substances and microorganisms. The variety of forms of resistance demonstrates the significant capabilities of the body to protect against the effects of external and internal factors. In individuals, as a rule, there are several types of reactivity. For example, the patient was injected with antibodies to a certain type of microorganism (staphylococcus) - the forms of resistance, with the following: secondary, general, specific, passive [32].

The relationship between reactivity and resistance has been clarified. In the general biological sense, reactivity is an expression of the individual measure of the adaptive capabilities of living systems, the whole range of reactions characteristic of the organism as a whole [33]. It is not reduced to a quantitative concept and is characterized by a certain set of adaptive reactions that is possible for a given organism, that is, it has a qualitative character. Resistance is already applicable to the interaction with a specific pathogenic agent and is quantitative, that is, it is characterized by a certain set of defensive reactions from this effect and ensuring the preservation of homeostasis, and in case of illness, contributing to the return to it [34]. The ability of an organism to resist the damaging effects of the habitat is ultimately determined by its response as a whole, and therefore, all mechanisms that provide resistance are one of the main consequences and expressions of reactivity [35].

Often, reactivity and resistance change unidirectionally, for example, immunity in case of hyper-reactivity during the tuberculosis process (high resistance against the background of hyperairgia). However, they should not be fully identified, with the same tuberculosis, pronounced resistance (immunity) can also be observed in the course of hypertension development of the pathology. Resistance may be reduced against the background of hyperergic forms of reactivity, as noted, for example, during an allergy; and vice versa - the lower the reactivity, the higher the resistance. The latter situation is most clearly demonstrated in winter-sleeping animals. They, during hibernation, many of the mechanisms (manifestations) of reactivity are significantly reduced. But at the same time (decrease in reactivity) resistance to the most diverse agents (hypothermia, hypoxia, poisoning, infections) is significantly increased [33]. The fact is that opioid peptides released during hibernation inhibit the activity of the hypothalamic-pituitary and other brain systems. Hence, the inhibition of the activity of the higher vegetative parts of the central nervous system helps to reduce the metabolic rate, significantly reduces the oxygen consumption by the tissues, which allows these animals to tolerate, for example, more significant hypothermia than awake individuals. Active individuals actively respond to hypothermia - there is a significant strain of the higher vegetative and neuroendocrine centers with activation of the peripheral endocrine glands (adrenal glands, thyroid gland). A diametrical opposite effect is noted - the intensity of metabolism increases, the need for oxygen in tissues increases, which leads very quickly to the depletion of the body’s energy and plastic resources. In addition, the simultaneous stimulation of the function of the thyroid gland and the adrenal cortex causes a certain antagonism in the final mechanism of the action of their hormones [35]. At the level of cellular processes, the effect of glucocorticoids and thyroid hormones is opposite (thyroid hormones uncouple oxidative phosphorylation, and glucocorticoids enhance it).

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CONCLUSION

Resistance of an organism is the property of an organism to resist the action of pathogenic factors or immunity to the effects of damaging factors of the external and internal environment. The basis of the organism's existence is primary resistance - it is the body's resistance to the action of factors, determined by the specific structure and function of organs and tissues inherited. There is secondary resistance - it is the resistance of the body, formed after a preliminary exposure to certain factors. An example is the development of immunity after infectious diseases. Acquired resistance to non-infectious agents is formed through training for hypoxia, physical exertion, low temperatures. Specific resistance is the body's resistance to the effects of a single agent. For example, the emergence of immunity after recovery from such infectious diseases as smallpox, plague, and measles. The increased resistance of the organism after vaccination also belongs to this type of resistance. Nonspecific resistance is the body's resistance to the effects of several agents at once. Active resistance is the resistance of the organism, provided by the inclusion of protective-adaptive mechanisms in response to exposure to agents. Passive resistance is the stability of the body associated with its anatomical and physiological features, that is, it does not provide for the activation of protective reactions when exposed to agents. Total resistance is the resistance of the organism as a whole, to the action of an agent. Local resistance is the resistance of individual organs and tissues of the body to the effects of various agents. The relationship between reactivity and resistance has been clarified. In the general biological sense, reactivity is an expression of the individual measure of the adaptive capabilities of living systems, the whole range of reactions characteristic of the organism as a whole.

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