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Physiological Basis Of Maintaining The Body's Reactivity.

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ABSTRACT

Reactivity of an organism is its ability to respond in a certain way to the influence of internal and external factors. Reactivity determines whether a disease is to be or not, in addition, it is one of the factors of the pathogenesis of the disease, since changes in its mechanisms can be the basis for the further development of pathology or recovery. Ideas about reactivity began to take shape in parallel with the birth of medicine. This is indicated by the treatises of ancient Chinese and ancient Indian medicine; but in a more precise form, they were formed by ancient Greek physicians. Already then, they noted differences in the response of people to the same pathogenic effect, dissimilarity in the course of diseases, that is, one and also the disease proceeds differently in individual patients. It has now been found that reactivity is formed in the process of evolution, phylogenesis, as the combined complexity of a number of the fundamental properties of living systems. It is clear that each period of the ontogenetic development of the human body has its own, special kind of response to external and internal stimuli. For this reason, ontogenesis can be represented as a process of the temporary deployment of genetic programs that experience expression and repression. For this reason, individual organisms have differences in the response in different age periods to the same stimulus. Modern medicine has come to firmly believe the importance of taking into account the reactivity of the body during the selection of options for all medical influences.

Keywords: reactivity, ontogenesis, health, viability, functioning.

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INTRODUCTION

The reactivity of an organism is its ability to respond in a certain way to the effects of internal and external factors [1, 2]. Ideas about reactivity began to take shape in parallel with the birth of medicine [3]. This is indicated by the treatises of ancient Chinese and ancient Indian medicine. In a more precise form, they were formed by ancient Greek doctors. Already then, they noted differences in the response of people to the same pathogenic effect, dissimilarity in the course of diseases, that is, one and also the disease proceeds differently in individual patients. Ptolemy Dioscorides wrote that each person has his own, certain mixture of vital juices. Sextus Empiricus introduced the concept of "idiosyncrasy" to refer to increased individual sensitivity associated with a particular mixture of juices. These arguments were based on the teachings of Hippocrates on the importance of the vital juices of the body for its normal functioning. The modern trend in the study of reactivity began to emerge after F. Glisson (1672) described the concept of "irritability" as the property of all living things to perceive irritations and react to them. In 1780, J. Brown introduced the term "excitability" to refer to the active state of the organism, due to the influence of various environmental factors. However, the concept of "reactivity" appeared and was used in the medical literature only in the early 20th century. At this time, pathological scientists began to pay attention to various types of organism responses. A major role in the development of this issue had the views of R. Virchow ("cellular reactivity"), K. Bernard (homeostasis and reactivity). Comparative pathological studies I.I. Mechnikov on phagocytosis showed the importance of the mechanisms of reactivity in inflammation and the formation of immunity. He is considered one of the founders of the theory of immunological reactivity [4]. It was possible to reveal the general laws of the evolution of reactivity in phylogenesis and ontogenesis. The relationship between reactivity and constitution with mesenchyme derivatives was previously shown. Earlier, the integrating role of the nervous system in the implementation of reactivity mechanisms was noted. Research E. Starling, G. Selye and others have created the endocrine basis of the mechanisms of reactivity [5]. Considering the importance of the problem, in our work the goal was set: to summarize the available information about the reactivity of the organism and its manifestations in various conditions.

Reactivity often determines to be or not to be a disease. In addition, she herself is often one of the factors of the pathogenesis of the disease, since changes in its mechanisms can be the basis for the further development of pathology [6]. Reactivity is formed in the process of evolution, phylogenesis and ontogenesis, which became possible as the combined complication of a number of fundamental properties of living systems:

- irritability - the property of a cell (organism) to respond with functional and structural changes to the effects of external and internal agents. The answers are, as a rule, generalized, of a slightly differentiated nature (changes in metabolism, cell shape and size, content and ratio of intracellular structures) [7];
- excitability - the property of a cell to perceive the effects of external and internal agents and respond to them with an excitation reaction. This is a kind of quantitative assessment of irritability. Excitability is determined by the threshold of irritation, that is, by the lowest strength of the stimulus (mechanical, electrical, chemical), which is sufficient for the formation of excitation (contraction, secretion). Consequently, excitability is characterized by the minimal force of an agent that transfers a cell from a state of rest to a state of active activity [8];
- sensitivity - the property of the body to perceive the effects of agents of the external and internal environment and to determine their nature (quality), strength, location and frequency. This term is almost identical to excitability, but is applicable to more complex processes occurring in the body than elementary acts (muscle contraction or secretion of the glands). The basis of the physiological mechanisms of sensitivity is the dynamic interaction of various sensory systems - visual, auditory, olfactory, and others. On this basis, they speak of visual, auditory, pain sensitivity [9];
- reactions - an action that occurs in response to a particular impact. This is the ability of the organism (or its individual cells, tissues, organs and systems) to respond to the effects of external and internal agents [9].

The variety of reactivity is based on:

- biological properties of the organism (species, group and individual reactivity) [11];

- severity of the body's response to the action of factors of external and internal environment (normal, increased, reduced, disturbed, and its absence) [12];
- the degree of specificity of the response of the organism (specific and non-specific reactivity) [7,13];
- biological significance of the response of the body (physiological and pathological reactivity) [14].

The species reactivity (biological, primary) is the most general form, which is determined, first of all, by the hereditary mechanism and expresses the ability of all representations of a given species to respond to various effects of the same type of changes in life activity. Various influences are understood as the influence of factors of external and internal environment (microorganisms, toxins, solar radiation, hypoxia, etc.) on the organism, whose response to these effects, as a rule, is protective and adaptive in nature. Species reactivity is formed in the course of evolution as a result of variability (mutation), hereditary consolidation of positive properties and the natural selection of individuals of a given species. Examples of species reactivity are hibernation of animals, seasonal migration of birds and fish. During hibernation, reactivity to many factors is significantly reduced. Infection gophers during hibernation plague is not accompanied by the development of the disease. Hibernation increases resistance to poisons, such as strychnine. Specific features of reactivity determine the species immunity to various infections. The immunity of humans to cattle plague pathogens, and animals to infection with syphilis, is explained by species immunity [15].

Group reactivity is the reactivity of individual groups of people (or animals), united by some common feature, on which the response features of all members of this group depend on the influence of external and internal factors. This includes:

- Constitutional reactivity. Structural and functional features of different groups of people correlate with the frequency of occurrence of certain types of pathology. These groups do not respond in the same way to the same etiological factor. For example, hypersthenics more often than asthenics, there are diseases of the cardiovascular system. Peptic ulcer disease of the stomach and duodenum is mainly noted in asthenics [16].
- Sexual reactivity. Observations reflecting the differences in reactivity between female and male organisms, a significant amount. Gout, peptic ulcer, atherosclerosis, spondylitis, alcoholism are more common in men. The prerogative of women - gallstone disease, cancer of the gallbladder, hyperthyroidism, iron deficiency anemia; they are more resistant to hypoxia, mechanical injury [17, 18].

Male reactivity is characterized by a wide variety of individuals and a more diverse range of variability. Female reactivity, with a more "narrow" response, contributes to greater resistance to a significant number of exogenous factors [19]. Therefore, the course of diseases (somatic and infectious) in women is manifested by a smaller range of symptoms and frequent manifestations of typical forms. For men, significant polymorphism of clinical signs is characteristic - from erased, asymptomatic, to extremely severe cases of the same pathology. As a result, the overall mortality of men is higher than that of women in all age groups [20]. As explanations for the uneven response of the female and male bodies to various factors of the external and internal environment, the following is given:

- multidirectional action of sex hormones. Androgens increase lymphocyte suppression, and estrogens limit it, hence a large range of autoimmune pathology in women. On the other hand, the effect of sex hormones on T-lymphocytes favorably affects the antibacterial immunity in women. When smoking, the frequency of lung cancer in women is higher than in men, it is assumed that estrogens have a promoter effect. The increased risk of atherosclerosis in men is associated with the effect of androgens [21];
- metabolic feature of the female and male body. The female body contains 6-10% less water, but more fatty tissue. Female alcoholism is more malignant, possibly due to the lower activity of alcohol dehydrogenase than in men;
- cyclical changes in the body of women. The greater frequency of iron deficiency in women than in men is associated with the loss of iron during menstrual cycles and is aggravated by breastfeeding the baby [22];
- hereditary diseases linked to sex or limited to sex. For example, dominant inheritance linked to the X chromosome (vitamin D-resistant rickets). Women are affected twice as often, the transfer

to sons and daughters is equally likely, the more severe course is observed in men. Hemophilia A, hemophilia B - chromosome-linked X-recessive diseases. The disease is almost always recorded in men. Mother - obligate carrier of the pathological gene [23];

- differences in the socio-ecological and occupational roles of the sexes in populations. The reactivity of men is largely focused on forced loads, active defensive reactions under stress, since they mainly have the role of first contact with environmentally new factors for the population. Male responses are designed to increase resistance to anthropogenic influences. Women's reactivity is characterized by optimality and perfection of stereotypical conservative adaptive mechanisms. They are aimed at passive defensive reactions under stress and provide adaptation to the usual natural influences [24];
- differences in sex chromosomes. Males on sex chromosomes are hemizygous, which limits the choice of genetic programs compared to women with two homologous X chromosomes. Therefore, in the somatic cells of the female body, the adaptive functionalities are wider and more diverse [25, 26];
- genetic features of the Y chromosome. Hemizygoty does not allow the Y chromosome to participate in crossing-over, that is, it does not participate in the evolutionary mechanism for eliminating defective genes in a number of generations. From here, the Y chromosome stores many mutant genes. And, if the mutant gene is not lethal or does not determine infertility, then it is passed from father to sons. Thus, in addition to male infertility, excess hair growth in the middle phalanges of the fingers of the hands and auricular hypertrichosis are inherited [27].

Age reactivity. Each period of the ontogenetic development of the human body has its own, special kind of response to external and internal stimuli. Ontogenesis can be represented as a process of the temporary deployment of genetic programs, in the form of their expression and repression. Hence, the unevenness of the response of different age groups to the same stimulus. For example, newborns are more resistant to acute hypoxia than adults, compared with them - the threshold of pain sensitivity is higher. At the same time, due to the incomplete deployment of the genetically determined program of the inflammatory process, they are extremely sensitive to pyogenic infection [28]. In childhood, heart defects are well compensated, rarely myocardial infarction [29]. Thus, at a certain age, there may be a higher resistance to some stimuli and a lower resistance to others. In this regard, the widespread view that the reactivity of children is reduced (compared to the adult body) does not look quite right. Perhaps it is more correct to say that it is different in children [30-33]. Their reactivity is protective in nature, it largely determines the dynamics and outcome of a disease [34]. In a disease, there are always two opposite beginnings - "damage" and "protection" [35, 36]. The absence of "damage" is health, and the absence of "protection" during "damage" means death, that is, in any case, the disease does not occur [37, 38].

CONCLUSION

Reactivity of an organism is its ability to respond in a certain way to the influence of internal and external factors. It often determines whether or not to be a disease. In addition, it is one of the factors in the development of pathology or recovery. Reactivity is formed in the process of evolution, phylogenesis and ontogenesis, which became possible as the combined complication of a number of fundamental properties of living systems. Each period of the ontogenetic development of the human body has its own, special kind of response to external and internal stimuli. For this reason, ontogenesis can be represented as a process of temporary deployment of genetic programs in the form of their expression or repression. Hence, the unevenness of the response of different age groups to the same stimulus.

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