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ПРИЧИНЫ СТАРЕНИЯ И ЕГО БИОЛОГИЧЕСКИЕ ФАКТОРЫ

Аннотация: В этой статье обсуждаются причины старения и его биологические факторы.

Ключевые слова: старение, биологические процессы, образ жизни, физическое воспитание, генетика, здоровое питание

CAUSES OF AGING AND ITS BIOLOGICAL FACTORS

Abstract: This article discusses the causes of aging and its biological factors.

Key words: aging, biological processes, lifestyle, physical education, genetics, healthy eating

Nowadays, the combined efforts of chemical and biological physics are aimed at solving important problems of biology and medicine. Diseases, the influence of harmful effects of physical and chemical environmental factors, aging of living organisms occupy a special place among biological processes.

Biophysics is a science that studies physical and physicochemical processes occurring in biosystems at different levels of organization and are the basis of physiological acts. The emergence of biophysics happened as a progress in physics, contributions were made by mathematics, chemistry and biology. Living organisms are an open, self-regulating, self-reproducing and developing heterogeneous system, the most important functional substances in which are biopolymers: proteins and nucleic acids of a complex atomic-molecular structure.

Half a century ago, chemical physics was formed - a new area of natural science, bordering between physics and chemistry. In this area, modern theoretical and experimental physics has found a huge variety of objects of study, and chemistry has received rigorous physical foundations for solving the most important problems of the structure and transformation of substances.

Around the same period, physics began to actively penetrate biology. This is again about modern physics, since many well-known physicists in the distant past have repeatedly turned their attention to biological phenomena. Thus, this period can be considered the second birth of biophysics.

Until now, the causes of aging have not been scientifically identified and there is no answer to the question of what are the primary and essential elements of senile involution.

The views of the ancients about the causes of aging can be divided into two groups. According to the first, the cause of aging lies in the gradual loss of something that is necessary to sustain life. This "something", according to some authors, is an energetic, material or mental factor. According to others, aging is the accumulation of excess of something that is harmful to the body (intoxication of the body from the outside or from the inside). These logically opposite concepts and more or less modified form have survived to this day. More complex explanations have been added recently. From a historical point of view, the hypothesis that aging is the result of the gradual loss of specific vital energy is of the greatest importance.

The most ancient and clear scientific explanation of the causes of aging is contained in the writings of Aristotle "On youth and old age." Aristotle (384-322 BC) believed that aging is caused by the gradual expenditure of "innate warmth" that every living creature has from the beginning of its individual life. The heart is the center of this warmth. The blood vessels carry this heat throughout the body and revitalize its limbs and organs. This thought does not represent anything original. It was formulated by Aristotle on the basis of the statements

of previous thinkers. A careful analysis of the writings of Hippocrates (460-377 BC) shows that he also accepts the hypothesis that aging is due to the loss of "natural heat". The opinion of Hippocrates and Aristotle is based on the correct observation that the release of heat in old age is less vigorous than in youth. In modern terms, old age is the result of a gradual decline in metabolic processes.

The Yugoslav pathophysiologist A. Zupancic adheres to similar views, believing that the structure of living organisms during their functioning continuously changes, collapsing and recovering at the same time, and that, in essence, aging is a slow loss of the ability to restore constantly changing structures. Over time, the old organism becomes less and less similar to itself, gradually loses the characteristics of a living being and approaches a state that resembles an inanimate system.

In the 20th century, the old theory has become popular again according to which aging is stimulated by the harmful effects of space. Now, however, neither deities wishing to punish mortals, nor the benevolent astrological influences of celestial bodies (the medieval concept: old age is the influence of the planets on the human body) are not involved in explaining this. Kunze in 1933 put forward a hypothesis about the harmful effects of particles of cosmic and other ultra-radiation, which constantly bombard living organisms, destroying the nuclei of their cells. A similar theory was developed in 1957 by the radiologist G. File, according to which old age may be due to the accumulation of irreversible disorders caused by spontaneous somatic mutations under the influence of various mutagenic agents, especially ionizing radiation.

Old age can be considered as a result of the struggle between the influence of harmful factors and the stability of the organism. A very interesting mathematical expression of this proposition was given by the German physiologist A. Pütter in 1921, and the analysis in two instructive works was given by the biochemist K. Mischer and the physician G. Schlomk. Aging and

death of an organism, like the decay of radioactive substances, obey similar mathematical laws.

Most of the hypotheses of recent years associate the aging process with the physical laws of the irreversibility of some processes and with the physical tendency towards an increase in disorder among molecules. Thus, in 1924 the Czech physiologist Ruzicka emphasized strongly that the hysteresis of protoplasm can be regarded as a consequence of the thermodynamic law of entropy. The Swedish biochemist G. von Euler in 1951 expressed the idea that old age is the result of an increase in the entropy of hormonal reactions, especially in the macromolecules of the pituitary hormones. The term "entropy" is understood as the anarchy of certain processes, a tendency towards disorder. In his valuable book on the biology of aging, published in 1956, A. Comfort writes that of all general theories, the theory proposed by Bidder is the most plausible. According to Bidder, the senile period is not part of the natural pattern of animal life, but rather an anarchic phenomenon following the fact that this pattern has already been realized. Comfort puts it this way: "Old age is a typical by-product, not part of the program, but a weakening of the force that guides the program." V. Kuhn in 1955 associates the onset of old age with changes in the synthesis of optically active substances in the body. According to physical laws, the optical purity of certain substances in the body changes, racemization progresses, while the presence of optical antipodes of certain substances seriously degrades the metabolism, thereby exerting a harmful effect on the body.

Many different hypotheses about the causes and essence of aging can be linked and supplemented. Some modern authors (S. Hirsch, A. G. Lansing, D. Kotsovsky, F. Genshen, L. Binet, M. Burger, K. Parkhon, etc.) believe that such a complex process as aging cannot be explained by one cause, for example, atrophy of the gonads or other endocrine glands, changes in the cells of the central nervous system, poisoning with intestinal toxins, accumulation of

harmful products of cellular metabolism, cytomorphosis and weakening of metabolism and regenerative capacity, hysteresis of protoplasmic colloids, calcium deposition and arteriosclerosis of blood vessels, cosmic radiation, an increase in entropy, etc.

None of these hypotheses address aging in general. Rather than explaining biological processes by a single causal one, there is now a tendency to explain them by many, encompassing and collecting many external and internal factors of aging. Until now, no answer has been found to the question - "why the body is aging." Better studied from a scientific and practical point of view, an important issue - "how is the aging process."

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