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The Pathological Mechanism of Systemic Inflammation in Humans has Opened. The Reason is Uncontrolled Leakage of Arterial Blood Through Arteriovenous Anastomoses

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Abstract

This brief report provides some data on the status of the problem of systemic inflammation in humans. The situation with understanding the causes of systemic inflammation and treatment of this disease progressed slowly. Our group has put forward a medical hypothesis, confirmed by some medical supervision, which consists in the problem of functional disorders of arteriovenous anastomoses.

Keywords: Systemic inflammation, C-reactive protein CRP, Heart failure, Metabolic syndrome, Atherosclerosis, Diabetes, Cancer

Introduction

This report contains a brief analysis of the opinions on the causes of the mysterious systemic inflammation in humans. In recent years, the causes and mechanisms of systemic inflammation have been suggested quite a lot, but so far there is no consensus and effective treatment.

The disease occurs in a large percentage of people at any age, but usually after 20 years old. A particularly critical situation with the prevalence of systemic inflammation has been observed in some countries over the past 30 years. Why is this happening right now?

Materials and Methods

Search for information through the Internet, study of classical and modern main sources, participation at presentations on medical conferences in 2012-2017, discussion of theoretical and clinical issues with health experts of Russia.

Results

I think that the complication of the problem of systemic inflammation in people in recent years has arisen because in the same years a boom of computerization began, the amount of physical work in the office and at home decreased, and the number of stressful situations increased.

But how is this related to the pathology of the circulation, with systemic inflammation and abdominal obesity, taking into account in turn that systemic inflammation correlates with a large number of cardiovascular diseases?

It can be said that this tangle of problems for medicine was not yet available for a correct understanding.

A detailed description of the problem of systemic inflammation is given in articles [1, 2, 3, 4]. It can be concluded that many re-

searchers of different generations worked on the search for the mechanism of occurrence and the solution of this problem, but as a result they only paved the way for the approval of my theory. Of course, all previous studies are not in vain, they will be more or less included in the development of the New Theory.

The problem - at the macro level: the cause of systemic inflammation should be considered physical interaction between the human body with the vertical spine and the forces of gravity of the Earth. Solve the problem at the microlevels (on the nervous, endocrine, intracellular, intracellular, molecular), when hundreds of small factors are discovered which, of course, are forcedly activated by sedentary work and blood stasis, affect systemic inflammation interacting with each other is very difficult.

As a physicist, I looked at this problem from the outside.

But first we postulate some factors that cause stagnation of blood or, conversely, contribute to satisfactory blood pumping in the organs.

1) Venous blood in a strenuous posture or sitting ordinary person for a long time (for example, when working at a computer) can not rise from the pelvic area and legs to the right atrium only at the expense of the negative pressure created by the heart itself. Sooner or later, there are stagnation of blood and lymph, edema, especially in the pelvic area and legs, in so-called "gravitational traps", where the cells are exposed to oxidative stress.

2) Venous blood of a physically working or walking (running) human being rises to the level of the heart due to the contracting muscles of the lower half of the body and legs. Venous valves play a positive role here. But the main link of pumping is the expanding

chest and movements of the respiratory diaphragm, especially its sharp deep movements.

3) In a person standing in the water at the level of the neck or chest, the hydrostatic pressure of water creates an inverse pressure along the human body and promotes a good delivery of blood to the heart. On the skin of the legs and superficial veins, there is a pressure that pushes up the venous blood up to 100 mm Hg, and to the pelvic region up to 50 mm Hg! That's why swimming and bathing in the water are very useful and recommended by all doctors for prevention and treatment of CVD. (A similar, but much less effective, analogue to pressure in water is compressible underwear with a certain constant pressure.) It is interesting that it is in the sea water, not on land, that vertebrates live 100-200 years and more.

4) Extreme breathing exercises are very useful, for example, qigong or yoga, to prevent stagnation of blood and lymph. Sharp movements of the diaphragm upwards (with a sharp exhalation) create powerful negative pressure waves in the veins of the lower half of the body and extract dirty blood from the "gravitational traps". For a person, walks with quick steps are also useful and any regular exercises (at least 5-6 times a week!). (For example, conductors of orchestras have a constant load on muscles and a diaphragm almost all life, therefore in the bulk they live the longest, on the average 83.2 years is a record among all professions!)

5) In a person who is in a horizontal position, the venous pressure in all organs is approximately equal. The blood from the "gravitational traps" to which the human body includes the organs of the small pelvis and legs is extracted quite easily by the negative pressure of the heart and the movement of the diaphragm with quiet breathing. Delivery of arterial blood to all organs is optimal. That's why a 7-8 hour sleep (but no more) is so useful, plus a periodic daytime 5-10-minute rest in a lying position. That's why a person wakes up in the morning always with warm hands and feet. This is why people who sleep less than 7 hours increase the likelihood of various cardiovascular diseases and live less, as observed in the US [5]. The reason for my opinion is this: with a restless and short sleep with frequent getting up, all stagnant venous blood does not manage to get into the big circle of blood circulation. That's why exercises with horizontal position of the spine are so useful, that is reason why such exercises easily leads to lose weight. For example, when performing a complex of Nishi (Japan): lying on your back with shaking of the limbs. Or when doing exercises at the "Pohudey" complex. In such cases, under the influence of gravity there is a good outflow of lymph, venous blood and intercellular fluid from the lower half of the body and limbs to the center! Getting rid of excess weight is not due to increased work of muscles, but due to the extraction of stagnant venous blood from the lower half of the body into the zone of the hollow veins.

From my point of view, the main macro factor contributing to blood stasis is functioning arteriovenous anastomoses (AVA). During periods of high physical or psychological stress, during overeating or abusing alcohol, with a sharp increase in blood pressure (BP) or in hypodynamia, in some organs may open AVA's, for example, between the superior mesenteric artery and portal vein [6]. In such a state, blood pressure sharply decreases, which saves

arterial vessels from mechanical damage, but volume of arterial blood decrease and excess venous arises. These same phenomena are the cause of the notorious «jumps of blood pressure», later called «Ermoshkin-Lukyanchenko syndrome» [7]. An increase in venous pressure and venous volume leads to venous hyperemia of the liver, to the sequential destruction of venous valves located «upstream» from the point where AVA's enters the veins. («Upstream» or higher by along stream, it is means closer to the ground or below the heart.) Damage to the valves leads to an additional increase in pressure in the veins due to the growth of the hydrostatic component. After a while, increased venous pressure can reach the venules. The pressure gradient between arterioles and venules becomes critically small. There is a blockage of blood circulation, the so-called hydraulic lock (bolt), some groups of cells are deprived of the possibility of continuous consumption of oxygen, nutrients and they are doomed to necrosis and apoptosis. To get rid of increased blood pressure and blockage in the pelvic area, rapid growth of collaterals, growth of white adipose tissue in the mesentery, and other pathological changes begin. Apparently, it is from the time of stagnation, edema and varicose that the «aging process» of the body begins, sooner or later a «bouquet of diseases» arises.

It is known that ischemia induces the generation of reactive oxygen species, such as superoxide, peroxide, hydroxyl radical. In turn, free radicals, in the form of active forms of oxygen (AFO), cause damage to cell membranes, proteins and chromosomes [8].

Over time, longer stagnation of venous blood, ischemia of the organs, edema, varicose veins, thromboses. Small veins and venules are filled with blood, pathologically expand and begin to flow blood into the intercellular space. During the night sleep, and also taking into account some minimal physical activity during the day, the organism of a passive person, his homeostasis can not be brought to a satisfactory state. The no regenerated remains of stagnant venous blood, affected by infection and other pathological processes lead to systemic inflammation of almost the entire cardiovascular system. The result of stagnation of blood, according to the New Theory of CVD, are many well-known diseases: metabolic syndrome, atherosclerosis, heart failure, mechanically induced arrhythmia due to hollow venous overflow, abdominal obesity, diabetes, cancer and other diseases [9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22].

It should be remembered, that over long sitting at the computer can significantly worsen the health of the person, including adolescents. There are many reports of sudden death of schoolchildren with minimal stress in the lesson of physical education. There are many reports of deaths in long-term multi-day computer games without interruptions to normal sleep and exercise [23, 24]. The reason is well explained by the New Theory: gambling (or long work in the office) has an effect on the psyche, but the main thing is that the many hours accumulation of venous blood in the lower half of the body leads to its thrombosis and sudden death of a person due to blood clots entering the arteries.

In addition, it can be safely assumed that infection, bacteria, AFO, oxidized forms of lipids and proteins from the stagnation zones along the bloodstream can penetrate the brain and cause Alzhei-

mer's, Parkinson's and others. I would like to emphasize that the etiology and pathogenesis of these and other neurodegenerative diseases are not yet known exactly. There is only a hypotheses [25, 26, 27], confirmed by some data, including my theory, obtained in recent years. It turns out that the laws of physics play a major role in the development of many CVDs!

Well, what did official medicine say a few years ago?

Development of critical conditions associated with microcirculatory disorders [2]: it is connect with the activation of endotheliocytes, with a sludge, with microthrombosis, with vasodilation, which in turn lead to decentering of blood circulation, hypovolemia, tissue edema, vascular shock, hypoxia, acidosis, toxicosis and etc. She said that systemic inflammation consists of a stress response of the neuroendocrine system, primarily the hypothalamic-pituitary-adrenal complex, the generalized manifestation of the immune response, the acute phase response of the liver, and the enhancement of leukocytopoiesis in the bone marrow. But the original cause did not indicate. In fact, there is official medicine confirms and supplements the New Theory of CVD, without naming the main mechanism of its development, without seeing a common system and the root cause. She believes that a special place in systemic inflammation is occupied by the cytokine network, which controls the development of immune and inflammatory reactivity. The main producers of cytokines are T-cells and "inflammatory" macrophages, and also to some extent other types of leukocytes, endotheliocytes of postcapillary venules and many types of stromal cells. The core of the syndrome of systemic inflammation is the "inflammatory" restructuring of postcapillary venules and the growing microcirculatory disorders in various organs and tissues, leading to a change in many parameters of homeostasis [1, 2]. So, each section and subsection of theoretical and practical medicine was engaged in its "narrow" problem, so there was no one to make systemic conclusions and generalizations.

Speaking about my New Theory, about the macro factors of inflammation, it can be said that the process of systemic inflammation begins precisely with an increase in venous pressure due to open **AVA's**, with the destruction of venous valves and postcapillary venules, with stagnation of blood and lymph, with **C-reactive protein (CRP) level increase**, with involvement in the pathological process of many micro factors, in fact with the immune and inflammatory reactivity of the body.

Based on these data, I believe that official medicine needs to focus its efforts on a thorough study of **AVA's** work under different conditions of their growth and functioning.

I believe that a long, many centuries of medical history may end, when almost all CVD were officially considered diseases with unknown etiology and pathogenesis. Only sets of factors that contributed to the development of different CVD were known. Now it becomes clear that the main mechanism of almost all CVD is one: non-optimal working arteriovenous anastomoses (AVA). That is why many CVD are pairwise correlated. That is why, the medicines for the prevention and treatment of many CVDs are also largely the same. That's why recommendations for physical activity are also the same. That is why the age-dependent diseases (heart

disease, stroke, diabetes, cancer, Alzheimer's disease) line up in parallel lines on the chart [28], where the X-axis is the age group (number of years), the Y-axis deaths per 100 000 people per year.

Conclusions

- 1) A more thorough study of the growth and functioning of arteriovenous anastomoses (AVA) in humans is needed.
- 2) The pathophysiology of the body, namely metabolic syndrome, systemic inflammation, atherosclerosis, other CVD can be caused by leakage of arterial blood into the veins, increased venous pressure, blockage of capillary circulation, stagnation of blood, lymph and intercellular fluid, varicosity, micro necrosis of tissues. According to the latest data, Alzheimer's and Parkinson's diseases are also associated with infection, with bacteria, with pathologies of protein structures.
- 3) Proceeding from the presented material, we can say: in order to live for a long time, moderate physical activity or special exercises are necessary for life. Training of respiratory organs, muscles, cardiovascular system, including AVA, is necessary. You need your favorite work and a good dream. It is impossible to rely only on medicines.
- 4) Now, apparently, we can say: old age is a disease, old age can be treated! The mystery of man's aging was in the anastomoses of AVA, so the duration of active life can be increased.
- 5) But I will not run ahead: strictly speaking, while this is a hypothesis, experiments and more substantial proofs are necessary. I offer cooperation, joint study of the problems of CVD.

List of abbreviations

CVD cardiovascular disease, **AVA** arteriovenous anastomose, **AFO** active forms of oxygen, **CRP C-reactive protein**, **BP** blood pressure.

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