

Problems of Strategy of Healthcare

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Abstract

The sharp rise in price of diagnosis and treatment today indicates the need for a change in health care strategy. The existing health care strategy leads to its bankruptcy amid a steady increase in morbidity. We suggest to develop an alternative strategy based on a pure natural approach, namely, the thermodynamics conception of health. A living organism can be considered as a system of open thermodynamics, the stability of which depends on its energy potential. In this case, when an individual leaves the aerobic energy potential of the biosystem (12 MET for men and 10 MET for women), the entropy due to evolution increases with the subsequent development of pathology. By the alternative of existent strategy of healthcare as a fight against pathology there is counteraction of entropy. An organizational form of counteraction of entropy is measures aimed at the maintenance of aerobic energy potential of the bio system within bounds of "safe" zone of health.

Keywords: Strategy of Healthcare diagnosis.

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INTRODUCTION

The global healthcare system is heading for imminent bankruptcy. The complexity of diagnostic and treatment procedures is increasing, their cost is exorbitantly increasing. Already, many therapeutic measures are not available to patients because of their high cost (for example, organ transplantation). To this must be added the growth of the world's population. At the same time, the increase in health care costs significantly exceeds the population growth rate, without reducing the morbidity. The problem has become so serious that it has been discussed by experts at the Davos Economic Forum. According to them, in the coming decades, global spending on the health sector will almost triple: from \$921 trillion in 2014 to \$2,424 trillion in 2040 with a population growth of 7 billion to 9 billion. The same was stated by WHO Secretary-General Ms. M. Chen at the WHO Anniversary Assembly (2012): "Chronic non-communicable diseases can negate all the gains of modernization and development. If we do not change the strategy to combat these diseases, then the global health system will face a financial crisis."

Chronic non-communicable diseases (cardiovascular, malignant, endocrine, respiratory systems) are a leading problem in modern healthcare. Their growth and rejuvenation are an objective reality.

It is this group of diseases that is the main cause of death in developed countries (87%), as well as disability and restrictions in the social realization of an individual. The fight against them is not yet encouraging.

Is there an alternative to a traditional health strategy based on patient care? Yes, such an alternative exists and is associated with the general laws of thermodynamics.

Theoretical Basis

A living organism is an open thermodynamic system that exists due to solar energy. There is no life without energy. It is amazing how so far medicine has not used this absolute regularity to solve health problems! Solar energy goes through a series of stages of transformation and is stored in the mitochondria in the form of macroergs. It is macroergs that are the basis of the mechanisms of self-organization of a living system and ensure the system's viability (homeostasis, adaptation, reactivity, resistance, repair, regeneration, thermoregulation, compensation, etc.). At its core, the processes of self-organization of a living system are health mechanisms that maintain a low level of entropy. In the existing health care strategy, the impact on them is practically not provided, since the main goal of this strategy is to influence the pathogenesis processes. At the same time, as well as in any other mechanism,

energetic potential determines the degree of the mechanism's perfection – the more energy (given the mass), the more perfect the system works.

The provision on the sources and nature of energy that ensure the functioning of living systems and on the applicability of the second law of thermodynamics to them was expressed by E. S. Bauer back in 1935. He formulated the principle of "stable nonequilibrium"; it is continuous imbalance that is the cardinal difference between the living and the nonliving. Based on this premise, E. S. Bauer formulated the basic law of biology: "All and only living systems are never in equilibrium and due to their free energy, they constantly perform work against the equilibrium required by the laws of physics and chemistry under existing external conditions" [1]. The applicability of the second law of thermodynamics to living systems was also discussed by the outstanding physicist E. Schrodinger in his lectures given in 1943 at the University of Dublin [2].

The energetic potential of a living system can be determined if we take into account that its main part is aerobic mechanisms of energy formation. Determining the maximal permissible concentration of oxygen (MPC in $\text{ml}\cdot\text{kg}^{-1}\cdot\text{min}$), we obtain information on the energy potential of the bio system in question. From a physiological point of view, the MPC integrally characterizes the state of the respiratory, circulatory and metabolic functions, and from a biological point of view, the degree of stability (viability) of a nonequilibrium system – a living organism.

The direct determination of MPC with a load test is a rather complicated and dangerous procedure for the modern population. For this reason, in order to make it more accessible and safe, we have created a simple and cheap system for the rapid assessment of the MPC [3]. Our methodological approaches are based on systemic reactions that reflect the growth of aerobic energy potential – the expansion of the reserve of functions and their economization at rest. The simplest function indices are used, which characterize the functional reserve (power and respiratory indices) and function economization ("double product" and the recovery time of the heart rate after 20 squats in 30 s).

The weight-growth index is also included in the diagnostic system. The indicators are ranked, each rank has its own score, and the sum of the points characterizes the level of aerobic capabilities, i.e. in other words, health and vitality. It was found that the total score has a high correlation coefficient with maximum oxygen consumption (about 0.8). There are 5 levels of health.

Using this methodology to assess the body's energetic potential, we were able to obtain the patterns presented below.

RESEARCH RESULTS

The low complexity and low cost of using the indicated diagnostic system, its availability for qualification of the average medical staff, allowed conducting thousands of studies of practically healthy and sick people from 6 to 80 years old, which made it possible to identify and describe new phenomena of individual health [3]:

- the higher the level of health, the less likely the development of endogenous risk factors and manifested forms of coronary heart disease (CHD) and other diseases;
- there is a 'safe' level, or zone of health, above which neither endogenous risk factors, nor manifest forms of diseases are determined; the level received a quantitative characteristic: 12 MET for men and 10 MET for women;
- when an individual leaves the 'safe' zone of health, the *phenomenon of 'self-development' of the pathological process* is noted;
- with increasing opportunities for aerobic energy production, the reverse development of endogenous risk factors for coronary heart disease (CHD) occurs;
- having quantitative indicators, health can be managed (formed, maintained, restored);
- returning practically healthy people to the 'safe' zone of health is the most effective way of primary prevention of chronic non-communicable diseases ('preventive rehabilitation').

Thus, healthcare is able to solve the most pressing problems without using the technologies of 'management' of the disease.

DISCUSSION

In the process of life, the functions of a living system for various reasons can be disrupted and then a disease occurs. Where the disease is there is a cure. Allopathic medicine is at the heart of a modern healthcare strategy. Why did it get an advantage over other technologies for influencing health?

By the middle of the 19th century, a pronounced division into "empiricists" and "allopaths" appeared in medicine. Empiricists are all those who have followed the concept according to which a sick body needs only to help restore its natural self-organization and it will cope with the disease itself. Allopaths included those who used strong chemicals, surgery and bloodletting and followed the concept that the symptoms of the disease should be eliminated, and then the patient will recover. Behind allopathic medicine was a lot of money from banking tycoons and owners of the chemical (in the future pharmaceutical)

industry. Latest advances in science of that time had also greatly helped allopathy; namely, the invention of anesthesia and the introduction of aseptics and antiseptics, which made it possible to use surgery as a treatment method.

At that time, there was no strict standard by which medical specialists could be qualified. There was no organization that would do this. In 1913, the Rockefeller Foundation was organized, which began to formulate the standard of medical schools in favor of the absolute dominance of allopathic medicine in the curriculum and the complete elimination of all natural areas in it. Medical schools in America began to receive huge grants in exchange for appointing 1-2 people from the Rockefeller Foundation to the board of directors. And those, in turn, insisted on changing the medical curriculum, which now focused solely on its business – pharmaceutical medicine. Medical students began to study under the new program, in which the treatment of patients consisted only in the use of synthesized chemicals, expensive procedures and operations.

Allopaths began to call natural medicine unscientific, since at that time many successful natural methods could not be explained scientifically, while the effect of chemicals on the body they already were able to explain. Those schools, which did not agree to change the program so radically, were unable to receive a grant. Hence those schools could not compete with allopathic medical schools. Subsequently, part of the chemical industry turned into the pharmaceutical industry, and, having infiltrated the American Medical Association, they gained complete control over it. By that time, this organization began to accredit medical schools. As a result, only schools that received grants from the Rockefeller Foundation and accepted allopathy could receive accreditation.

For several decades, all of America and Europe have accepted allopathy as the only form of official medicine. In our time, it has become obvious that it is pointless to expect a significant improvement in health when financing mainly the scope of diagnostic and treatment assistance. Moreover, in healthcare practice, the structure of drug consumption weakly correlates with the pattern of morbidity. But even properly prescribed drugs often do not have the expected therapeutic effect. So, according to extensive research, most drugs are effective only in 25-60% of patients. For example, according to WHO, modern drugs do not provide a therapeutic effect in 75% of patients with arterial hypertension [4].

At the same time, our studies show that the high aerobic potential of the body is a reliable obstacle to the development of endogenous risk factors and helps to reduce the incidence of chronic non-communicable diseases and mortality from them.

Studies by many authors confirm our data on the possibility of using aerobic capabilities as an indicator of the body's resistance to pathogenic influences. Keteyian *et al.* [5] showed that each increase in the specific MPC by 1 ml is accompanied by a 15% decrease in the risk of death in men and women with coronary heart disease. Myers *et al.* [6] noted that a 1 MET increase in maximum aerobic capacity was accompanied by a 12% increase in the survival rate of men with cardiovascular disease. A group of Norwegian researchers [7], having examined more than 4600 practically healthy men and women, noted that women with a MPC lower than $35 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ in 5 times, and men below $44 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ in 8 times more likely had more common risk factors for the development of cardiovascular diseases. Moreover, each decrease in a specific MPC by 5 ml was accompanied by an increase in the severity and prevalence of risk factors for cardiovascular morbidity by 56%.

Even more convincing are the results of studies by American scientists who showed the dependence of mortality risk versus the maximum aerobic abilities of an individual (Fig. 1). When an individual's MPC indicator falls below a threshold of 10-12 MET, then mortality increases sharply [8].

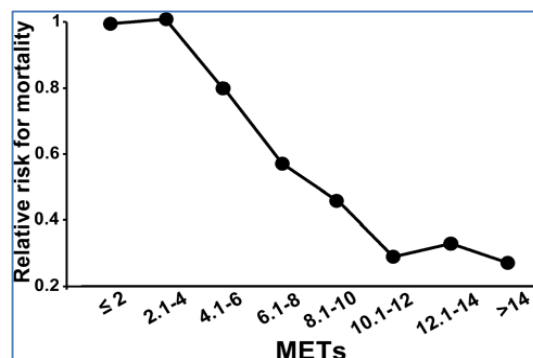


Fig-1: Risk of death among US was veterans depending on the MPC.

1 MET= $3.5 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ of mass of body [8].

Other studies have shown that the length of telomeres, with which life expectancy is linked, is directly proportional ($r = 0.78$) to the maximum aerobic abilities of the individual [9].

CONCLUSION

The thermodynamic concept of health convincingly proves that people get sick and die prematurely from losing their health, and chronic non-communicable diseases are the result of the energetic potential of the biosystem going beyond the limits caused by evolution (more health – less disease, and vice versa). The problem of formulating a new health paradigm is becoming relevant. Its essence lies in the predominant transition from the costly, but not justified from the point of view of maintaining the health of the

population, “the concept of continuous improvement of medical care to the population” to “the concept of monitoring, reproduction, preservation and strengthening of public health”.

Herewith, recovery (support of the energetic potential within a safe health zone) should be carried out continuously, and treatment if necessary. In order to improve health, it is necessary to form “health industries” in addition to the “disease industry” (medical institutions). The “Health industry” involves the development of a whole series of measures that help optimize the physical activity of the population (saturating the information space with relevant materials, training medical personnel in the field of ‘managing’ health, creating physical fitness infrastructure, tourist and recreational clusters, etc.). As a criterion for the necessity of involving an individual in the sphere of the “health industry”, as well as the effectiveness of these measures, the level of health determined by our methodology. As a criterion for the necessity of involving an individual in the sphere of the “health industry”, as well as the effectiveness of these measures, one can rely on the methodology for determining the level of health proposed in this paper.

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