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MEDICINE IN CRISIS OR IN FRONT OF NEW OPPORTUNITIES

The article presents the classification of medical sciences from a holistic perspective. Modern classification based on structural functionalism shows a lack of consistency. Holistic vision, based on role determinism, consider function as a role of the organ in biological variables determination. Biological variables play an organizing role in the overall functioning of the body and determine its physiological identity in health and disease. Holistic vision could be successfully applied in medical theory, diagnosis and education.

Keywords: holism, reductionism, classification, risky behavior, pathogenesis, teaching

Classic physiology is no longer sufficient for understanding the body functioning. Classical medicine is a part of the reductionist science that comes after descriptive medicine of Galenus. Reductionist medicine understands clearly how the organs work, but still cannot explain how life is possible and what is exactly disease. These deficiencies provoke the interest in holistic future of medicine presented by integrative physiology and systems biology. Both systems biology (www.systemsbio.org) and integrative physiology claim that their purpose is holistic explanation of the body functioning, the dispute between them concerns only the methods. The proponents of integrative physiology (Joyner and Pedersen, 2011; Joyner 2011; Noble, 2008), attack systems biology that it relies too much on genomics and clame that the solution lies in making integrative experiments to study the role of combined causative factors. But the crisis in modern medicine does not concerns empirical methods. The crysis it is mainly theoretical and hardly be solved by counter response of one empirical view by another nor by eclectic mixing of the different thesis as Pitt and colleagues offer (2011). Some criticisms to system byology are correct, but genomics could not be ignored in disease explanation. It is true that common genetic variants have limited predictive power to disease risk (Talmud et al., 2010) and knock-out animal models result in obesity only when stressed with high-calorie diet (Ouchi et al., 2010) but we cannot ignore the fact that the combination of high-calorie diet and genetic predisposition can explaine why some people become ill and suffer more that others in high-calorie conditions. So the debate between systems biology and integrative

physiology is in fact not about methods, it originates from the insufficiency of reductionist physiological theory. As descriptive science was not able to generate spontaneous reductionism, so reductionism can not naturally grow in holism. Sometimes science needs qualitative theoretical leap.

Holism is older than science.

The human mind needs understanding environment in its entirety and the lack of orientation creates anxiety. Nothing significant can be ignored in nature without a risk for survival. The main task of the brain is to think synthetically. Sometimes holism needs speculations but it does not contradict descriptive observations and reduced investigations. Holism gets facts from both observations and experiments and has no other tools for perceiving objective world. Holism does not explore the facts and functions, it uses them prepared by descriptive observations and reductionist experiments. Its main task is to understand the roles of body structures for life and disease. Its main method is finding consistency of the explanations based on facts and experiments. Holistic thinking does not produce evidence. It is a tool for creating hypotheses and understanding. Any holistical statement is true if and only if all the facts in the field are explained in consistent manner, even if they seem contradictory at experimental or obserational level. As it may seem plausible, holistic explanations can be rebutted by evidence that could not be explained or integrated into theoretibal body. Thus holistic statements are proved by every fact and experiment in the field, but none of them is enough separately to motivate any holistic statement.

Modern medicine is controversial.

It is well known that controversial results of the experiments are one of the biggest

problems facing modern medical theory. This lack of consistency can be found even in medical education. One believes that science is systematized knowledge based on one fundamental principle. The end of scientific activity is classification. Descriptive (deductive) classifications organises world in hierarchy of genus and species and seeks order in diversity. Reductionist (inductive) classification follow the principle of structural functionalism (the function is defined as the way the structure work) as main reductionistic belief is that we can understand the body by understanding its parts. First one is perfect for biology, second – for anatomy, physiology and surgery. None of them is compatible with pathophysiology and internal medicine. None of them explains live and disease as a whole. Nevertheless the structural functionalism is widely used in modern textbooks of physiology (see Guyton and Hall, 2000; Pocock and Richards, 2001) pathophysiology (see Huether, 2008; Lazenby, 2011a; McCann, 2011), and clinical medicine (see Fauci et al., 2008; McPhee and Hammer, 2006; Kumar and Clark, 2002), where organs are genuses and functions are species. One can easily find that anemia is classified as a blood disease, although it is functionally related to oxidation. Endocrine diseases are separated in a special category, although some of hormones serve metabolism, other stress-reactivity, third – water-electrolyte balance. These are examples of inconsistent classification. What is the consistent classification of life and disease?

Holism is based on role determinism. If we think the body as a hole, we can see organs as parts of functional complexes, composed by producers and consumers of biological

variables (Sarov, 2002). Biological variables are constructive, resultative, and integrative matter. They are constructive, because their alterations generate changes in the functional complexes. They are resultative, because they are result of functional complexes work. They are integrative because one variable is impossible without others and each variable integrates others as resources. The role of organs in functional complexes is to contribute to the maintenance of biological variables. All body functions are organized in the most fundamental functional complex that provides life (life is the most fundamental biological variable). At any separate time living body has different identity – a separate form of life (for example, sleeping body, running body, sick body, etc.). Nevertheless the body identities change, homeostatic variables remain almost the same in health and in compensated phases of diseases. So identities are in fact different scenarios of achieving homeostatic balance. (While consistency is the main gnoseologic aspect of the holisting mind, balance is the main ontologic aspect of the holistic matter). Therefore the medical holistic classification should put biological variables as genus, and functions – as species. Life is the most integrative function and needs all the variables in balance. Due to three-dimensional nature of the whole, body has three main groups of variables – substantial (tissues), functional (homeostatic variables) and organizational (behavioral variables). Each of them integrates variables from the lower classes and so one can structure the holistic classification in three main divisions:

1. **Tissue variables** are result from a functional complexes that generate tissue homogeneity (populations of identical cells).

1.1. Tissues arise from the differentiation of a progenitor cells. Genome of all cells in the body is both identical and tissue-specific. Each cell of the body has a non-specific functionality that is necessary for its existence and specific functionality. Medical sciences that operate at this level are *genetics and molecular biology*.

1.2. During their life-span cells are damaged and altered. This activates the

functional complex, which aims to restore tissue homogeneity. It is represented by immunity and inflammation. Medical science that operates at this level is *immunology*.

2. Homeostatic variables are the product of internal (vegetative) organs. They are three types – physical, chemical and organic.

2.1. The first two classes are combined in inorganic aspects of internal environment: *water content, osmotic pressure, acidity*. One should include here cleanse of the body from residual and unnatural products by liver and kidneys. Specific medical area that operates these parameters is *emergency medicine*.

2.2. Organic variables are integrated into *energy synthesis*. Energy production integrates oxygenation and metabolism via mitochondrial oxidative phosphorylation. So this class should be divided into two subclasses:

2.2.1. *Oxygenation* regulates oxygen content of the body by functional integration of the lungs, heart, blood vessels, platelets and erythrocytes.

2.2.2. *Metabolism* produces substrates for oxidative phosphorylation via functional integration of the gastrointestinal tract, liver, pancreas, muscle tissue and cellular metabolism.

Medical sciences that operate at level 2.2. are *physiology, pathophysiology, internal medicine and surgery*.

3. Behavioral variables determine adaptivity (survival and prosperity). Each individual adapts to the two types of environment – objective and subjective. Objective environment requires adaptation and subjective – socialization. Therefore, the behavioral variables are two types – social and adaptive

3.1. *Adaptive variables* determine the status of the individual in the objective environment. They concern control over events and ownership of objects. Respective body functions include sensation, analysis of information and movement. Medical sciences that operate at this level are *orthopedics, ophthalmology, otolaryngology, neurology, psychiatry and medical psychology*. Since adaptive behavior is implemented through the motions, behavioral functional complex consume energy and change homeostatic

variables synchronous, compensatory and anticipatory. In compensatory mode homeostatic variables change after movement and then return at its basic values. Synchronous mode activates during moderate continuous movement. When behavior is going to happen, homeostasis operates anticipatory. Behavior also affects homeostasis through *consumption*, thus behavioral malfunctions (for example, overeating) can provoke homeostatic disturbances. These two impacts (via movement and consumption) are the basic tenet for understanding diseases of risky behavior. Medical science that operate at this level is behavioral medicine.

3.2. Individual attitude to social norms defines *social variables* and result in socialization. The natural socialization in the wild occurs in reproductive behavior and sexuality. In addition, human socialization also includes communication of the social values and norms. Thus social variables should be divided into two parts:

3.2.1. Reproduction is an object of *sexology, andrology, obstetrics and gynecology*.

3.2.2. Values of the individuals and populations are objects of *public health*, as much as some norms and values can result in risky behavior (physical inactivity, overeating, alcohol drinking and smoking).

Holistic vision has important practical advantages. Described above medical classification organizes all medical fields but its logic can help diagnostics and medical education. When damaged, any of the producers in functional complex, activates specific symptoms as well as common compensatory mechanisms. So all different diseases of a functional complex are species of the same genus. As functional disorders manifest as disease symptoms, such a functional (holistic) classification would enable rapid orientation for genus and species of diseases and would accelerate and facilitate diagnostic process. This principle could be applied in the curricula of Physiology, Pathophysiology (Sarov, 2003) and Internal Medicine and students could understand it easier and take exams more successful (Sarov, 2011).

Holistic vision easily explains pathogenesis of risky behavior.

Holistic principle not only allows to improve the understanding and diagnosis of internal diseases, but also gives a unique insight to the pathogenesis of risky behavior (Sarov, 2011b). Common pathogenesis of risky-behavior-diseases starts with a chronic imbalance of the homeostatic variables because of malfunctions of adaptive and social behavior. Prolonged overload of homeostatic compensatory function forms minimal but progressively increasing structural damages of the blood vessels and functional exhaustions of the compensatory organs (fat tissue and pancreas). The magnitude of functional exhaustions depends on genetically inherited resistance of the organs under functional pressure. The combination of genome and risk exposure determines the duration of preclinical phase, as well as diversity of clinical forms, severity and rate of disease progression. For example, the pathogenesis of metabolic syndrome can be explained as follow: Social attitudes towards food as something very valuable and lack of exercise in modern social life are pathologic conditions that create permanent calorie overload. In its turn overload increase functional activity of the organs that reduces calorie excess and results in hyperinsulinemia and obesity, which potentiate each other (positive feedback). Hyperinsulinemia exhausts the pancreas, increases sodium retention and promotes cell proliferation. Obesity via

hyperlipidaemia and cytokines production is responsible for hypercholesterolemia and atherosclerosis. Individual differences in genetic resistance and additional risks determine whether the metabolic syndrome will develop into diabetes type 2, hypertension, ischemic heart disease or cancer, as well as the moment of clinical manifestation and severity of disease.

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