

The Biophysiscal Modeling of the Perturbation Theory

Janos Vincze ^{1*}, Gabriella Vincze-Tiszay¹

Health Human International Environment Foundation, Budapest, Hungary.

***Correspondence Author:** Janos Vincze, Gabriella Vincze-Tiszay, Health Human International Environment Foundation, Budapest, Hungary.

Received Date: August 25, 2023 | **Accepted Date:** October 20, 2023 | **Published Date:** January 04, 2024

Citation: Janos Vincze, Gabriella Vincze-Tiszay (2024). The Biophysiscal Modeling of the Perturbation Theory, *International Journal of Clinical Epidemiology*, 3(1); DOI:10.31579/2835-9232/020

Copyright: © 2024, Janos Vincze. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

The term „homeostasis” has been introduced by Cannon in 1929, meaning autoadjustment in order to maintain a certain level of morphological, biophysical and biochemical parameters, as well as the reestablishment of the disturbed equilibrium by returning to the initial state or an equivalent one. Hence, homeostasis is the ability to maintain the structure and functions of the living organism within optimal limits, on the basis of the adaptive requirements imposed by the surrounding environment. The most common structural perturbations occur as a result of accidents. The vast majority of accidents occur as a result of domestic, work, transport, sports and natural disasters. It is no coincidence that we have devoted a longer course of thought to psychic perturbations, because in the case of humans, psychic regulation is of decisive importance. Another large group of functional perturbations are allergic diseases caused by foreign substances in the human body. Another functional perturbation is intoxication. Toxin is any substance that is capable, even in small doses, to harm a healthy human body or to take their life. A classic example of the symbiosis of structural and functional perturbations is vascular occlusion due to atherosclerosis. Many long-lasting structural perturbations result in functional perturbations and similarly, long-lasting functional perturbations result in structural perturbations.

Keywords: perturbations; structural perturbations; functional perturbations

Summary

Homeostasis is one of the biophysics' major concepts. Its significance suffered modifications along the time. Initially, in the second half of the XIXth century, it was anticipated by Claude Bernard, who defined the internal environment, showing that the characteristic feature of the living organisms is the capacity to maintain the internal environment invariable, independently from the modifications of the external environment. The term „homeostasis” has been introduced by Cannon in 1929, meaning autoadjustment in order to maintain a certain level of morphological, biophysical and biochemical parameters, as well as the reestablishment of the disturbed equilibrium by returning to the initial state or an equivalent one. Hence, homeostasis was defined as an organism's ability to maintain the equilibrium states of the whole based on the coordinated biophysical processes. [1]

Hence, homeostasis is the ability to maintain the structure and functions of the living organism within optimal limits, on the basis of the adaptive requirements imposed by the surrounding environment. This implies complex control and anticipation mechanisms through which the organism and its constitutive systems autoadjusts the equilibrium level for the given situation, dynamic equilibrium between the disturbing and compensating factors. Homeostasis is a dynamic process of permanent adaptation, each of its sequences representing a new equilibrium which, in the following

sequence, will be at a different level, in accordance with the requirement, between the permissive limits of the systems reactivity.

Structural perturbations

The most common structural perturbations occur as a result of accidents. The vast majority of accidents occur as a result of domestic, work, transport, sports and natural disasters. Most serious injury accidents are caused by traffic. In terms of multiplicity, the number of domestic accidents is the most common, especially among the elderly population and children. Injuries resulting from suicide attempts must be mentioned. [2] In Hungary, the number of suicide attempts and suicides leading to death is extremely high. It is an unfortunate fact that criminals also cause a great deal of injury to their fellow human beings, and it is also sad that some are able to kill others.

It is imperative to emphasize the frequency of injuries that are practically barely perceived by humans, but meanwhile the cells, tissues and organs of the body do not forget. The human body could live for 120 years in its normal state, but in its life they suffer thousands of injuries, and then more serious accidents shorten their life. Every “successful surgery” shortens the human age by years. So any medical intervention reduces our chances of life. Similarly, every drug restores our health at a given moment, but we have to know that every drug acts as a foreign substance to the body and the body

fights it. Foreign substances accumulate in the body and reduce the efficiency of metabolism. [3]

It is no coincidence that we have devoted a longer course of thought to psychic perturbations, because in the case of humans, psychic regulation is of decisive importance. No person is able to withdraw from the many stressful effects they are exposed to. Stress is a condition of the human body with which they live together, and life without stress is unthinkable. [4] Stress is the adaptation of a person to society at every moment. Think about the fact that we have to obey tens of thousands of laws in society at all times, even if we live in complete isolation in our apartment. Stress is a condition that clearly shortens human life by decades.

Accidents occur within a very short time, the recovery process from more serious accidents is very lengthy, and even permanent structural changes often occur, and the injured person lives with partial physical disability for the rest of their life. Congenital formal disorders can be considered structural perturbation: six-finger syndrome, dislocated hip, etc.

Functional perturbations

One of the most characteristic forms of functional perturbations are infections. During infections, pathogenic microorganisms enter or come into contact with the human body, resulting in a negative interaction between the micro- and macro-organism, and this damages the functioning of the macro-organism. The infectious process spreads to most organs and tissues, and due to the invasive and aggressive ability of the microorganism causing the infection, the infection becomes common (sepsis). [5]

Another large group of functional perturbations are allergic diseases caused by foreign substances in the human body. The nature of the allergic reaction is determined by the site and mode of entry of the allergen. [6] The most common are inhalation allergens that can be: pollens, mold spores, feathers, flour, animal hair and dandruff, chemicals, dust, perfume, and so on. A multitude of contact allergens have been created nowadays due to the use of artificial chemicals in dishwashing, washing activities that create allergic reactions on human skin. A very common phenomenon is food allergy, which is related to substances that occur in the diet. Nowadays, it is a very common disease because in the preparation of food more than 60,000 additives are already used, the compatibility of which with the human body has not been tested. [7]

Inflammatory diseases can be considered functional perturbations. Inflammation is a non-specific response of the body to a wide variety of tissue-damaging effects (physical, chemical, immunological, etc.). During the inflammatory response, different degrees and types of effects only modify the duration and intensity of the body's response.

Another functional perturbation is intoxication. Toxin is any substance that is capable, even in small doses, to harm a healthy human body or to take their life. Thus, exogenous or endogenous substances are substances that are alien to the body or organs in terms of their quality or concentration, and therefore cause changes in function in the body, can be considered toxins. Toxins increase or decrease the function of cells and tissues, possibly even temporarily or permanently eliminate it, but they do not cause qualitative changes in the structure of organs. [8]

One of the most characteristic forms of functional perturbations is the formation of tumors. A tumor is a formula that results from the proliferation of tissue elements (cells) that make up the body. The characteristic feature of the tumor is the so-called autonomous growth; in this case, the tissue grows independently and unstoppably, detached from the coordination of the

body. So the reason is a qualitative change in the program of cell proliferation.

Symbiosis of structural and functional perturbations

In living organisms, the relationship between structure and function is reciprocal: the structure defines the function, and the function reacts to the structure, modifies and develops it, which again enables a higher level of function and activity.

A classic example of the symbiosis of structural and functional perturbations is vascular occlusion due to atherosclerosis. In the endothelium (intima) of the vessel wall, there is primarily lipid deposition, as a result of which the intercellular stock loosens, then the cells gradually become fat and a large amount of crystalline cholesterol is deposited in their environment, and the intima thickens above it. [9] In addition to vascular wall lesions, recurrent wall clots due to fibrin deposits (plaque formation) that gradually narrow or lead to the complete occlusion of the blood vessel are significant as the process progresses. The blood flow will be unable to perform its function, it will not be able to supply oxygen to the locally confined area. [10]

Narrowing of the blood vessel is already a serious danger, because very often the formed elements in the blood coagulate as blood clots – larger structural formulas. These block the narrowed blood vessel, which results in a heart attack. Failure to intervene quickly enough will lead to the death of the organism. According to international health statistics, cardiovascular diseases are considered the number one cause of death, accounting for almost 50% of deaths. [11]

Many long-lasting structural perturbations result in functional perturbations and similarly, long-lasting functional perturbations result in structural perturbations. Such examples include hypersecretion (gigantism) or hyposecretion (nanism) of the growth hormone.

The most classic example of the symbiosis of these two perturbations is the aging of the body. The aging process affects the structures and functions of the organism simultaneously. With aging, both in terms of changes in structures and functions, there is a new quality shift in structures and functions, when it requires the physician to consider advanced age when diagnosing disease. The symbiosis of these two perturbations is true for every organ of the human body and for all senses, and their combined effect creates the process we experience as we age.

References:

1. Vincze, J. (2015). The Capital Chapter of Biophysics. 5th. Ed. NDP P., Budapest.
2. Vincze J. (2021). Biofizikai vademecum. NDP K., Budapest.
3. Hoppe, W., Lohmann, W., Markl, H., Ziegler H. (1983). Biophysics. Springer-Verlag, Berlin.
4. Vincze, J. (2020). The Biophysical Modeling of the Apparatuses in the Human Organism. Lambert Academic Publishing, Berlin.
5. Vincze J., Vincze-Tiszay G. The Biophysics is a Borderland Science. Roum. J. Appl. Scien. Tech. (2)3:115–121.
6. Vincze, J. (2018). Medical Biophysics. NDP P., Budapest.
7. Sarson, E., Cobelli, C. (2014). Modelling Methodology for Physiology and Medicine. Elsevier P.
8. Vincze J., Vincze-Tiszay G.: The Human organism is a Biopsychical-Biopsychological System. Technium. 2020;2(7):29–35.
9. Vincze, J. Vincze-Tiszay, G. (2020). The Biophysical Modeling of the „Seven-Dimensional” Man. Int. J. Recent Sci. Res., 5(6):123–130.
10. Vincze J.: The Biophysics is a Borderland Science. Philosophy Study., 2021; 11(5):351–362.

11. Vincze J., Vincze-Tiszay G. (2020). The Biophysics is a Borderland Science. Roum. J. Appl. Scien. Tech.

Ready to submit your research? Choose ClinicSearch and benefit from:

- fast, convenient online submission
- rigorous peer review by experienced research in your field
- rapid publication on acceptance
- authors retain copyrights
- unique DOI for all articles
- immediate, unrestricted online access

At ClinicSearch, research is always in progress.

Learn more <https://clinicsearchonline.org/journals/international-journal-of-clinical-epidemiology>



© The Author(s) 2023. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.