

# THE ROLE OF BIOPHYSICS SCIENCE IN THE DEVELOPMENT OF PHARMACY AND MEDICINE

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**Introduction.** Biophysics as a science began to form in the XIX century. This is the science of the simplest and most fundamental interactions that underlie biological processes and phenomena. The main tendency of modern biophysics is penetration to the deepest, elementary levels that make up the molecular basis of the structural organization of the living.

**The purpose** of the investigation is to study the role of biophysics science in the modern pharmaceutical branch and its using in pharmacological, pharmaceutical and medical researches.

**Materials and methods.** In connection with the birth of the term "Biophysics", two names should be mentioned: Karl Pierson (1857-1936) and Jacques Arsen D'Arsonval (1851-1940). In 1892 Pierson proposed to call branch of science that has as its goal the application of laws of inorganic phenomena, or physics to the development of organic forms "Biophysics". D'Arsonval proposed and substantiated darsonvalization method in 1891. In 1882 (10 years before Pearson's book was published) he organized the department at the Collège de France, which he called the "Department of Biophysics". Its main theme was the study of the effect of alternating currents on bioobjects.

According to the decision of the International Association of General and applied biophysics, the sections of this discipline include: molecular biophysics, biophysics of membrane processes or cell biophysics, biophysics of photobiological processes, biophysics of the sense organs, biophysics of complex systems.

The theoretical construction and biophysics models are based on physical concepts of energy, force, types of interaction, on general concepts of physical and formal kinetics, thermodynamics, information theory. These concepts reflect the nature of the basic interactions and laws of the motion of matter, which, as we know, constitutes the subject of physics - as a fundamental natural science. Biological processes and phenomena are the focus of biophysics as a biological science.

In the early 30-ies of XX century an electron microscope appeared. Radioactive isotopes, an ever-improving spectral technique, X-ray structural analysis became effective tools for biological research. The sphere of application of X-rays and ultraviolet rays is expanding, electromagnetic oscillations are used not only as a means of research, but also as factors of influence on the biological objects. Physical

methods of analysis widely penetrate into biology and, especially physiology, electronic technology, pharmacy, pharmacology. The current stage in the development of biophysics is characterized by the fact that the problem of formulating initial theoretical concepts that reflect the fundamental mechanisms of interaction in biological systems at the molecular level is at the forefront.

**Results and discussion.** The study of deep biophysical mechanisms in connection with the physiological and biochemical features of the object creates a basis for the practical application of biophysical studies, in particular in pharmacy and medicine.

The solution of these problems is carried out both with the help of theoretical analysis, and with the help of a large set of physical, chemical and biological methods. Among the experimental methods, the leading role is played by X-ray structural analysis of protein crystals, high-resolution NMR spectroscopy of proteins and polypeptides in solution, methods of microsequencing proteins, molecular modelling methods.

Without a thermodynamic approach to the study of biological processes, it is impossible to correctly calculate the food ration for humans. The study of the biological processes rate makes it possible to establish the regularities of a number of biological phenomena: growth, reproduction, metabolism, not only in the normal organism functioning, but with pathological changes-bacterial intoxication, the effects of ionizing radiation, allergies, etc. The study of the cells and tissues permeability in the biophysical aspect allows pharmacologists and toxicologists to determine the patterns of absorption in the body and the elimination of various drugs from the body, etc.

**Conclusions.** So these days the research in the branches of physical-chemical biology and pharmacy in general and biophysics in particular are the following:

1. Study of the structure and mechanisms of gene expression;
2. Various aspects of cellular biology (including chromosomal-genetic studies, problems of cell differentiation and intercellular interactions);
3. Study of the structure of biopolymers (proteins, nucleic acids, polysaccharides and their complexes with each other and low-molecular ligands).