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INTEGRATION OF BIOPHYSICS AND BIOLOGY IN MEDICAL UNIVERSITIES

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Abstract
Biophysics occupies a special place in the system of theoretical disciplines taught in medical universities. It acts as a bridge between the exact sciences and the biological and medical sciences. The exact sciences will form special thinking in future doctors. This, in turn, contributes to a deeper understanding of the laws of norms and pathology in the human body.

Keywords: Medicine, Physics, Biology, Biophysics, Cell, Nanobiophysics, Quantum Biology, Synthetic Biology.

Introduction

The twenty-first century is characterized by the rapid development of specific sciences resulting from the combination of various disciplines, such as physics and biology. One such discipline is biological physics or biophysics.
Biophysics is a field of science that seeks to unravel the mysteries of life by applying the laws of physics to living organisms and biological processes. This science acts as a bridge between medicine, biology and physics, helping us understand the complex processes in living systems. Biophysics involves not only theoretical knowledge, but also practical experiments and the use of modern technologies. We will study the basic concepts of biophysics, its importance in human life and modern experimental methods.

The basics of biophysics include:

- search for general principles of interactions of biological significance at the molecular level;
- explain the essence of molecular interactions using the laws of physics and chemistry;
- the application of mathematical achievements to the solution of biological problems;
- develop generalized concepts that correspond to the biological phenomena described.

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In the present stage of biophysics development, there have been fundamental changes, primarily associated with the biophysics of complex systems and the development of molecular biophysics. It is in these areas that general results dealing with the dynamic behavior of biological systems and the mechanisms of molecular interaction in biostructures have been obtained, on the basis of which their theoretical base in biophysics has been formed.

Currently, in research in the field of physics, biology, and in particular biophysics, the following issues are prioritized:

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

Foundations of biophysical expertise include the following aspects:

- To examine the effect of physical factors on the body. To study the biological effects of ionizing and ionizing radiation.
- Analysis of the activity of sensory organs, such as the optics of the eye.
- Analysis of the activity of organs of movement, respiration and circulatory organs.
- Development of physical methods for the study of biological systems.
- To reveal common behavioral patterns of explicit disproportionate systems.
- Theoretical substantiation of the thermodynamic foundations of life.
- Scientific Interpretation of Individual and Evolutionary Development Phenomena.
- Clarify the bonds between the structure and functional properties of biopolymers and other biologically active substances. creation and theoretical substantiation of physicochemical methods for the study of biological objects.
- Physical interpretation of functional phenomena such as the appearance and distribution of nerve impulses, muscle contraction, perception, and photosynthesis.

CURRENT DIRECTIONS OF BIOPHYSICS

Nanobiophysics

The study of biological systems in nanophysics. This trend is leading to the development of new fields such as nanomedicine and nanodiagnostics.

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Quantum biology

Study of the effects of quantum mechanics in biological processes. For example, photosynthesis and magnetic fields are used to explain the mechanisms by which they are perceived.

IT Biophysics

The study of complex biological systems through computer modeling. This method is used in areas from drug development to predicting the course of diseases.

Optogenetics

Technology of controlling genetically modified cells using light. This method has great potential in the study of the nervous system and for the treatment of neurological diseases.

FUTURE AND PROSPECTS OF BIOPHYSICS

Personalized medicine - By studying the genetic and molecular profile of each patient using biophysical techniques, it will be possible to develop individual treatments for each individual in the future.

Quantum sensors - New generation of biosensors based on the principles of quantum mechanics is being developed. They allow the detection of very small amounts of biomolecules, which is important for the early detection of diseases.

Neurointerfaces – Technologies to establish direct communication between the brain and computer are emerging. This can give paralyzed patients the ability to move around and make it easier to administer artificial organs.

Synthetic biology - significant progress is being made in the creation of artificial biological systems and organoids using biophysical methods. This has led to new drug testing
opens up new opportunities for disease and modeling .

Conclusion

Thus, biophysics is the science of the simplest and most basic interactions based on biological phenomena. The theoretical structure and models of biophysics are based on physical concepts of energy, force, types of interactions, general concepts of

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physical and formal kinetics, thermodynamics, information theory. These concepts reflect the essence of the basic interactions and laws of motion of matter that are known to constitute the science of physics as the basic natural science. The main focus of biophysics as a biological science is biological processes and phenomena. The main trend of modern biophysics is to penetrate into the deepest, elementary levels that constitute the molecular basis of the structural organization of living things.

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