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# **PROBLEMS OF SOLVING GLOBAL PROBLEMS OF HUMANITY**

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## **BIOCHEMICAL SIGNIFICANCE OF PHOSPHOLIPIDS AND SPHINGOLIPIDS FOR THE HUMAN BODY**

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Lipids are the main components of the homeostatic function of the human body, which play a significant role in vital processes. Lipids (from the Greek lipos - fat) of the human body are a large group of fat-like substances and fats formed by phosphoesters and glycoside bonds. Their common property is solubility in polar solvents and inability to dissolve in water, and their presence in all living organisms. The main concentration of lipids in the human body is found in the liver, nervous tissue, heart, kidneys, and blood. Complex lipids of the human body include: phospholipids, glycolipids, sphingolipids, lipoproteins, lipopolysaccharides.

**Objective.** To deepen the knowledge of the course of fundamental biochemical processes in the human body, to determine the main functions of complex lipids, to determine their biochemical role.

**Materials and methods.** The research is based on the study of scientific articles that describe the biological significance of complex lipids, namely phospholipids and sphingolipids. Theoretical analysis of such methods of studying the structure and functions of phospholipids and sphingolipids as: liquid chromatography, ion-exchange chromatography, gas chromatography, fluorescence microscopy.

**Results and discussion.** Phospholipids are the most important components of lipoproteins, surfactants, and cell membranes. They are composed of two higher fatty acids linked by an ester bond to glycerol. Because of their amphiphilicity, phospholipids spontaneously form bilayers in aqueous media, and they are the main components of the human cell membrane.

In addition to their building function as part of the bilayer, phospholipids affect cell behavior. They regulate active physiological processes, such as exocytosis, chemotaxis, and cytokinesis. Despite their simple chemical structure, phospholipids, such as phosphatidylcholine and phosphatidylserine, have a highly developed ability to transmit signals. The stability of chemical and electrical gradients supports the vital activity of a human cell.

Phospholipids are also precursors of eicosanoids. This is a family of compounds whose precursors are eicosan fatty acids. Eicosanoids regulate many processes in the human body, such as inflammatory and allergic processes, blood clotting, and muscle contraction. Phospholipids also make fats available for digestion and absorption by dispersing them in water.

In addition, phospholipids are contained in medications used in the treatment and prevention of liver, cardiovascular, and digestive system disorders.

As for sphingolipids, they are a class of membrane lipids that exhibit structural and signaling properties in the human body. Modern research on sphingolipids emphasizes their importance as signaling molecules in the pathogenesis of bacteria, fungi, and viruses. They regulate the balance between microbes and hosts during microbial pathogenesis.

In cells, most sphingolipids, such as ceramides, regulate stress response, cell proliferation, apoptosis, cell differentiation, insulin resistance, cancer, and aging. Fungi produce their own sphingolipids during pathogenesis, while bacteria and viruses use the compounds in the human body upon contact to harm it.

Sphingolipids, such as sphingomyelins, are components of the plasma membrane and myelin sheath that covers axons, thereby ensuring cell functionality and stability, as well as the rapid transmission of nerve impulses. And sphingosine-1-phosphate is involved in the regulation of the immune response, i.e. modulates the activity of cells of the human immune system.

In lipidosis, sphingolipids accumulate, resulting in Niemann-Pick, Gaucher disease, etc.

**Conclusions.** Phospholipids and sphingolipids: essential chemical compounds of the lipid class, whose multiple biochemical functions are vital for the human body; essential components of cell membranes, their main functions are signaling and structural; involved in signal transduction by the nervous system, regulation of the immune system (immune response), blood clotting and fat digestion. The study of phospholipids and sphingolipids is developing dynamically and has the potential to understand fundamental biological processes and develop new diagnostic and therapeutic methods.

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