A characteristic feature of biological membranes

Baxtiyor Baxshilloyevich Toxirov
Muhayo Bafoevna Tag'aeva
Dilbar Abdurazoqovna Razoqova
Bukhara State University

Abstract: Studying the structure of biological membranes in the article, we will look at the various components of the plasma membrane, their functions, diversity and how they make the cell changeable, receptive and work together to create a safe boundary around the cell.

Keywords: membrane, prokaryotes and eukaryotes, lipid, globular proteins, phospholipids, glycolipids

INTRODUCTION

Biological membrane is an important functional unit of the cell. In general, disruption of membrane function leads to disruption of normal functions in the body. Carbohydrates, proteins, and lipids, which are components of the membrane, each have their own function. Quantitative change of these also leads to disruption of membrane activity. The selection function is the most important function of the membrane, and it is one of the most important features of not only the cell, but also the whole organism. The change of this one small membrane affects the whole organism. Changes in the membrane are mainly caused by radicals. Antioxidants are used to prevent these changes [1].

MAIN BODY

Membranes are complex and highly specific structures that define the vital process of the cell. Membranes control the entry and exit of substances into the cell, the biochemical processes associated with membranes, and the exchange of substances (metabolism) in the cell through the enzymes situated in the membranes [2-6]. Membranes perform a limiting function. Molecules of various substances (for example, proteins) have specific properties only as a result of their arrangement and interaction in a certain order. Such a relationship of substances is observed in biological membranes.

Currently, two types of cellular structure are distinguished: prokaryotes and eukaryotes. Prokaryotic cells are cells that do not have a nuclear envelope and DNA is freely lying in the cytoplasm. Prokaryotic cells include some bacteria and algae. The main majority of cells of living organisms are eukaryotic cells, in which a nucleus is formed. In these cells, a complex nuclear envelope separates chromosomes from the cytoplasm. Eukaryotic cells are rich in membrane structures [7-13], and

these membranes perform various functions. The plasma membrane, which forms the outer layer of the cell, determines the connection of the cell with the external environment. Membranes inside the cell (cytomembranes) form mitochondria that synthesize ATF, lysosomes that break down certain substances, endoplasmic reticulum that synthesizes protein, fat, carbon water and chemical substances necessary for the cell, plate-like complex, nuclear envelope and other structures.

Biological membranes are a 6-10 nm thick lipoprotein structure forming the cell membrane, cell membrane organelles and nuclear envelope. About 40% of biological membranes are composed of lipids and 60% of proteins. Lipids are different, among them phospholipids (glycerophosphates), sphingomyelin occupy a special place. Lipid molecules are arranged parallel to each other in two layers, their hydrophilic (polar) parts are facing outward, and their hydrophobic (nonpolar) parts are facing each other. In biological membranes, proteins are located between lipid molecules. Figuratively speaking, "protein molecules float in lipid lakes" [14-17].

In addition to proteins, lipids, biological membranes hold carbohydrates, inorganic ions and water. The proteins that make up the membrane are structural receptors and globular proteins. Globular proteins form enzymes and are important in the transport of substances through the membrane.

The main function of the membrane is to control the transfer of substances. Hundreds of different substances pass through the cell membrane in one and two directions at the same time. The plasma membrane must transfer and retain substances necessary for the cell and free from unnecessary substances by diffusion [18-21]. Mass transfer occurs only when there is a concentration gradient (concentration on one side of the membrane and concentration on the other side), and this situation continues until the same concentration of the substance is reached on both sides of the membrane.

Types of diffusion

Diffusion				
Passive			Active	
Ordinary diffusion	Lightened up diffusion	Active Transport	Primary Active	
			Secondary Active Transport	Symport
				Antiport

Diffusion transport and its types

Diffusion transport takes place under the influence of osmotic forces, that is, it is related to the concentration difference (gradient) of the transported substance. A temporary difference in the concentration of substances in the unstructured environment (for example, the internal and external liquid environment of the cell) is observed, for example, their transfer from another part to this part or their formation with the help of enzymes located in this part. With the help of diffusion, substances are transferred from the zone of production to the zone of consumption. Diffusion in

a structured medium membrane occurs due to the difference of substances on the two sides of the membrane [22-25]. For example, the differences between the internal and external environments of the plasma membrane or the internal and external environments of the mitochondrial membrane. There are two types of diffusion - simple (passive transport) and facilitated (facilitated transport). Simple diffusion or carrier-free diffusion is determined by the solubility of transported substances in the medium or membrane substances (especially in its lipid layer) and the concentration gradient. If an excess amount of substances accumulates in some parts of the unstructured environment - cell sap, intercellular fluids, all water-soluble molecules mix by simple diffusion. Small biomolecules - water, CO_2, O_2 [26-28], as well as some ions, glucose and maybe other substances can pass through the membrane by simple diffusion. If foreign substances are lipophilic, they can pass through the membrane by passive transport. The cell membrane is a great barrier to the passage of substances from one place to another, but without pores, it is not considered a completely closed barrier. One of the main functions of membranes is to control the passage of substances. For example; the plasma membrane must bring in the necessary substances into the cell, keep them, and leave them alone. Hundreds of different substances pass through the cell membrane in both directions at the same time. There are three ways of substances passing through the membrane. Normal diffusion, facilitated diffusion, and active transport methods are distinguished.

Biological membranes are composed of proteins and lipids and control the metabolism of cells, as well as the development of organelles in the cytoplasm of cells.

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The metabolic function of biological membranes is related to the enzymes located in them. Biological membranes are special barriers, because they separate the cell from the external environment, cell organelles from the cytoplasmic matrix. Although they have a certain hardness, they are also elastic.

The exchange of substances in biological membranes occurs through simple, facilitated and active diffusion. Oxygen, carbonic anhydride and water exchange is stimulated by normal diffusion. Facilitated diffusible substances are transported by proteins. Activated diffusion occurs with the expenditure of energy.

Biomembranes are composed of fats, proteins and carbohydrates. Membrane components are connected by noncovalent bonds, which determines their relative mobility. The liquid state of the membrane depends on their unsaturated fatty acids. Membrane proteins are also mobile. If they do not penetrate deep into the membrane,

they float in the lipid layer [34]. Therefore, the membranes have a liquid-mosaic form. The ratio of fats, proteins and carbohydrates depends on the type of biomembranes. For example, ¾ of myelin is fat, the inner membrane of mitochondria contains a lot of proteins, and the outer layer of plasma membrane contains carbohydrates. The composition of lipids in membranes depends on their cell and tissue specificity. Their basis is formed by phospholipids (phosphotidylcholine, phosphotidylethanolamine, phosphotidylserine, cardiolipin, sphingomyelin), followed by glycolipids and cholesterol. Minor components of the membrane include ubiquinone, tocopherols in mitochondrial membranes.

The main part of membrane proteins are enzymes. Therefore, the greater the enzymatic activity of the membranes, the greater the amount of proteins in it. Myelin contains 20% protein. The inner membrane of mitochondria with very high enzymatic activity contains 75% protein [35].

Carbohydrates in biomembranes are not free. They are found in the form of glycolipids combined with lipids or glycoproteins combined with proteins. The carbohydrate part of glycoproteins is located on the surface of the cell and forms the glycocalyx.

A characteristic feature of phospholipids and glycolipids molecules is their amphiphilicity. Glycolipids molecule is formed from a carbohydrate part at the hydrophilic end, while the hydrophilic end of phospholipids is formed from a phosphate residue with choline, ethanolamine, or serine attached to it [36]. This property of structure and physico-chemical properties determines the place of phospholipids and glycolipids in the structure of biological membranes; the main part of the membrane is the lipid bilayer.

Several different models describing the structure of biomembranes have been proposed. The first model is the "sandwich" model proposed by Daniel and Dawson (1931); according to it, the membrane consists of a lipid bilayer, the hydrophobic part of lipids is located in the middle of the membrane, and the protein parts are located on both sides of the lipid layer. According to the second model, the hydrophobic tail part of lipids and proteins are intertwined with each other like carpet threads, and their stability is ensured not by electrostatic force, but by hydrophobic bonds [37]. According to the third type of model ("mosaic") membranes are composed of protein molecules, and the spaces between them are covered with lipids.

In addition to proteins, lipids, biological membranes hold carbohydrates, inorganic ions and water. The proteins that make up the membrane are structural

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cell from the external environment [38-40], cell organelles from the cytoplasmic matrix. Although they have a certain hardness, they are also elastic.

Metabolic substances of cell organelles pass through biological membranes. If these substances move in the direction of low concentration and this transport is without the participation of energy, such transport is called passive transport (diffusion). Such transport of substances depends on the chemical gradient of this substance.

Diffusion transport can also be associated with special conducting substances. These substances have a protein nature and are specific for the substance (substrate) passing through the membrane. These substances form complexes with the substrate and ensure rapid passage of substances through the membrane.

CONCLUSION

To conclude, the biological membrane is a key functional unit of the cell and interruption of membrane function causes disturbance of normal bodily functioning.

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To conclude, the biological membrane is a key functional unit of the cell and interruption of membrane function causes disturbance of normal bodily functioning. Specific purpose of each the membrane's components, carbohydrates, proteins, and lipids are studied as well as the changes in these quantities affect membrane functioning. It is clear that the selection function is the most significant function of the membrane, and it is one of the most important characteristics of entire organism. The alteration of small membrane has a big impact on the entire organism. Radicals are the primary source of membrane changes. To avoid these alterations antioxidants are utilized.

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