Original Article

The mechanism of information transmission in living organisms

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Abstract

Background: According to modern ideas, in all organisms there is a single integrated system consisting of separate interrelated supramolecular structures localized both in the intercellular and intracellular spaces [1]. Extracellularly localized structures such as extracellular matrix, various adhesive sites; the main intracellular supramolecular structure is the cytoskeleton system that affects the work of many subcellular structures, including the nucleus and the genetic apparatus of the cell. In this aspect, the plasma membrane (PM) of the cell is a separate supramolecular structure; on the one hand it distinguishes, and on the other hand combines all these supramolecular structures into a single integrated system of bioregulation (ISB). It is important to note that in the PM there are numerous systems that determine the vital activity of not only individual cells, but also their cooperative interaction with each other. As an example, we can cite ion channels, ligand-receptor complexes, enzyme-substrate systems, etc. It is assumed that the work of the ISB can be regulated mechanically as well, due to the forces of tension, pressure, contact, and so forth arising in separate supramolecular structures. What is the source of these forces? Any living organism is a dissipative non-equilibrium system that constantly experiences the influence of various fields and substances from the outside world, adapting at the same time and adjusting to constantly changing conditions.

Aims: In our view, the main structure that performs the function of a matrix that perceives such signals from the environment is the water of biological fluids.

Methodology: As the results of numerous works of recent decades show, water is precisely the compound that is capable of dynamically responding to changes in its structure to the effect of various physicochemical factors. For example, a change in the conformation of the receptor can occur both in direct interactions with the hormone and in the action of water structures formed in its presence [2].

Results and discussion: An important moment in the concept of this mechanism of information transfer is the constant ability of organisms to perceive new information. This is possible only if there is a device in the ISB that ensures the destruction of the already perceived information. According to our concept, such a function has a supramolecular structure localized on the surface of the membrane, which is a glycosylated, lipid-containing protein-peptide complex (PPC). Biologically active peptides in this complex are products of protein proteolysis. Certain isoforms of serum albumin modulate the action of peptides due to their folding, ensuring the maintenance of a certain conformational stability of the formed PPC. The biological effect of this supramolecular structure is

characterized by the ability of PPC in ultra low doses to influence all the basic biological processes - cell adhesion, migration, proliferation, apoptosis, and differentiation.

Conclusion: It should be noted that PPC data can stimulate the processes of recovery and repair in pathologically altered tissues due to activation of cellular sources of regeneration (stem cells).

References

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