

MODERN THEORETICAL CONCEPTS OF THE EFFECT OF IONIZING RADIATION ON PLASMA MEMBRANES

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The article describes modern theoretical concepts of the causes and possible molecular mechanisms of the effect of ionizing radiation on the cytoplasmic membranes of living organisms.

Keywords: cytoplasmic membrane, ionizing radiation, lipids, proteins, peroxidation.

All living organisms, being a part of the biological system, are constantly exposed to various environmental factors. Biotic, abiotic, anthropogenic factors can have both a positive and negative impact on living organisms. However, the force of the influence of these factors can vary and has a different effect on biological objects.

One of the abiotic factors that can have a big impact on living organisms is ionizing radiation. The sources of radiation can be as natural as artificial ones.

However, any ionizing radiation, irrespective of the source of radiation, can have a detrimental effect on living organisms. This type of radiation can affect organisms, both at a macroscopic and microscopic level. When the cells are damaged by ionizing radiation, the cytoplasmic membrane assumes the first impact. The irreversible changes in the membrane can lead to structural changes and cell death, because the main functions of the cytoplasmic membrane and its structure will be violated [1].

Plasma membrane is a complex system, which consists of proteins and lipids. Plasma membrane performs many different functions: transport, barrier, energy, receptor, enzymatic, and others. All these functions are aimed at maintaining the life of the cell and its normal functioning [4].

The specificity of radiation-chemical changes under the influence of ionizing radiation in the main components of biological membranes, as well as the features of radiolysis of these components in water, are of great scientific interest.

It is shown that under the influence of ionizing radiation in proteins, the molecular mass can decrease, the secondary and tertiary structure may break down, aggregates and crosslinks can be formed. Lipids enter the process of peroxidation, which leads to the formation of an aldehyde, which can have a detrimental effect on the structure and function of proteins [2, 3].

While the technology is developing and the environmental conditions are getting worse, more and more living organisms are exposed to ionizing radiation. The cytoplasmic membrane is a structure of every living cell. In this case, under the influence of ionizing radiation, irreversible changes in the membrane can lead to structural changes and the cell death. Therefore, a detailed study of the mechanisms and consequences of exposure to ionizing radiation at the molecular and cellular level provides the basis for preventing and minimizing such effects.

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