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CHANGES IN LIPID PEROXIDATION AND ANTIOXIDANT SYSTEM IN PATIENTS WITH COVID-19 ASSOCIATED PNEUMONIA

Чабан Тетяна Володимирівна,

доктор медичних наук, професор,
професор кафедри інфекційних хвороб
Одеський національний медичний університет

Павленко Олена Віталіївна,

кандидат медичних наук, доцент,
доцент кафедри інфекційних хвороб
Одеський національний медичний університет

Бочаров Вячеслав Михайлович,

асистент кафедри інфекційних хвороб
Одеський національний медичний університет

Чубач Марія Іванівна,

асистент кафедри інфекційних хвороб
Одеський національний медичний університет

It is known that the integrity of cells as morphological and functional formations, their adaptive reaction in response to changes in the external environment, including the interaction of cells of the immune system, is provided by membranes. The mechanism that causes changes in the structure of membranes and, consequently, the functional state of cells, is considered to be free radical reactions of lipid peroxidation (LPO). The processes of free radical lipid peroxidation are assigned the role of a universal reaction that provides an adequate response of the body to the impact of external factors due to changes in the speed of movement of receptors on the surface of membranes, the activity of membrane-bound lipid-dependent enzymes, the level of cyclic nucleotides, inhibition or activation of the processes of transcription and RNA synthesis, etc. [9].

The aim of the work is to determine the level of lipid peroxidation and the state of antioxidant protection of cells in the dynamics of the disease and depending on the characteristics of the clinical course of COVID-19 associated pneumonia.

During the study, it was found that fluctuations in the intensity of free radical lipid peroxidation affect almost all cellular functions, which is associated with a change in the ratio of membrane lipids, the accumulation of lipid peroxidation products and, ultimately, a change in the activity of membrane-bound enzymes [1 - 4].

An analysis of the results showed that pneumonia, different in clinical course and outcomes, also differ in the nature of free radical reactions. Changes in the functioning of the antioxidant system (AOS) are also associated with the clinical course

of pneumonia. It was revealed that different clinical forms of pneumonia were distinguished by a peculiar dynamics of AOC indicators. The inflammatory process in the lungs proceeds with a significant intensification of the processes of free radical oxidation of lipids, with a change in the state of the AOS. At the same time, the level of lipid hydroperoxides, which are the primary relatively stable LPO products, reflects the severity of the pathological process, and the dynamics of lipid hydroperoxides, malondialdehyde, superoxide dismutase characterizes the clinical course and outcome of COVID-19 associated pneumonia. LPO processes lead to the intensification of the metabolism of arachidonic acid with an increase in the content of leukotrienes, prostaglandins, thromboxanes and other biologically active substances that support the inflammatory process, impair microcirculation, disrupt the processes of movement of ions through the membrane, reduce the energy supply of the cell due to damage to mitochondria, and change the functioning of the cell genome. As a result of an increase in the level of lipid peroxidation, the state of immune defense changes, the regulatory effects of lymphocytes are violated [5 - 8].

AOS components, reducing the level of lipid peroxidation, reduce the formation of toxic products, help reduce intoxication, normalize the function of membranes, membrane-dependent enzymes, which is confirmed by the dynamics of clinical, instrumental and laboratory examination of patients. It has been shown that the general mechanism of the development of the inflammatory process in the lungs is lipid peroxidation and associated changes in the AOS, causing the development of a universal membrane pathology in case of redundancy of the first and insufficiency of the second. The latter includes damage to the receptor apparatus of the cell, changes in the response to neurohumoral and hormonal stimuli, disturbances in the activity of various enzyme constellations, and the cell genome. Since lipid peroxidation, which changes in the process of cell adaptation to new conditions of existence, including the introduction of SARS-COV-2, is a phylogenetically older system for maintaining homeostasis than the antioxidant and immune systems, this causes the possibility of rapid AOS depletion, the appearance of secondary immunodeficiency conditions, dysfunctions of other organs and systems, formation of conditions for the development of fibrotic processes. A relationship was found between the level of primary lipid peroxidation products and clinical variants of the course of the disease, as well as the severity of immunity disorders. Determination of the content of lipid hydroperoxides in erythrocyte membranes makes it possible to predict the course and outcome of pulmonary pathology and to objectify the severity, to judge the possibility of formation of foci of pneumofibrosis. Under the influence of lipid peroxidation, the structural and functional organization of biomembranes changes, causing changes in the effector and regulatory functions of immunocompetent cells. The severity of lipid peroxidation and depletion of AOS are closely related to the degree of immune disorders. The LPO level and the state of AOS have a decisive influence on the course and outcomes of COVID-19 associated pneumonia.

The results obtained made it possible to formulate indications for prescribing antioxidant and immunomodulatory drugs. The use of antioxidants and immunomodulators in the complex therapy of patients with pneumonia ensures the

correction of the level of lipid peroxidation and AOS, indicators of immune protection and the maximum therapeutic effect.

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