

## **HYPERBARIC OXYGEN: PATHOPHYSIOLOGICAL ASPECTS OF THE TOXIC EFFECT**

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The action of hyperbaric oxygen (oxygen under increased pressure) on the human body is one of the modern means of intensive therapy for various types of pathology, in the emergence and development of which hypoxia or anaerobic infection plays a certain role. This method is used in acute hypoxic diseases (carbon monoxide poisoning, barbiturates), as well as in many chronic and refractory diseases with tissue hypoxia or intractable infection. Currently, it is relevant to use this method for the treatment of COVID-19 disease

**Aim.** The purpose of this review is to provide an overview of the mechanisms of development of toxic effect and complications of hyperbaric oxygen.

**Materials and methods.** Data analysis of literature and Internet sources.

**Results and discussion.** During a hyperbaric oxygen session, a number of factors act on a person, the most important of which are increased density of compressed gases, increased partial pressure, primarily nitrogen and oxygen, changes in the physical conditions of sensory perception (vision, hearing, etc.), dynamic change the nature of these factors during compression and decompression. All this significantly affects the functional life support systems of the body, and the respiratory system experiences the greatest stress. Inhalation of pure oxygen for less than 1 day or long-term inhalation of 60% oxygen mixture does not cause such drastic disturbances in the body that would be more dangerous than hypoxia itself. However, with the use of high oxygen concentrations, as well as with prolonged oxygen therapy, especially in the elderly, some pathophysiological effects may be observed, leading to complications. Respiratory arrest or significant hypoventilation with hypercapnia may occur already at the beginning of oxygen therapy in patients with a decrease in the sensitivity of the respiratory center to an increase in the concentration of CO<sub>2</sub> in the blood. With prolonged inhalation of mixtures with a high concentration of oxygen or pure oxygen, oxygen intoxication (hyperoxia) may develop. In the respiratory tract, hyperoxia causes irritation and inflammation of the mucous membranes, the ciliated epithelium is damaged, the drainage function of the bronchi is impaired, and their resistance to gas flow increases. In the lungs, the surfactant is destroyed, the surface tension of the alveoli increases, micro- and macroatelectasis, pneumonitis develops. The vital capacity decreases and the diffuse capacity of the lungs decreases, the unevenness of ventilation and blood flow increases. The leading manifestations of oxygen intoxication are signs of damage to the respiratory system and central nervous system.

**Conclusions.** Most of the observed complications can be predicted and prevented. Particular attention should be paid to the technique of the first sessions, during which to test the features of the barofunction of the eustachian tubes, reactions to hyperbaric oxygenation, hemodynamics and respiration.