

**HYPOXIA AND THE BODY'S ADAPTATION MECHANISMS TO IT****Z.B.Xosilova**

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**Abstract.** Hypoxia (from the Greek hypo - under, below, oxii - oxygen, oxygen starvation) is a decrease in the amount of oxygen in the body or in individual organs and tissues. Hypoxia can occur when the inhaled air lacks oxygen for various reasons (for example, when climbing to a height, working underground, when foreign bodies are blocked in the respiratory tract, during bronchial spasm, and in other cases).

**Keywords:** Hypoxia, unhealthy processes, oxygen, important elements, hypoxic hypoxia, hemic hypoxia, circulatory hypoxia, tissue hypoxia.

Hypoxia is very common in our everyday life and is the basis of various unhealthy (pathological) processes. Depending on the degree of occurrence in the body, hypoxia can be acute, transient, and chronic. Hypoxia is an insufficient supply of oxygen to the tissues of the body. This process can occur as a result of disruption of various physiological and pathological processes. We know that oxygen is of great importance for the human body and is one of the most important elements necessary for life. It is precisely the lack of oxygen that negatively affects the functioning of many systems in the human body. Hypoxia is divided into the following main types according to its origin:

1. Hypoxic hypoxia
2. Hemic hypoxia
3. Circulatory hypoxia
4. Tissue hypoxia

Hypoxic hypoxia is a type of hypoxia that develops as a result of a decrease in the amount of oxygen in the alveoli and a violation of the passage of oxygen through the blood to the tissues, resulting in a decrease in the amount of oxygen reaching the body. Hypoxic hypoxia occurs in situations such as a decrease in atmospheric pressure, impaired ventilation, lung diseases, and a decrease in the amount of oxygen in the atmosphere. Hypoxic hypoxia can be dangerous for the body.

Hemic hypoxia is one of the types of hypoxia that occurs when the amount and quality of hemoglobin decreases. In this process, oxygen enters the blood through the lungs in sufficient quantities, but it occurs as a result of an insufficient amount of hemoglobin that performs the transport function.

Circulatory hypoxia is a type of hypoxia that occurs as a result of a sharp drop in blood pressure, slowing of heart function, and impaired blood circulation. In this type of hypoxia, there is a normal amount of oxygen in the blood, but it occurs as a result of an insufficient amount of oxygen reaching the tissues.

Tissue hypoxia is a pathological condition caused by damage to enzymes involved in the respiratory process, and in this type of hypoxia, oxygen reaches the tissues from the lungs, but tissue cells are unable to absorb it. The cause of this condition is various drugs with side effects,

poisoning with toxic substances (H<sub>2</sub>S, CN), and severe infectious diseases. This type of hypoxia is one of the most dangerous types of hypoxia. Oxygen deficiency in the body can manifest itself through the following symptoms:

- rapid and deep breathing;
- rapid heartbeat;
- general weakness, dizziness;
- headache;
- impaired vision and hearing;
- the appearance of bruises on the skin and mucous membranes;
- in severe cases, dangerous lung diseases;
- cardiovascular diseases;
- can lead to long-term disability.

The human body has a number of adaptation mechanisms to maintain survival during hypoxia, and these mechanisms can be short-term and long-term.

Short-term adaptation mechanisms include increased respiration, i.e., activation of the respiratory center in response to oxygen deficiency in the body, and an increase in the flow of oxygen into the body. Increased cardiac activity, i.e., an increase in the number of heart contractions, accelerates the circulatory system and provides sufficient oxygen to the tissues. As a result of increased cardiac activity, the distribution of oxygenated blood in the blood vessels of the body improves.

An example of long-term adaptation mechanisms is the increased synthesis of erythrocytes in the bone marrow as a result of the production of erythropoietin in the kidneys. This also increases the oxygen-carrying capacity of the blood. As a result of the formation of new capillary blood vessels and their increase in number, oxygen is supplied to the tissues over short distances.

In organisms adapted to hypoxia, oxidative enzymes are activated, as a result of which the need for glucose increases. As a result of the accumulation of lactic acid, cell damage accelerates. The body protects itself in such hypoxic conditions through a number of adaptive mechanisms. When hypoxia persists for a long time and maladaptations develop, various pathological conditions can occur. Therefore, the study of hypoxia and its effects is of great importance in the field of health care.

Hypoxia is a serious stress factor for the body, strongly affecting metabolic processes, energy production, respiration and the cardiovascular system. The human body resists this condition through its strong adaptive capacity and, through adaptive mechanisms, relieves hypoxia and ensures the continuation of life. These adaptive mechanisms are effective only in mild and moderate forms of hypoxia. Severe and prolonged hypoxia can even lead to a violation of the body's functions.

Hypoxia causes structural and functional disorders of various organs.

**Nervous system.** The central nervous system is very sensitive to hypoxia, but not each of its parts is equally damaged by hypoxia. The cerebral cortex is especially sensitive to it, while the brainstem, medulla oblongata and spinal cord are less sensitive. After 2.5-3 minutes after the cessation of oxygen supply, foci of necrosis are observed in the cerebral cortex and cerebellum. At the same time, when there is asphyxia in the medulla oblongata, a number of cells die even after 10-15 minutes. When there is a lack of oxygen in the brain, first there is agitation, then there is inhibition, sleep, headache, and impaired motor control.

**Breathing.** With acute oxygen deficiency, breathing becomes frequent and superficial, and air exchange is reduced. Peripheral breathing of the Cheyne-Stokes type may develop.

**Blood circulation.** In acute hypoxia, tachycardia is observed. Systolic pressure remains or gradually decreases, pulse pressure does not change or increases, and minute blood volume also increases. The oxygen content in arterial blood decreases by 8-9%, which significantly increases blood circulation in the coronary arteries. These changes are due to the expansion of coronary vessels and increased venous flow, which occurs as a result of accelerated heart contraction.

Changes in metabolism in hypoxia begin with a violation of carbohydrate and energy metabolism and are associated with biological oxidation. Hypoxia is characterized by a decrease in the value of macroergs in the cell - ATP and a decrease in the concentration of its breakdown products - ADF, AMF and inorganic phosphate. The content of creatine phosphate in brain tissue decreases. As a result of the decrease in macroergs, glycolysis increases, and due to the decrease in glycogen content, pyruvate and lactate increase. The increase in pyruvate, lactate, and several other organic acids contributes to the development of metabolic (gas-free) acidosis, which occurs due to oxygen deficiency.

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