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NON-RESPIRATORY LUNG FUNCTIONS IN CHILDREN

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ABSTRACT

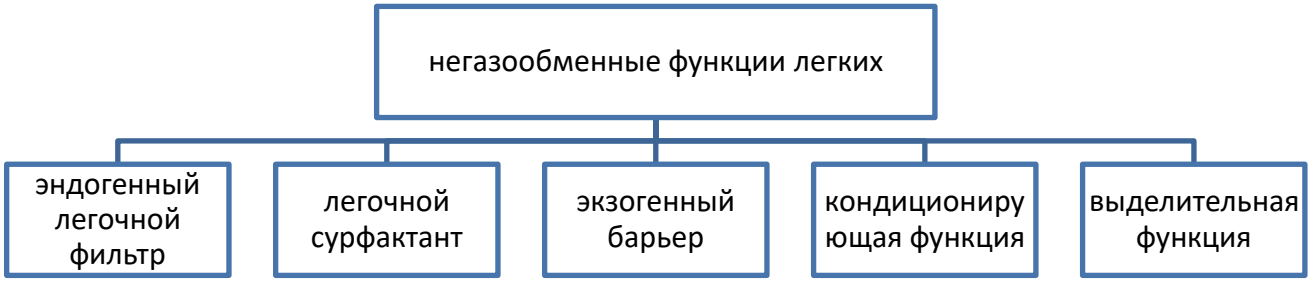
A large number of factors indicating the existence of non-respiratory lung functions indicate the need for their systematization. The proposed working scheme takes into account the functions of the endogenous pulmonary filter, which mainly controls the levels of vital and highly active blood substances, the exogenous barrier that protects against harmful environmental influences, pulmonary surfactant, and the conditioning function of the lungs.

Keywords: respiratory function, lung metabolism, surfactant.

The respiratory system is a complex of formations that provides, first of all, respiratory function, which, in turn, includes regulatory and peripheral nervous components and effectors, combined into a single system of functioning. The end result of the activity of this system is the maintenance of homeostasis of the gas composition of the blood and tissues of the body.

The metabolic level of functioning of any organ, including the lungs, has its own unique features, and the recognition of the existence of non-respiratory features of the lungs has given a significant impetus to the study of this area. It is known that the lungs are actively involved in carbohydrate, protein and fat metabolism, detoxification, hemostasis, rheology, regulation of water and electrolyte balance, etc. All this was united under the general term "non-respiratory functions of the lungs", which was first introduced in 1969 by J. Jane.

The relationship between the individual links can be represented in the form of a working diagram:



The term "endogenous pulmonary filter" refers to a set of methods for controlling homeostasis, which is carried out with the help of a set of enzymes of the capillary endothelium.

Specific ways of protecting the airways have been combined into the concept of "exogenous barrier" and represent the metabolic functioning of specialized cells of the epithelial integument of the bronchial tree, which makes it possible to significantly change the biochemical composition of mucus in pathological conditions. Recent studies have proven that the lungs contain a large set of enzymes necessary for the synthesis of fatty acids, triglycerides, cholesterol, but at the same time, lipolytic processes also take place in the lung tissue. The vessels of the pulmonary circulation are a giant endothelial bed, in which there is a high activity of lipoprotein-lipases and, possibly, the lungs not only provide themselves with various

substrates, in particular polyunsaturated fatty acids, but are also the first of the organs to influence the circulating ones.

The above actualizes the study of the surfactant system, which performs a number of functions related to biodynamic, gas exchange and protective processes occurring in the respiratory apparatus and the role of surfactants in the metabolism of lung lipids.

More than 85% of the phospholipids of the surface-active lining are synthesized by type II pneumocytes. The composition of lung tissue lipids, the nature of their metabolism associated with the formation of the main element of the aerohematic barrier - surfactant, determine the mode of adaptation of the organ and affect the resistance to the action of damaging factors. One of these factors is the activation of lipid peroxidation, which stimulates research on the dynamics of lipid peroxidation processes and the activity of the antioxidant defense system of the lungs. Thus, the pulmonary surfactant system lies at the boundary of two barriers, endogenous and exogenous, and is closely related to pulmonary gas exchange. The importance of surfactant is, first of all, an anti-atelectatic factor, a regulator of water balance between the blood and the alveolar space, it promotes the diffusion of oxygen and has an antioxidant ability, which in turn allows surfactant to be considered as an endogenous antioxidant.

The conditioning and excretory function of the lungs can be presented separately, since the humidification and heating of the inhaled air occurs not only in the nasal cavity and trachea, but also spreads to the distal respiratory tract. The proof of this is that the temperature of the alveolar air is equal to the temperature of the blood, and the blood flowing from the lungs is 0.2-0.3°C warmer than the inflow due to the energy of metabolic processes.

The excretory function of the lungs is often used in diagnostic tests and is most clearly traced in the excretion of aromatic substances and metabolic products (metabolites of lipids, hormones, ions) in predominant quantities excreted with the exhaled air.

It should also be recalled that research on the function of external respiration began more than two centuries ago, while metabolic processes in the lungs and non-respiratory functions of the lungs began to be studied only about half a century ago. Therefore, any opposition in their significance is unfounded. It is more correct to judge the non-respiratory functions of the lungs as necessary, helping to perfectly ensure the functional reliability of gas exchange.

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