# THE SIGNIFICANCE OF VITAMIN D DEFICIENCY IN HISTOLOGICAL STRUCTURE AND INFECTIONS OF THE UPPER RESPIRATORY TRACT

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***Abstract.*** *This article discusses the histophysiological structure of the respiratory system and its peculiarities. In addition, the article discusses infectious and non-infectious diseases of all parts of the respiratory system, the origin, clinic, course and treatment tactics of vitamin D deficiency in them.*

***Keywords:*** *Respiratory system, infection, vitamin D, histophysiology, deficiency, non-infectious, risk factor, age, gender.*

# ЗНАЧЕНИЕ ДЕФИЦИТА ВИТАМИНА D В ГИСТОЛОГИЧЕСКОЙ СТРУКТУРЕ И ИНФЕКЦИЯХ ВЕРХНИХ ДЫХАТЕЛЬНЫХ ПУТЕЙ

***Аннотация.*** *В статье рассматривается гистофизиологическое строение дыхательной системы и его особенности. Кроме того, в статье рассматриваются инфекционные и неинфекционные заболевания всех отделов дыхательной системы, происхождение, клиника, течение и тактика лечения дефицита витамина D при них.*

***Ключевые слова:*** *Дыхательная система, инфекция, витамин D, гистофизиология, дефицит, неинфекционный, фактор риска, возраст, пол.*

**Introduction:** In recent years, the role of vitamin D in stimulating an effective immune response against infectious diseases has gained great importance. Since vitamin D affects the body's immune cells and increases resistance to various infectious and inflammatory processes, its deficiency can lead to a decrease in immunity and, as a result, frequent colds, various inflammations, and slow healing of wounds.

Nasal cavity- Divided into two by a septum.

- The inner surface is covered with a mucous membrane.
- The inner surface is covered with ciliated epithelium.
- The inner surface has small glands that secrete a mucous fluid that cleans the air.

Larynx - located opposite the IV-VI cervical vertebrae.

- Air-conducting airway.
- Voice apparatus that produces sound.
- The inner layer consists of a hairy mucous membrane.
- The wall consists of cartilage and muscles.

- In the middle of the inner layer are the vocal cords and muscles.

Trachea - starts opposite the VI-VII cervical vertebrae and continues opposite the V thoracic vertebra

- reaches 9-13 cm.

Bronchi - formed by the division of the trachea into two (right and left bronchi) opposite the V thoracic vertebra.

- The bronchi branch like a tree into the lungs.

The trachea and bronchi are considered respiratory tracts, they warm and humidify the air, clean it of small dust particles, and pass it to the alveoli of the lungs.

Lungs - A pair (right and left lungs), cone-shaped.

- The right lobe has 3 lobes, the left lobe has 2 lobes.

- In the middle of the lungs: the larynx, esophagus, blood vessels, thymus gland, nerve fibers, lymphatic vessels and nodes, and the heart are located.

- The lungs are bounded below by the diaphragm.

- The lungs are bounded behind by the spine.

- The lungs are bounded in front by the sternum and ribs.

Pulmonary alveoli - The process of gas exchange takes place.

- The wall consists of a single-layer epithelial tissue

- It is surrounded by a network of small blood vessels - capillaries.

- Their number is about 750 million in both lungs.

- The total surface area is 100 m^2.

**Research objective:** To study the susceptibility of children with vitamin D deficiency to upper respiratory tract infections.

**Materials and methods of the study**: Data from the PubMed database and the eLibrary platform, scientific articles in scientific publications over the past 10 years were analyzed.

**Result:** Acute respiratory infections of the upper respiratory tract are the most common pathology in children, mainly occurring in children aged 2-5 years. Viruses are the main etiological factor of acute respiratory infections of the upper respiratory tract. Today, more than 200 viruses are known to cause acute respiratory infections of the upper respiratory tract, which are manifested by rhinitis, sore throat, cough, often accompanied by diarrhea. In recent years, modern methods of molecular diagnostics have identified new viruses as etiological factors in the development of acute respiratory infections of the upper respiratory tract, including: metapneumovirus, new subtypes of coronaviruses (SARS, NL63, NKU1), bocavirus

(HBoV). The number of mixed infections has also increased. Vitamin D deficiency increases the risk of developing acute respiratory infections of the upper respiratory tract. The

main cells involved in the defense mechanism of the respiratory system include the respiratory epithelium, alveolar macrophages, and dendritic cells. All of these cells contain the CYP27B1 gene, which helps express vitamin D receptors on the cell surface and produces the enzyme 1-alpha-hydroxylase. This enzyme converts vitamin D to its active form, 1,25-dihydroxyvitamin D (1,25-(ON)2-vitamin D). 1,25-(ON)2-vitamin D, produced in airway epithelial cells, stimulates cell proliferation and reduces apoptosis following inflammation. The active form of vitamin D acts on vitamin D receptors, which are expressed not only in bones and intestines, but also in bone marrow, brain, pancreas, prostate, tumor cells, and immune cells.

For many years, the most important effects of vitamin D have been considered to be the induction of monocyte differentiation, stimulation of phagocytosis in macrophages, and increased production and expression of antimicrobial peptides. Some authors reasonably believe that maternal vitamin D intake during pregnancy reduces the risk of bronchiolitis in newborns.

Administration of vitamin D to patients with bronchial asthma reduces the risk of attacks and increases sensitivity to glucocorticosteroid therapy in severe cases. Stimulation of innate immunity and increased resistance to infections have been noted against the background of long-term use of vitamin D. Literature data describing the most important factors of innate immunity are based on the results of treatment of hypovitaminosis in young children and long-term administration of a prophylactic dose of β1- and β2-defensins (1000 IU per day). Increased concentrations of β-defensins have a positive effect on innate immunity. Vitamin D is an important nutritional factor, and its consumption has been shown to have a positive effect on innate immunity.

**Conclusion.** Vitamin D and its metabolites help to strengthen the innate immune response, which provides the first line of defense against viral and bacterial infections. A review of the literature shows that children with low vitamin D levels are more likely to develop respiratory tract infections, and correcting vitamin D deficiency can ensure a relatively mild course of the disease. In conclusion, vitamin D is produced in the human body under the influence of sunlight and is involved in immune processes. We have observed a slight decrease in the synthesis of vitamin D in a number of infectious and non-infectious diseases. These include diseases of the respiratory system. By increasing the synthesis of this same vitamin D, it is possible to increase the body's immune responses to diseases.

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