



Dysfunctions of the Immune System and Their Role in the Development of Diseases

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Annotation. The article is devoted to the consideration of disorders of the immune system and their role in the development of internal diseases. The work examines the basic mechanisms of immune system dysfunction, as well as the connection between immune system disorders and inflammatory processes and other internal diseases. Clinical manifestations and diagnostic criteria for these diseases are given. Understanding the mechanisms and consequences of immune system disorders is essential for the development of new approaches to the treatment and prevention of internal diseases

Key words: immune system, autoimmune diseases, immunodeficiency states, inflammatory processes, clinical symptoms, diagnostic criteria, treatment, prevention.

Introduction. The immune system is a huge network of cells, tissues and organs responsible for protecting the body from infections. Its main task is to detect and destroy foreign cells such as viruses and bacteria, as well as other external factors that can cause disease.

The immune system is made up of many elements, including white blood cells, antibodies, the spleen, and lymph nodes. It plays an important role in preventing pathogens from entering the body, destroying them and clearing away dead cells, regulating inflammation, healing wounds and maintaining overall body health.

However, dysfunction of the immune system can lead to various diseases of the internal organs and can manifest itself as overactivity (autoimmune diseases) or underactivity (immunodeficiency conditions), as well as inflammatory processes associated with an inadequate immune response.

The human immune system consists of two interacting mechanisms: innate immunity and adaptive immunity. Innate immunity provides an immediate response to pathogens and includes physical barriers, such as the skin and mucous membranes, and cells (neutrophils and macrophages) that destroy infectious agents. Adaptive immunity develops over time and provides more specific and long-lasting protection. This involves lymphocytes that recognize specific antigens and produce



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antibodies to destroy them. However, dysfunction of the innate and adaptive immunity can lead to disruption of the body's normal defense response.

The functioning of the immune system can be influenced by many factors. These include genetic predisposition, age, gender, environmental exposure, lifestyle and the presence of stressful situations. Diet, physical activity, sleep and stress levels can also affect the effectiveness of the immune system.

The immune system has complex regulatory mechanisms that maintain a balance between the body's defenses and an inappropriate immune response. However, sometimes this balance is disrupted and the immune system attacks its own tissues and organs, leading to the development of autoimmune diseases. These diseases are characterized by errors in self-foe recognition systems, in which immune cells attack normal cells and tissues of the body. The causes of autoimmune diseases are not fully understood, but hypotheses exist such as genetic predisposition, decreased self-tolerance, and environmental influences. Common autoimmune diseases include rheumatoid arthritis, systemic lupus erythematosus, Sjögren's syndrome, systemic red bowel disease (including Crohn's disease and ulcerative colitis), type 1 diabetes, psoriasis, and autoimmune thyroiditis [1, 11].

The clinical symptoms of autoimmune diseases vary depending on the organ or system affected. Common symptoms include inflammatory reactions, joint pain, fatigue, digestive problems, skin rashes and thyroid dysfunction. Diagnosis of an autoimmune disease usually includes symptom analysis, physical examination, clinical examination (eg, antibody testing), and instrumental testing.

Immunodeficiency diseases are characterized by disruption of the normal immune system, which can lead to increased susceptibility to infections and the development of certain diseases. There are many types of immunodeficiency conditions. Congenital are caused by dysfunction of various components of the immune system, such as lymphocytes, phagocytes and complement components. Acquired immunodeficiencies are caused by a variety of causes, including infection, drug therapy, chemotherapy, radiation therapy, stress, and autoimmune processes. [2, 14].

Clinical manifestations of immunodeficiency vary depending on the type and degree of immunodeficiency. Frequent, recurring infections such as pneumonia, sinusitis, urinary tract infections and fungal infections may be signs of immunodeficiency. Diagnosis includes a history, physical examination, clinical examination (eg, lymphocyte count and function, immunoglobulin levels), and instrumental tests.

Inflammation is an important response of the immune system to injury, infection, and other insults. The main purpose of inflammation is to protect the body by eliminating harmful irritants and repairing damaged tissue.

Inflammation is regulated by various molecules, including cytokines and inflammatory mediators. Cytokines stimulate inflammation, attract immune cells to sites of inflammation, and modulate the immune response. Inflammatory mediators such as histamine, prostaglandins, and leukotrienes cause vasodilation, increased vascular permeability, and activation of inflammatory cells. [7, 8].

Chronic inflammation causes tissue and organ damage and is also implicated in the development of other internal diseases such as cardiovascular disease, diabetes, cancer and some neurological disorders. [2, 6].



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Immune system disorders can lead to a number of complications and associated diseases. For example, people with weakened immune systems are more susceptible to infections because their immune systems are unable to effectively fight pathogens. Chronic inflammatory diseases can also cause tissue and organ damage, leading to dysfunction and destruction of the body. [1, 5, 10].

Immune system diseases may be associated with other medical conditions. For example, immunodeficiency may increase the risk of developing certain infections and cancer. Autoimmune diseases can also affect other organs and systems, such as the cardiovascular system, nervous system and kidneys. Their connection with other diseases requires an integrated approach to diagnosis and treatment [3, 12, 13].

Understanding these effects and associations is important for developing strategies for the diagnosis, treatment and management of patients with immune system disorders, and for preventing or minimizing adverse effects on organs and body systems.

Conclusions. In conclusion, immune system disorders are a serious problem that can lead to the development of medical conditions that can have a significant impact on the health and quality of life of patients. The immune system plays an important role in protecting the body from infections and maintaining homeostasis in the body. However, its excess and deficiency can lead to various diseases. We discussed the underlying mechanisms of immune system dysfunction, such as autoimmune diseases and immunodeficiency conditions, as well as the relationship between immune system dysfunction and inflammatory processes and other diseases in the body. The impact of immune system disorders on organs and systems of the body is enormous, including the development of inflammation, tissue damage and complications.

Further research into immune system disorders will help develop more effective methods of diagnosis, treatment and prevention. Understanding the mechanisms, associations, and consequences of immune system disorders is important to improve the health and quality of life of patients, as well as to develop new approaches to the treatment and prevention of medical conditions associated with the immune system.

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