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IL-10 (INTERLEUKIN-10) - ENGLISH TRANSLATION

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IL-10 (Interleukin-10) is an anti-inflammatory cytokine that plays a crucial role in regulating the immune system's response during pathological processes. It is produced by T and B lymphocytes and dendritic cells derived from the bone marrow. IL-10 inhibits pro-inflammatory cytokines (TNF-α, IL-1, IL-6), thereby preventing excessive immune activation and functioning as a protective mechanism in autoimmune diseases.

It regulates the activity of macrophages and dendritic cells, limiting their overreaction to inflammatory stimuli. IL-10 also enhances the proliferation of B lymphocytes and stimulates antibody production. It plays an important role in combating viral and bacterial infections. However, excessive IL-10 production may allow viruses to persist in a latent state. This occurs with highly mutagenic viruses capable of integrating their DNA into the host genome and replicating—such as human papillomavirus, herpes viruses, and hepatitis viruses—which are recognized as etiological factors in the development of certain organ cancers. Mutations in the IL-10 response gene have been shown to be key indicators in the emergence of oncological diseases.

IL-10 is also essential in regulating inflammation in autoimmune disorders by preventing immune cells from destroying healthy cells. Reduced IL-10 production increases the risk of autoimmune diseases. A decrease in IL-10 levels by 30% below normal significantly raises the likelihood of autoimmune disease development. However, in some cancers, atypical cells themselves may produce large amounts of IL-10, helping them evade immune detection.

Genetic polymorphisms (such as 1082A/G, 819C/T, 592C/A) have been studied across different fields of medicine for their role in determining IL-10 levels and disease susceptibility.

Studies investigating the relationship between IL-10 and circulatory insufficiency in patients with type 2 diabetes have shown that genetic mutations leading to reduced IL-10 production can increase inflammatory mediators that attack pancreatic β-cells, thereby suppressing insulin production or impairing its function—ultimately contributing to diabetes development. Conversely, certain mutations may increase IL-10 production excessively. Thus, any mutation in the IL-10 gene can lead to overproduction or underproduction of anti-inflammatory cytokines, resulting in insulin resistance and an increased likelihood of developing type 2 diabetes.

In neurological studies conducted in Uzbekistan, IL-10 gene polymorphism was identified in ethnic Uzbek patients suffering from transient ischemic attacks (TIA). The homozygous A/A mutant genotype was found to be a significant predictor of TIA, stroke, and mortality risk.

Implementing this approach in clinical practice has helped reduce complications and improve treatment outcomes.

In patients who underwent gastroshunt (MGB) surgery, increased levels of TNF-α and IL-2 and decreased levels of IL-10 and IFN-γ were observed in complicated cases of anastomositis. This indicates the role of immunological imbalance and suggests the presence of inherited or acquired IL-10 deficiency.

In rheumatologic diseases, cytokine system abnormalities—including IL-10 gene polymorphisms—have been identified as diagnostic markers confirming the progression of inflammation. These findings are applied in the early diagnosis and optimization of treatment for diseases such as rheumatoid arthritis (RA), systemic lupus erythematosus (SLE), and ankylosing spondylitis. In RA patients, IL-10 levels were found to be approximately 25–30% lower, leading to intensified inflammation and more severe disease progression. IL-10 suppresses monocyte and macrophage activity, reducing excessive inflammatory responses that damage blood cells in autoimmune conditions such as RA, SLE, and hemolytic diseases.

In vertebrobasilar insufficiency caused by vertebral artery syndrome, a correlation between elevated IL-10 levels and thrombolytic properties has been identified, which may serve as an important prognostic indicator.

IL-10 plays a vital role in regulating immune system and blood cell function. In hematology, IL-10 is primarily studied and utilized in the treatment of disorders related to the immune system and blood. It influences the differentiation of stem cells into specific lineages. Thus, IL-10 is crucial in conditions associated with hematopoiesis, immune regulation, inflammation, and hematologic malignancies. Its levels are evaluated in leukemia, lymphoma, sepsis, autoimmune diseases, and transplantation.

IL-10 stimulates B lymphocytes and plasma cells, thereby supporting immune regulation.

Leukemia (Leukosis): IL-10 may promote the survival of leukemic cells; thus, its levels are monitored to design optimal treatment strategies.
Lymphoma (e.g., Hodgkin's lymphoma, NHL): IL-10 is used to evaluate patient prognosis. Elevated IL-10 levels are often associated with aggressive disease progression, rapid dissemination, and increased mortality risk.

The IL-10 (Interleukin-10) gene G1082A polymorphism represents a significant genetic variation influencing immune function and has been studied in relation to various diseases.

A study conducted among patients with acute lymphoblastic leukemia (ALL) at the Hematology Research and Practical Center revealed that the A allele of the IL-10 G1082A polymorphism was more frequently associated with extramedullary disease, BCR-ABL positivity, and relapse in both children and adults. Moreover, in children, the GG genotype was correlated with a higher overall survival rate.

Conclusion

Research on IL-10 is rapidly advancing. Continuous monitoring of its genetic polymorphisms and their phenotypic effects can lead to:

- Development of new strategies for effective treatment of oncological and autoimmune diseases;
- Early diagnosis and prevention of complications in acute leukemia;
- Optimization of chemotherapy dosage and achievement of early remission.