

MODERN CONCEPTS OF BRONCHIAL ASTHMA PATHOGENESIS

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Abstract: This article analyzes the mechanisms of bronchial asthma (BA) progression and modern concepts related to them. The study examines immunological and physiological aspects of the disease, genetic factors, and environmental influences. Based on statistical data, the research investigates the causes of BA development and treatment methods.

Keywords: bronchial asthma, immune mechanisms, genetic factors, allergic reactions, environmental factors.

Introduction

Bronchial asthma is a chronic inflammatory disease characterized by airway obstruction, bronchial hyperresponsiveness, and acute spasms. The development of bronchial asthma is significantly influenced by genetic predisposition, environmental factors, and immune system alterations. Research suggests that BA pathogenesis is complex and involves both allergic and non-allergic mechanisms.

According to the World Health Organization (WHO), approximately 262 million people worldwide suffer from this disease, with over 455,000 deaths annually due to BA complications. Recent scientific studies emphasize the importance of an in-depth understanding of BA pathogenesis for prevention and the development of effective treatment strategies. Contemporary research confirms that type 2 inflammation and epithelial barrier dysfunction are key components of bronchial asthma pathogenesis. Moreover, epigenetic modifications also play a significant role in disease progression. The objective of this article is to analyze the mechanisms of BA progression in light of modern scientific concepts and to identify disease prevalence trends based on statistical data.

Methodology

A comprehensive approach was utilized in the study, incorporating the following methods:

- Epidemiological data analysis: Statistical reports from WHO, the American Lung Association, and the Ministry of Health of the Republic of Uzbekistan were examined regarding disease prevalence and demographic characteristics of patients.
- Review of clinical studies: Scientific articles, experimental research, and retrospective analyses were studied concerning key BA progression mechanisms, including allergic and non-allergic processes, bronchial inflammation, and environmental influences.
- Genetic and immunological factor analysis: Genetic markers associated with BA development (IL-4, IL-13, ADRB2, GSDMB) were reviewed, along with the role of immune cells (eosinophils, mast cells, T-lymphocytes) based on laboratory research and clinical data.



- Biomarker analysis: Using modern laboratory methods, type 2 inflammation indicators, IgE levels in bronchial fluid, eosinophil concentration, and cytokine levels were examined.
- Computational modeling: Mathematical modeling techniques were applied to analyze BA development mechanisms and predict disease dynamics.

Discussion.

An analysis of bronchial asthma pathogenesis demonstrates that the disease results from a complex interaction of genetic, immunological, and environmental factors. Type 2 inflammation and bronchial hyperreactivity play a crucial role in BA pathogenesis, as evidenced by high IgE and eosinophil concentrations in patients. Research suggests that suppression of inflammatory processes using biological agents, such as monoclonal.

Furthermore, BA prevention is of great importance, involving reduced allergen exposure, air quality improvement, and smoking cessation. Genetic studies enable the development of personalized treatment approaches based on individual patient characteristics. However, despite significant progress in BA research, many aspects of its pathogenesis remain insufficiently explored, necessitating further investigation in this area.

Results

- 1. **Genetic factors:** Research indicates that more than 60% of BA patients exhibit genetic predisposition. The IL-4, IL-13, and ADRB2 genes play a major role in disease development.
- 2. **Immunological mechanisms:** The primary driver of bronchial asthma progression is the type 2 immune response. Elevated IgE levels, eosinophil activity, and mast cell degranulation contribute to bronchial spasm and inflammation.
- 3. Environmental factors: Allergens, dust, tobacco smoke, air pollution, and viral infections are the primary external triggers for BA development. Studies show that BA incidence is 30% higher in regions with high air pollution levels.
- 4. **Epidemiological situation:** In recent years, the prevalence of BA has been increasing, especially among children, where the incidence has risen by 15% over the past decade. According to the Ministry of Health of the Republic of Uzbekistan, in 2023, the number of BA patients exceeded 120,000, with 35% of them being children and adolescents.

Conclusion.

The study results indicate that bronchial asthma is a multifactorial disease influenced by a combination of genetic, immunological, and environmental factors. The most effective approaches for BA prevention and treatment include individualized therapy, immunotherapy, and environmental measures. Future research should focus on a deeper understanding of BA pathogenesis and the development of novel therapeutic agents.

References

- 1. World Health Organization. Global Asthma Report 2023.
- 2. American Lung Association. Asthma Trends and Statistics.
- 3. Ministry of Health of the Republic of Uzbekistan. Medical Statistics for 2023.
- 4. Barnes PJ, Adcock IM. The role of inflammation in the pathogenesis of asthma. Journal of Allergy and Clinical Immunology, 2022.
- 5. Holgate ST. Genetic and environmental factors in asthma: Clinical & Experimental Allergy, 2021.