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## The Role of Allergens in Allergic Airway Disease



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### ABSTRACT

Asthma is the commonest chronic disease in children in economically developed countries and is also common in adults. It is increasing in prevalence and severity. Suddenly, your airways narrow as lung muscles contract, the airway walls swell, and thick mucus is produced. Asthma is a chronic disease. It inflames the airways. It produces air hunger and makes it difficult to breathe. The lining of airways swells and mucus blocks and clogs the airways. Mucus tightens the airways and produces bronchospasm. Asthma is characterized by a cough, wheezing, tachypnea, hypoxemia, low inspiratory/expiratory ratio. It also caused by other hypersensitivity reaction. Aspirin-induced asthma is a combination of COX inhibition. In some atopic individuals, development of IgE antibodies to the surface antigens of *Aspergillus conidia* elicits an immediate asthmatic reaction upon subsequent exposure. In others, the conidia germinate and hyphae colonize the bronchial tree without invading the lung parenchyma. This phenomenon is characterized by allergic Bronchopulmonary aspergillosis, which is clinically defined as asthma, recurrent chest infiltrates, eosinophilia, and both type 1 (immediate) and type 111 (Arthus) skin test hypersensitivity to *Aspergillus* antigen. Many patients produce sputum with *Aspergillus* and serum precipitants. They have difficulty breathing and may develop permanent lung scarring. Normal hosts exposed to massive doses of conidia can develop extrinsic alveolitis. (1)

## INTRODUCTION

Asthma is a heterogeneous chronic inflammatory lung disease originating from a complex interaction between individual and environmental factors.(2). Asthma is a heterogeneous chronic inflammatory lung disease originating from a complex interaction between individual and environmental factors (3) Asthma causes the airways of the lungs to narrow or become blocked, making it hard to breathe. (4) Severe asthma is increasingly associated with different specific phenotypes and it represents a major unmet therapeutic need (5) Approximately 5–10% of patients are estimated to suffer from severe asthma, whereas 1–2% have severe treatment-resistant/refractory asthma, but there is significant geographic variation (6)Smoking is a well-known factor that not only aggravates asthma symptoms and worsens asthma control, but is also associated with neutrophilic asthma that is refractory to corticosteroids and other medication (7)Adequate inhaled corticosteroids treatment in patients with eosinophilic asthma and introducing treatment for COPD in patients with COPD could reduce PPCs.(8) It has been reported that some video-associated surgeries could decrease the prevalence of postoperative complications (9,10) The disease is mainly managed using drug therapy.(11). Airway inflammation can cause airway hyperresponsiveness (AHR) and reversible airflow obstruction.(12) In recent years, the morbidity and mortality rates of asthma have been constantly rising worldwide, and 1–18% of the populations of different countries are known to have asthma.(13,14)

To determine the relation between obesity and new-onset asthma among school-age children, the authors examined longitudinal data from 3,792 participants in the Children's Health Study (Southern California) who were asthma-free at enrollment.(15) In some communities, the prevalence of asthma among school-age children exceeds 25 percent, and prevalence has been rapidly rising in many regions of the developed world (16,17) Previous studies have indicated that oxidative stress plays an important role in the development of asthma (18). Airway oxidative stress also has been associated with declining disease status, poor lung function, and epigenetic changes (19) Solanum trilobatum plant is used in Indian system of medicine to cure various diseases in human and animals.(20)

## HISTORY

Thomas Willis and Sir John Floyer began arguing that asthma was different from other breathing disorders and is the same from person to person. Asthma was recognized in ancient

Egypt and was treated by drinking an incense mixture known as kyphi. It was officially named as a specific respiratory problem by Hippocrates circa 450 BC, with the Greek word for "panting" forming the basis of our modern name. (21) In 200 BC it was believed to be at least partly related to the emotions. (22) Maimonides wrote a treatise on asthma in Arabic, based partly on Arabic sources, discussed the symptoms, proposed various dietary and other means of treatment, and emphasized the importance of climate and clean air (23) In modern medicine on the subject tried to explain that asthma can be cured by rubbing the chest with chloroform liniment. (24,25) Medical treatment in 1880 included the use of intravenous doses of a drug called pilocarpine. (26) In 1886, F.H. Bosworth theorized a connection between asthma and hay fever (27) Epinephrine was first referred to in the treatment of asthma in 1905 (28) Oral corticosteroids began to be used for this condition in the 1950s while inhaled corticosteroids and selective short-acting beta agonist came into wide use in the 1960s (29,30) Theodore Roosevelt (1858–1919) experienced recurring nighttime asthma attacks that caused the experience of being smothered to death, terrifying the boy and his parents. (31) During the 1930s to 1950s, asthma was known as one of the "holy seven" psychosomatic illnesses. Its cause was considered to be psychological, with treatment often based on psychoanalysis and other talking cures. (32)

### **SIGNIFICANT GAP IN RESEARCH**

Asthma is the most common reason for presenting to the emergency room with shortness of breath. It is the most common lung disease in both developing and developed countries affecting about 5% of the population. Other symptoms include wheezing, tightness in the chest, and a non-productive cough. (33) Inhaled corticosteroids are the preferred treatment for children, however, these drugs can reduce the growth rate (34) Acute symptoms are treated with short-acting bronchodilators. The United States of America have developed and maintained a national database of their citizens along with the natural allergy (Asthma) causing plants detail, this detail includes the pollen releasing time, along with the main geographical distribution to assist its citizens in selection of a living as well as working place that may be free of trees responsible for causing asthma to particular individual. (35)

Asthma is a disease of the human respiratory system in which the airways constrict and become narrow, often in response to a "trigger" such as exposure to an allergen, cold air, exercise, or emotional stress (36).

## **WHERE THE RESEARCH GO NEXT?**

This research study is testing an investigational medication. The purpose of the study is to examine its effectiveness in treating asthma. This medication is not yet approved by the Food and Drug Administration (FDA), so can only be used in research studies. The medication was designed to help patients who have moderate to severe asthma symptoms, despite already being on medication. (37) Implementation research investigates the processes by which evidence results in the modification of patient care (38). Current examples of advances made through implementation research include interventions to achieve evidence-based practices in some communities (39) and use of school programs (40,41) for children with asthma. Other examples have defined modifiable barriers that may be addressed to improve asthma care (42).

## **MAJOR ADVANCES AND DISCOVERIES**

Asthma is airway hypersensitivity -reactivity (AHR). The relationship between atrophy and asthma is well established, and many individuals, there is a clear relationship between sensitization (demonstration of skin prick reactivity or elevated serum specific IgE) and allergen exposure. Inhalation of an allergen into airway is followed by a two-phase Broncho constrictor response with both an early and late phase response (43) Chemical fumes that may bring on an asthma attack. Be especially careful when you buy and use new chemical cleaners. Air pollution and smog are terrible for asthma sufferers. One cigarette can hinder your breathing and cause mucus to build up in your lungs. Seafoods and some dairy products like milk and eggs have been linked to asthma flare-ups. Eating foods with sulfites (food preservatives) and artificial coloring products can also trigger asthma. Dried fruits and dehydrated potatoes to prevent discoloration. A high-salt diet may make asthma worst. (44)

Eating magnesium-rich foods can prevent wheezing and reduce your chances of suffering an asthma attack. Researchers think the answer lies in the mineral's ability to relax smooth muscles in the lungs. Magnesium sulfate has been used by doctors to help open up the airways of asthma sufferers. Avoid eating too many processed foods. They tend to be very low in magnesium.

Caffeine has been found to reduce asthma attacks by widening the blood vessels in the lungs. During an asthma attack, caffeine can be particularly helpful as an emergency backup. Many peoples with asthma are sensitive to aspirin. Because aspirin is one of the

most widely used drugs in the world, it is imperative that everyone with asthma be tested for aspirin-sensitivity. Doctors strongly recommend using acetaminophen in place of aspirin. Cold-water baths, though they may not be the most comfortable, seems to ease asthma symptoms. Studies show remarkable improvements in wheezing and breathing after bathing in cold water for one minute or taking a 30-second cold shower every day. Cigarette smoke and other pollutants can be deadly for people with asthma. Vitamin C, the most important free-radical fighter in the lungs, helps protect your body from environmental pollutants. (44,45,46,47)

## **CURRENT DEBATE**

Acute severe asthma may prove fatal. Usually, such patients have had a long history of asthma. More recently, although treatment for asthma has improved substantially, the prevalence of asthma continues to increase in low and middle income countries and in some ethnic groups in which prevalence was previously low.

Asthma may also be classified according to the agents or events that triggers bronchoconstriction. These include seasonal, exercise-induced, drug-induced, (e.g. aspirin), and occupational asthma, and asthmatic bronchitis in smokers. (48). The late phase or delayed response may be nocturnal. The inflammatory cells include activated eosinophils. Other putative mediators of the inflammatory process in the delayed phase are adenosine (acting on the A1 receptor, induced NO• radical and neuropeptides). (49) Growth factors released from inflammatory cells act on smooth muscle cells, causing hypertrophy and hyperplasia, and the smooth muscle can itself release inflammatory mediators and autocrine growth factors shows schematically the changes that take place in the bronchioles.

## **CONCLUSION**

Asthma is the commonest chronic disease in children in economically developed countries and is also common in adults. It is increasing in prevalence and severity. Suddenly, airways narrow as lung muscles contract, the airway walls swell, and thick mucus is produced. Asthma is a chronic disease. It inflames the airways. It produces air hunger and makes it difficult to breathe. The lining of airways swells and mucus blocks and clogs the airways. Mucus tightens the airways and produces bronchospasm. Asthma is characterized by a cough, wheezing, tachypnea, hypoxemia, low inspiratory/expiratory ratio. It also caused by other hypersensitivity reaction. Asthmatic patient experience intermittent attacks of

wheezing, shortness of breath-with difficulty especially in breathing out- and sometimes cough. Inhaled  $\beta$ 2-adrenergic agonists directly relax airway smooth muscle. They are used for the quick relief of asthma symptoms. Short-acting  $\beta$ 2-agonists (SABAs) have a rapid onset of action and provide relief for 4 to 6 hours. They are used for symptomatic treatment of bronchospasm, providing quick relief of acute bronchoconstriction. All patients with asthma should be prescribed a SABA inhaler.  $\beta$ 2-agonists have no anti-inflammatory effects, and they should never be used as the sole therapeutic agents for patients with persistent asthma. However, monotherapy with SABAs may be appropriate for patients with intermittent asthma or exercise-induced bronchospasm. (50)

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