

Understanding the Basics of Asthma

The background features abstract, overlapping geometric shapes in various shades of blue, ranging from light sky blue to deep navy blue. These shapes are primarily located on the right side of the frame, creating a modern, layered effect. The rest of the background is plain white.

What is asthma?

Bronchial hyper-responsiveness

(Hallmark of asthma)

Bronchial hyperresponsiveness is defined as an increase in sensitivity to a wide variety of airway narrowing stimuli.

Bronchial hyper-responsiveness/airway hyper-responsiveness is the hallmark of asthma and the most characteristic clinical feature of asthma.

It is provoked by a variety of stimuli (cold air, dust, allergens or perfumes) which will not otherwise cause dramatic response in the healthy individual.

It is also found in a spectrum of other lung diseases.

It can serve as a predictor of future lung disease and disease progression and it has been shown to be an independent risk factor for irreversible loss of lung function in patients with and without pulmonary symptoms.

WHO definition of Asthma

- Asthma is a common lung condition that causes sporadic breathing difficulties. It often starts in childhood, although it can also develop in adults and affect people of all ages.
- Currently there is no cure, but treatment can help control the symptoms.
- The patients can live full and rewarding lives with the right treatment and management.
- Asthma is caused by the swelling and narrowing of the tubes that carry air to and from the lungs.

Definition of Asthma

- Asthma is a heterogenous disease, usually characterized by chronic airway inflammation.
- It is defined by the h/o respiratory symptoms such as wheeze, sound of sobbing, chest tightness and cough that vary over time and intensity together with variable airflow limitation.

- Day-night variability
- Seasonal variability
- Triggered by exercise, laughter, strong smells, allergens and air pollution



Asthma



COPD/Other airway disease

Defining variability in lung function

- Diurnal Peak Flow Variability: >10% adults and >13% children
(Measured at least over a 2 week period)
- PEFr improvement of >20% with inhaled corticosteroids
- PEFr fall of >15% with exercise
- Post bronchodilator (Inhalational Salbutamol 200-400 mcg) FEV1

Adults: >12% and >200 mL
>400 mL

Children: >12%

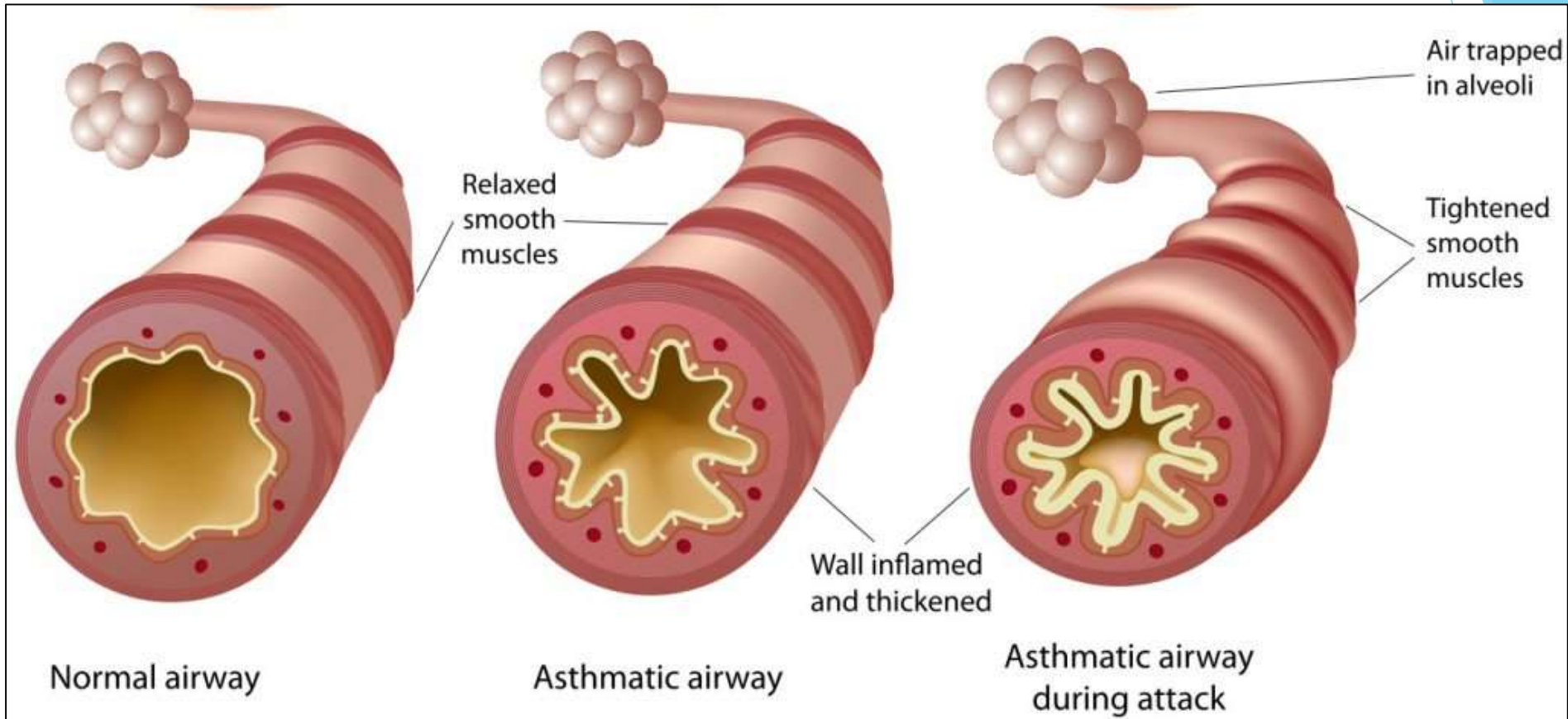


Asthma



COPD/Other airway
disease

What happens in Asthma?

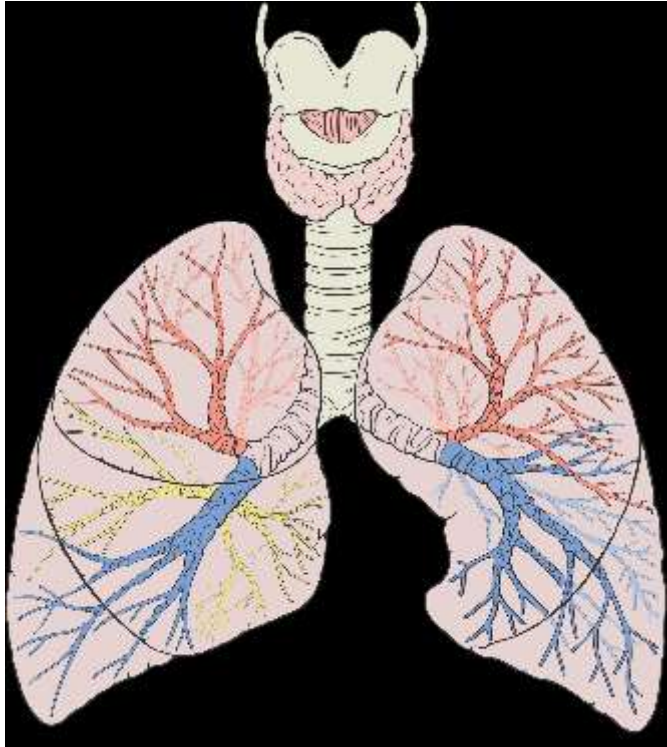


During asthmatic attack airway become inflamed, airway wall muscles contract and, mucus secretion increases.

These factors narrow the airways and makes breathing difficult.

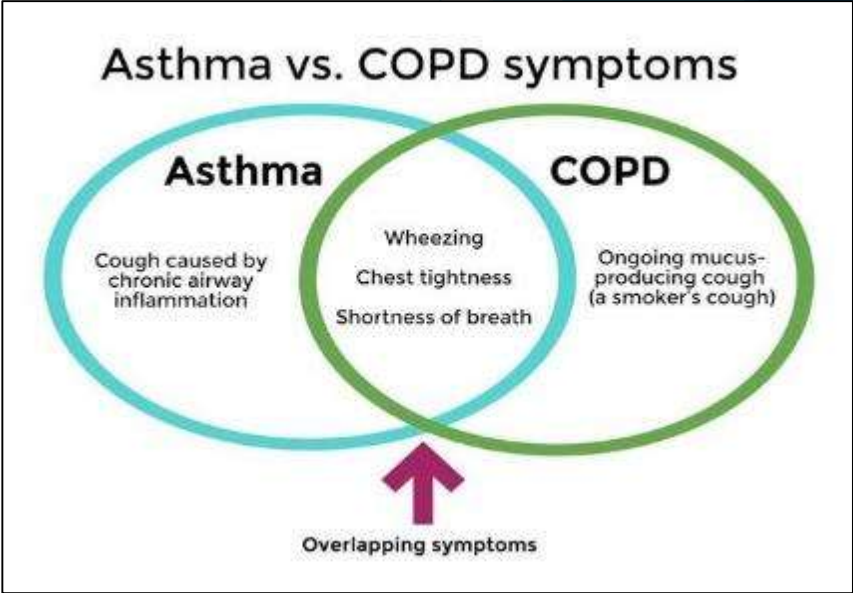
Asthma vs COPD

All airways are affected
Large airways
Medium airways
Small airways



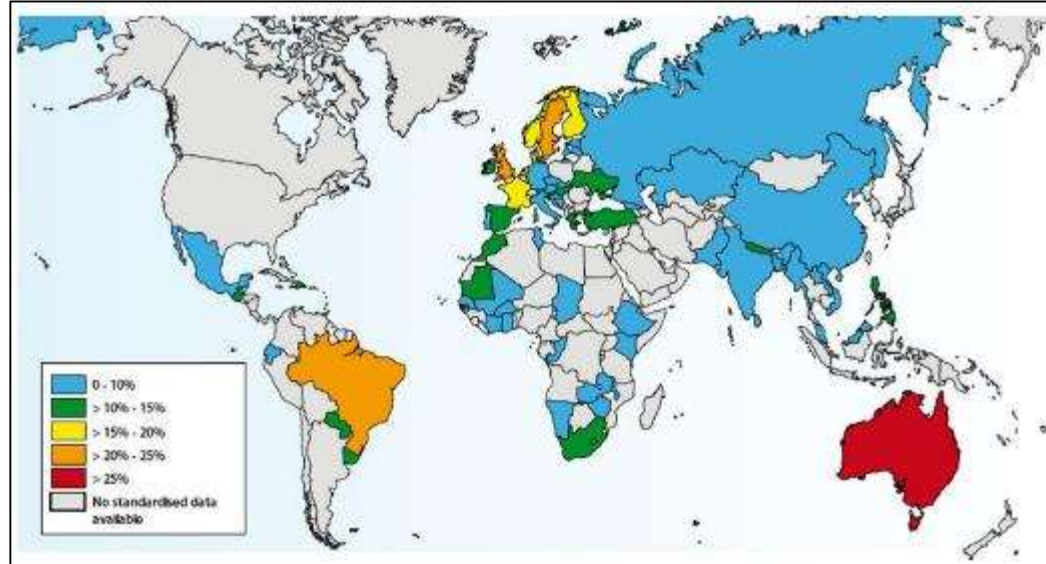
Small airways are affected

Asthma and COPD share many similarities but are different diseases. Asthma-COPD overlap syndrome has symptoms of both asthma and COPD.

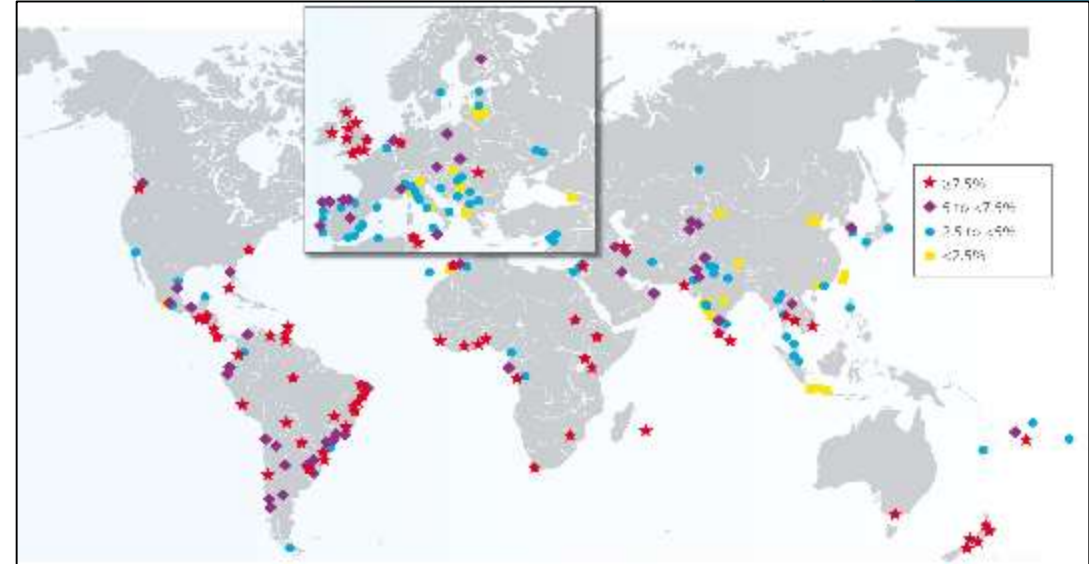


How common is Asthma?

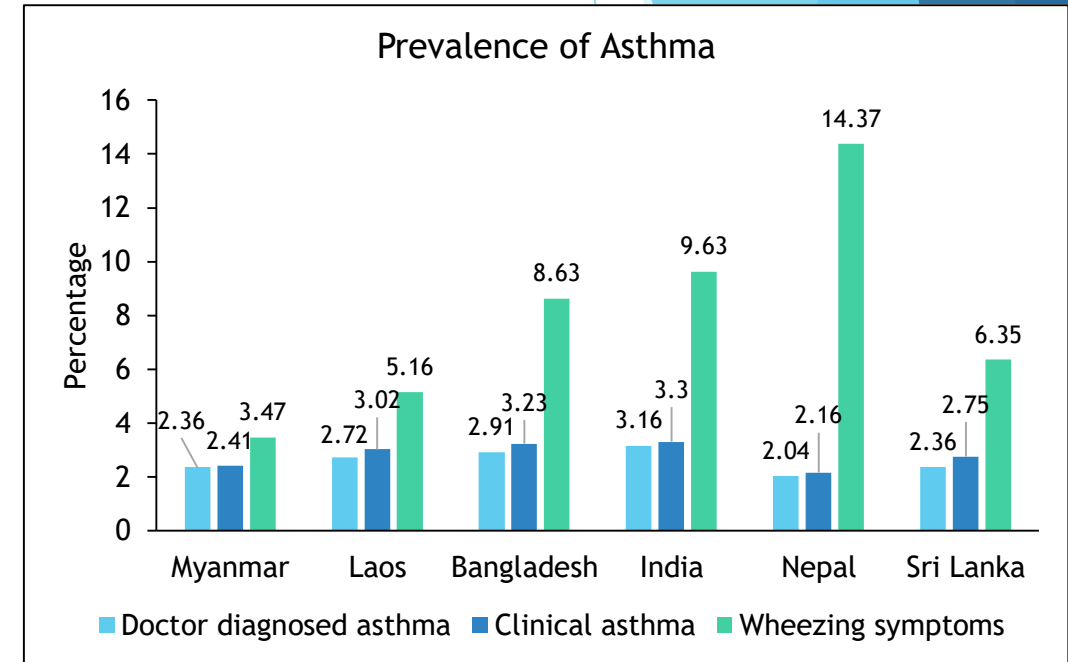
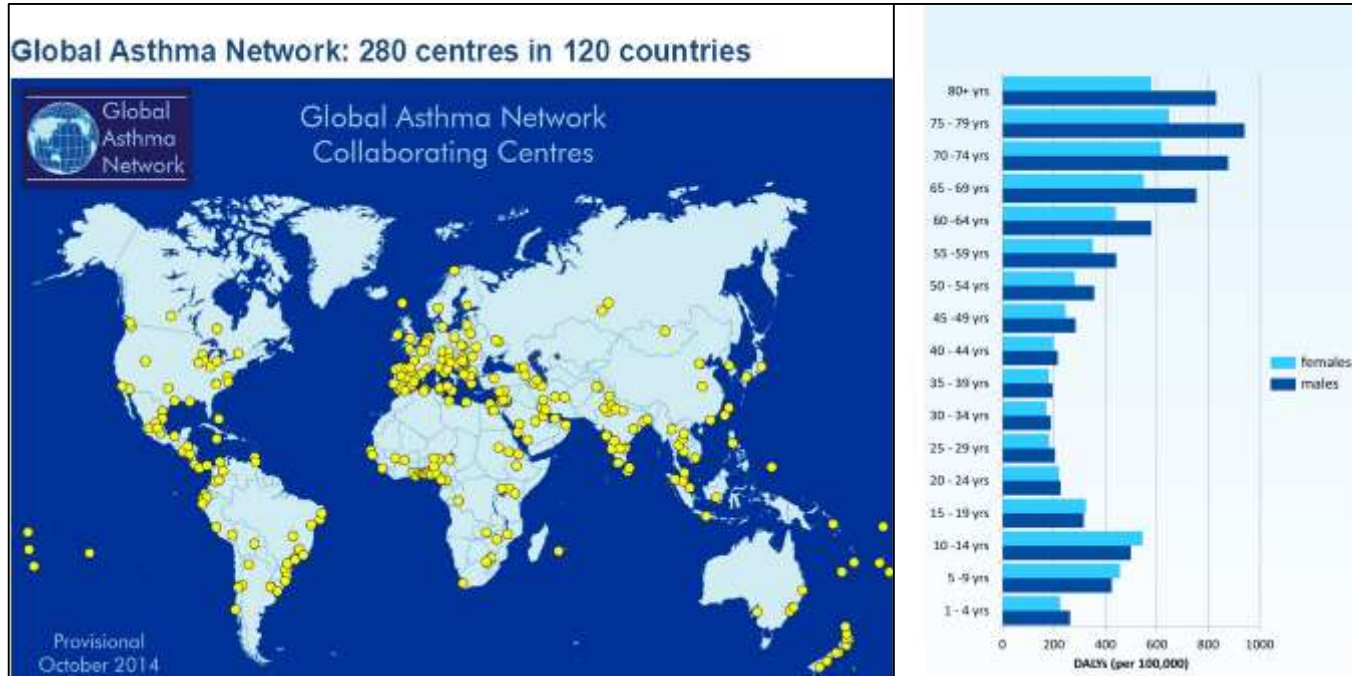
More than 339 million people are living with asthma



Around 50% of the world asthmatics are children



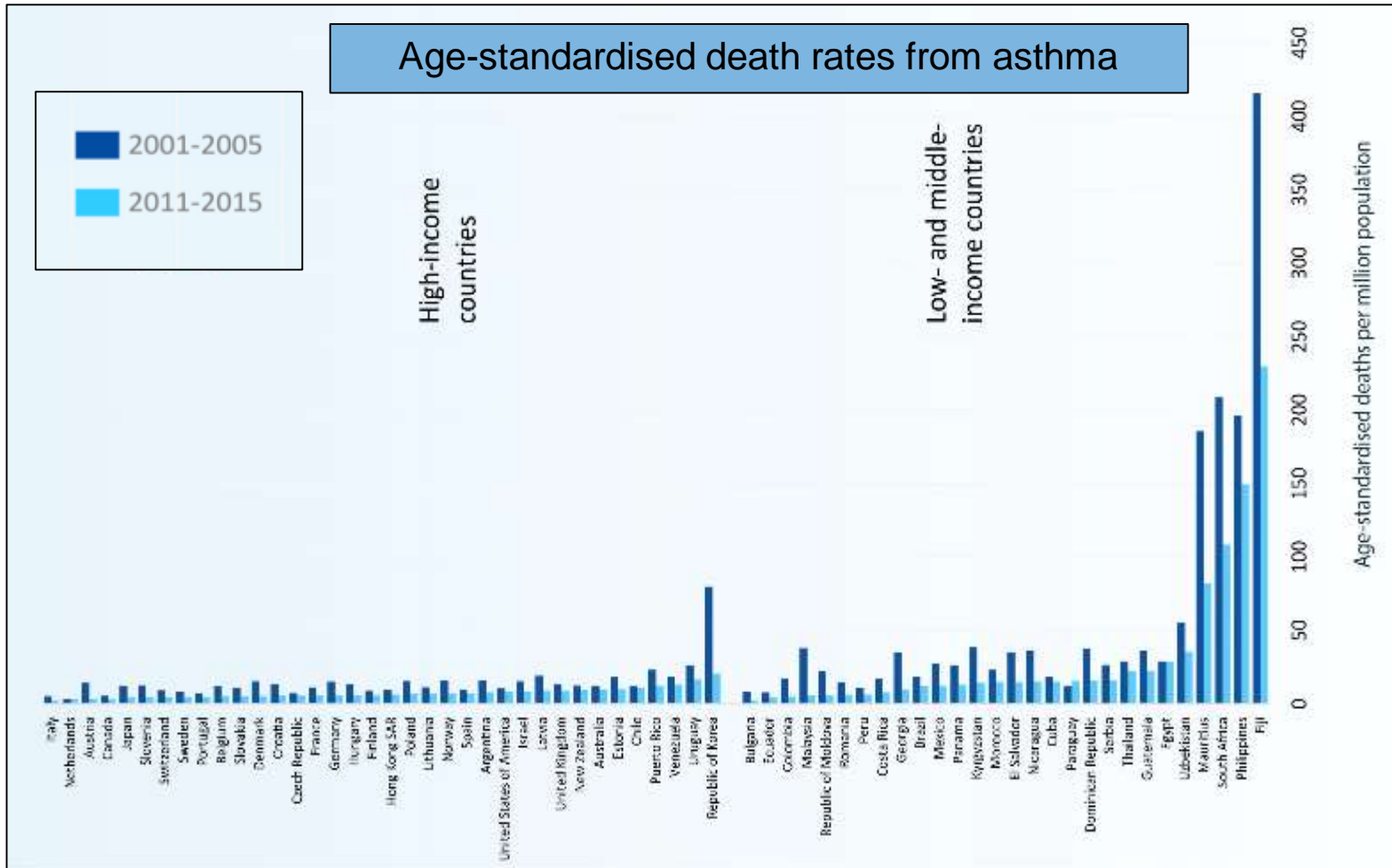
Prevalence of Asthma



According to the CDC, asthma episodes have declined in children from all races and ethnicities from 2001 through 2016.

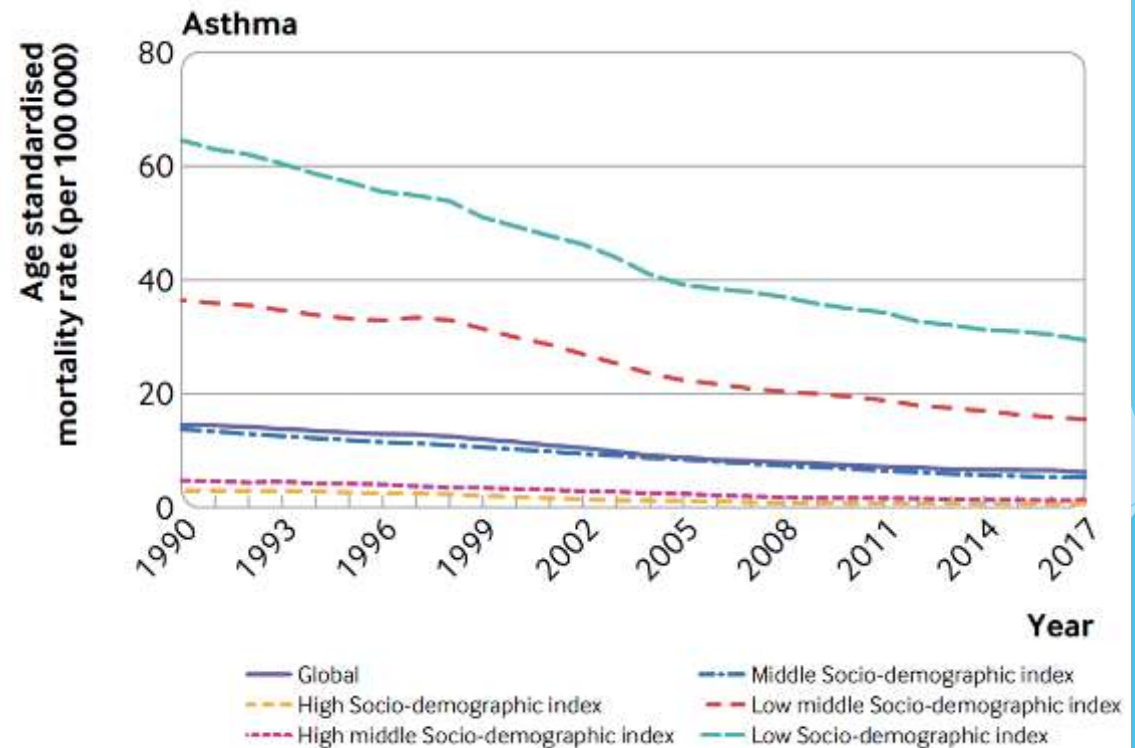
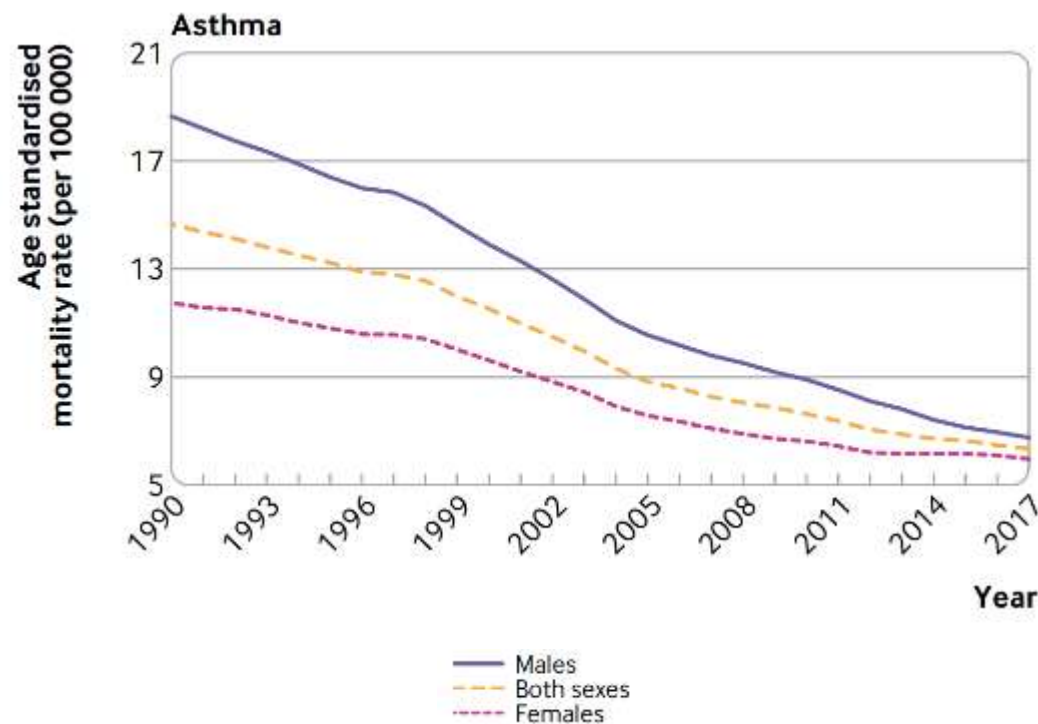
Asthma prevalence by 3 definitions is almost similar in Sri Lanka.

Global Asthma Mortality



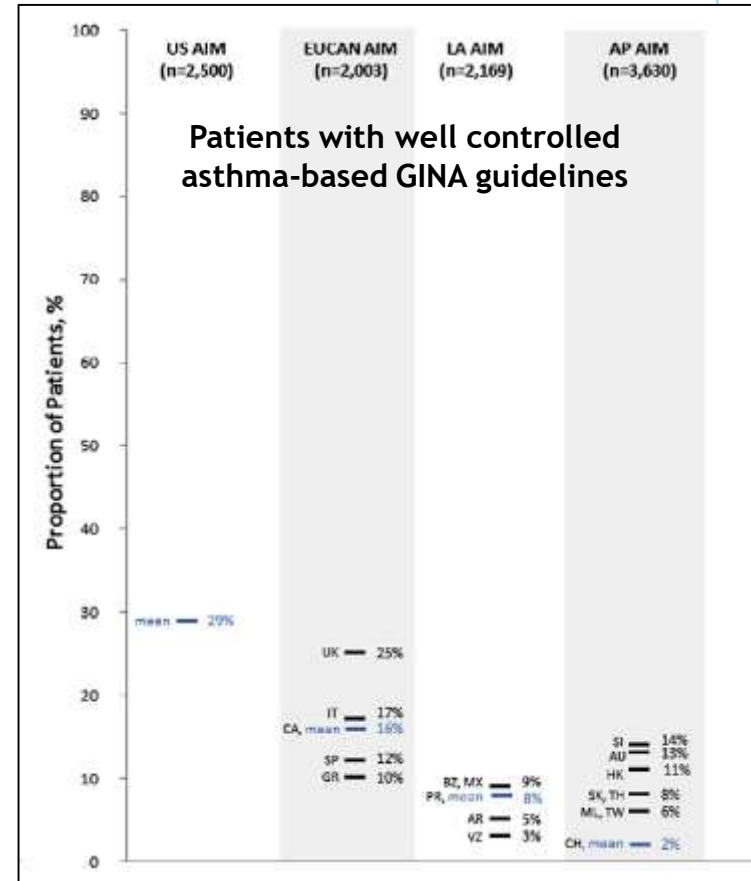
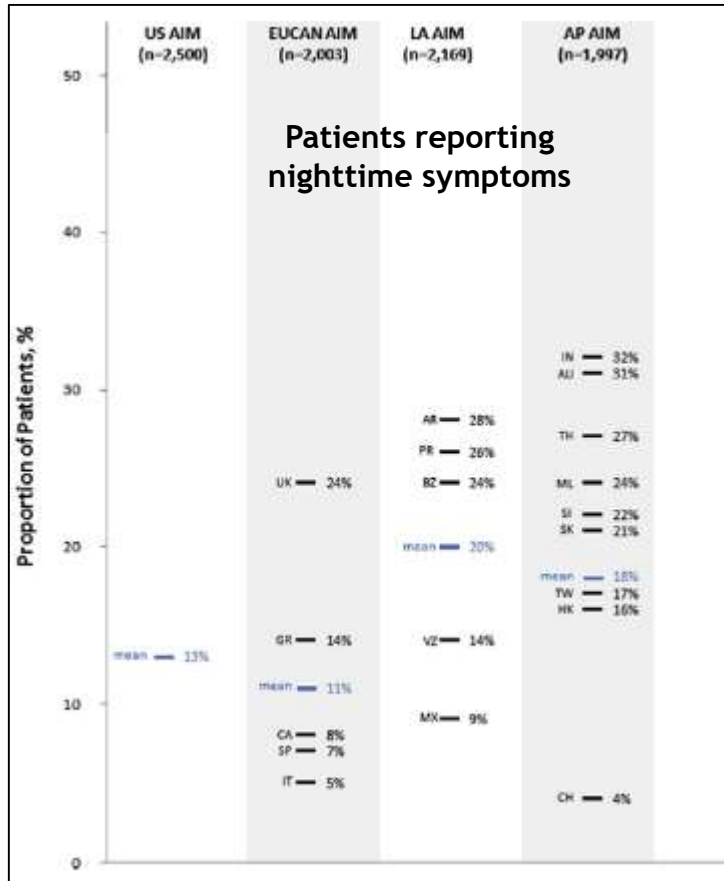
- Prevalence of wheeze was 23.9%, among which 80.1% had at least one other symptom, cough being the commonest.
- The prevalence of self-reported physician diagnosed asthma was 11.8% and that of current asthma medication use was 11.0%
- Asthma medication use was among 11.1%
- Paediatric asthma prevalence was 27%

Trends and risk factors of mortality and disability adjusted life years for chronic respiratory diseases from 1990-2017: Systematic analysis for the global burden of disease study 2017



The regions with a low Socio-demographic index had the greatest asthma burden

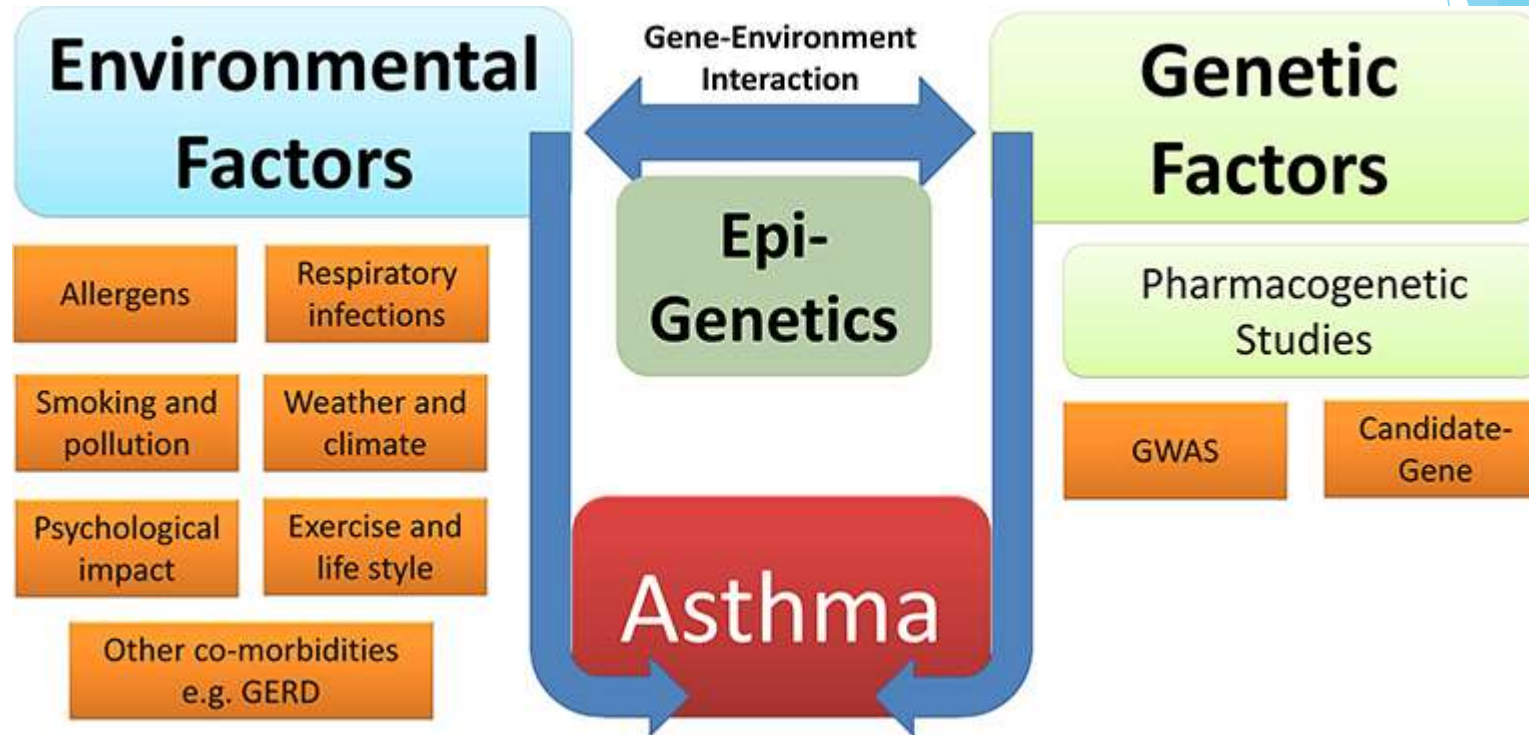
Global Results of the Asthma Insight and Management Survey in the Asia-Pacific Region, Latin America, Europe, Canada, and the United States



Globally, around 67% of patients perceived their asthma as completely and/or well controlled, but only 9% of patients had well-controlled asthma.

Basics of Asthma

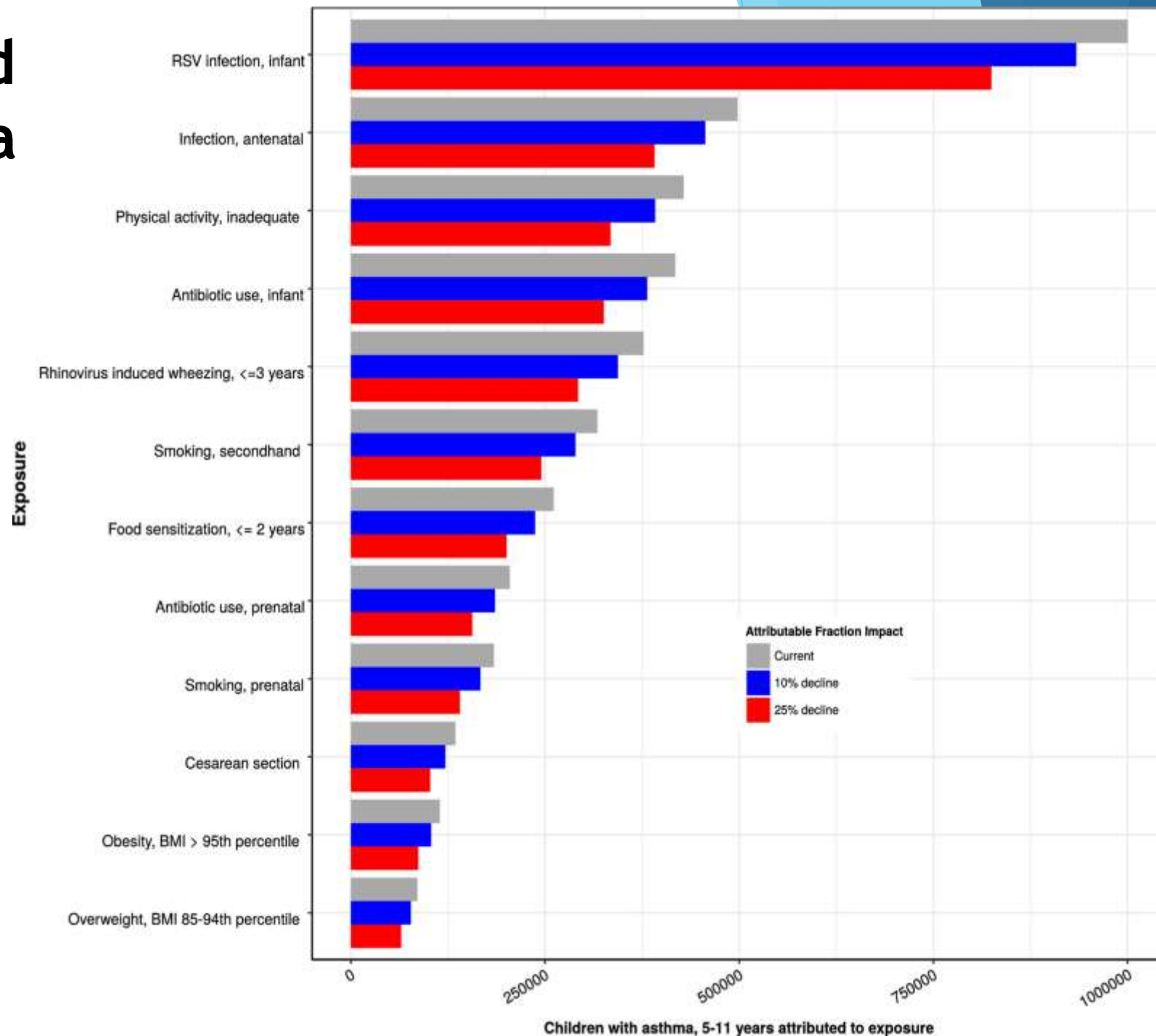
**What are the risk factors
for Asthma?**



Asthma is a complex disease, determined by an intricate interplay of genetic and environmental factors

Risk factors associated with childhood asthma

- Impact of reducing selected risk factor exposures on asthma cases among children 5-11 years of age.
- Based on an asthma prevalence of 9.6% from the Centers for Disease Control and Prevention to estimate 2,761,000 children with asthma.
- Twelve risk factors were selected for ranking based on their effect size, prevalence of exposure, and potential for modification.



Role of genetics in asthma



- Asthma is a heritable trait.
- A positive family history of severe asthma increases the risk of developing severe asthma.
- The recurrence risk of asthma in children with one affected parent is $\approx 25\%$, whereas if both the parents are affected the risk is $\approx 50\%$.
- Transmissibility: It is of the atopic tendency and not only of asthma. This is responsible for variety of atopic diseases.

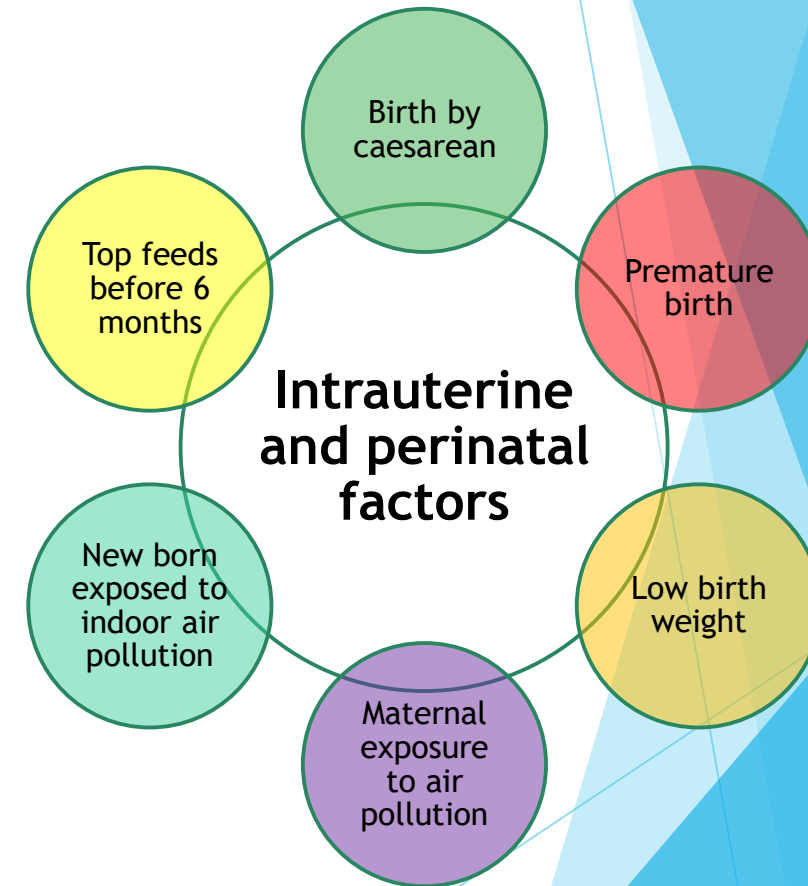
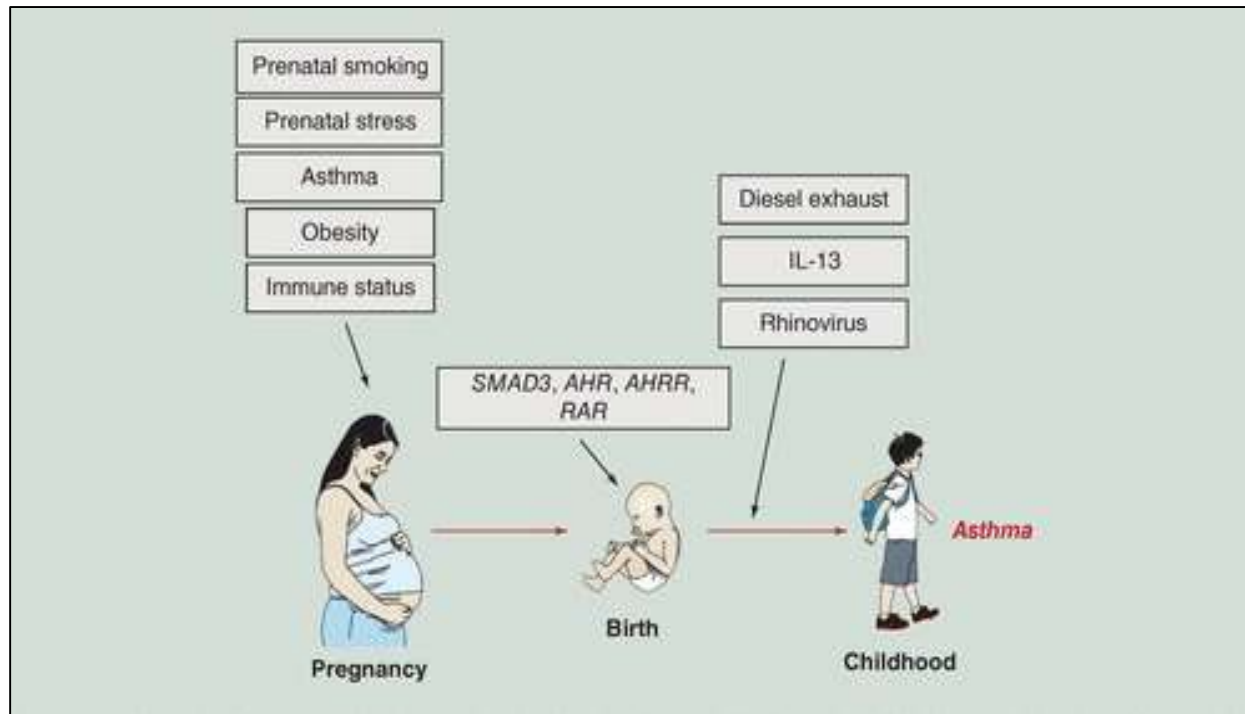
Asthma

AR/ARC

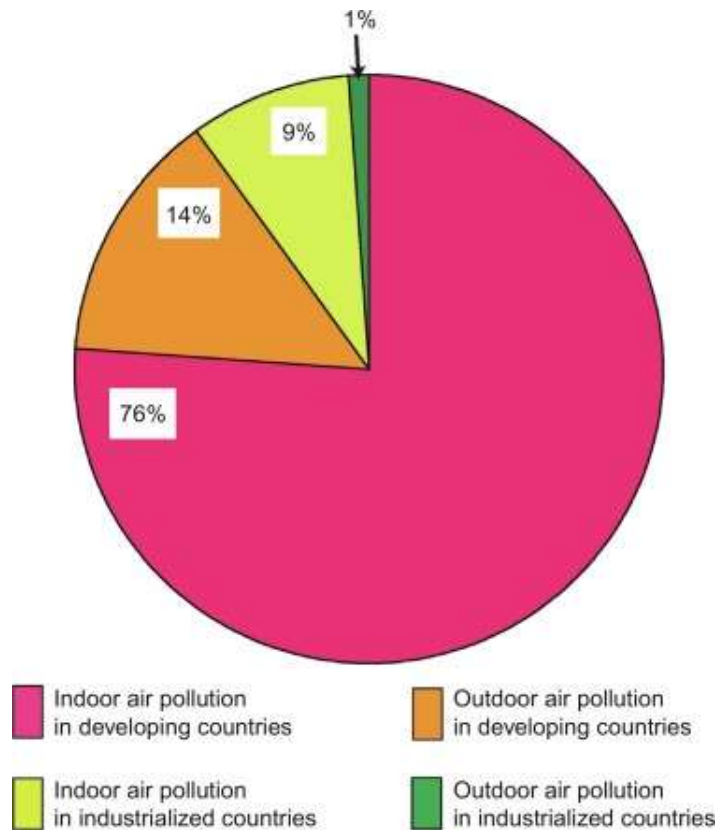
Eczema

Migraine

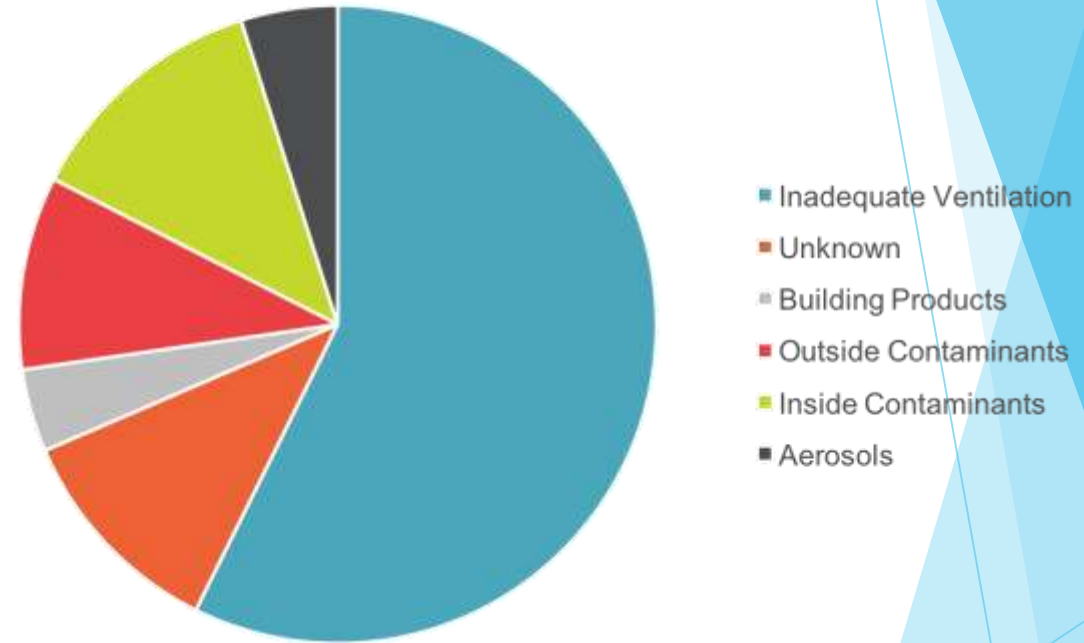
Intrauterine and perinatal exposures and factors causing asthma



Exposure to air pollution

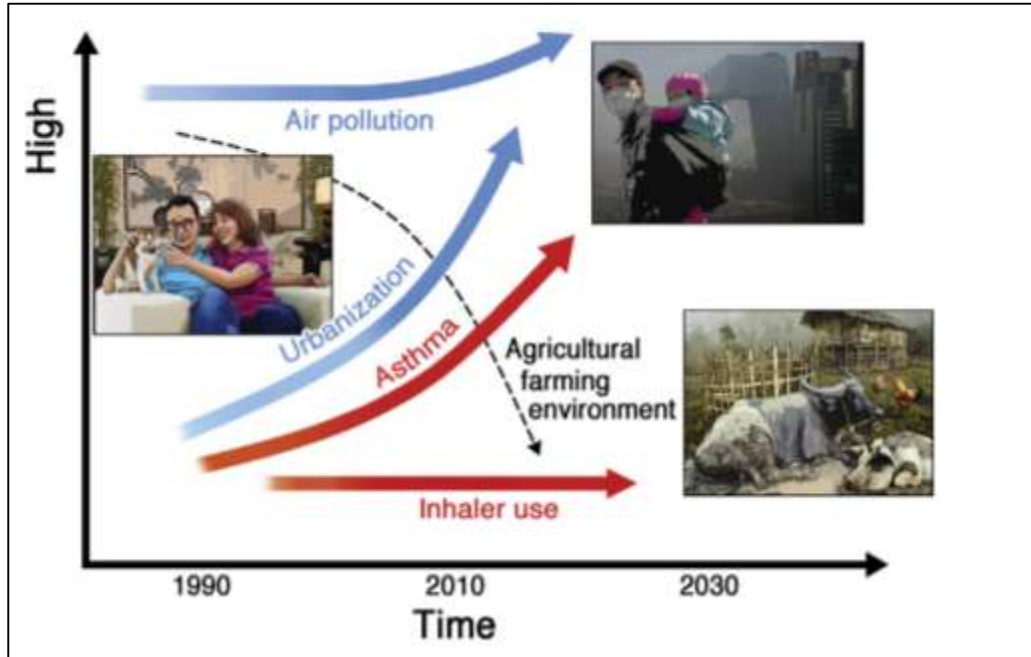


Reasons for Indoor Air Quality Problems



Diesel exhaust particles increases allergen specific IgE levels by up to 50-fold.
Adult-onset asthma occurs due to occupational exposure and seasonal allergic asthma.

Urbanization, obesity and asthma



Increasing burden of asthma and related environmental risk factors

With rapid urbanization over the past decades, asthma has become one of the most common chronic disorders



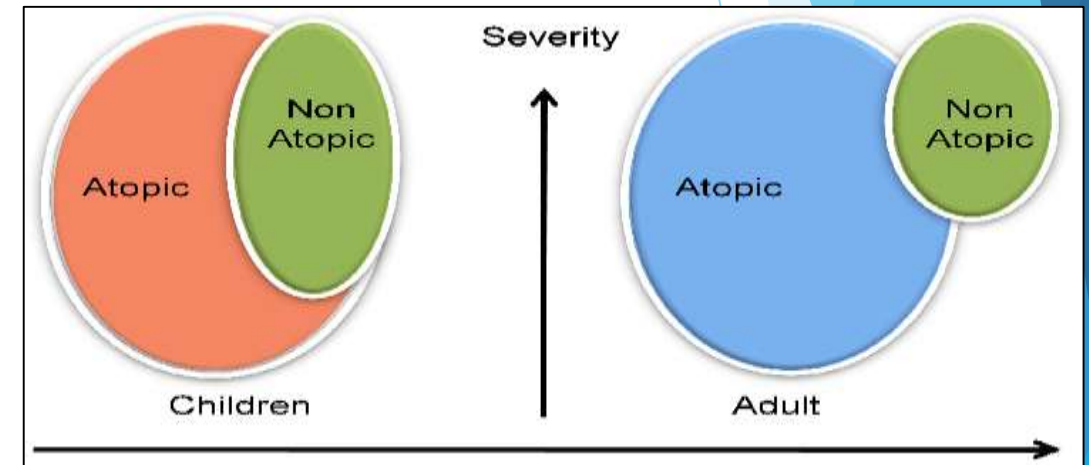
- Obesity is a growing problem in developed and developing countries
- It is associated with metabolic disorders and asthma
- Rapid urbanization accounts for significant shifts in dietary patterns and for physical activity levels that tends to increase risks for obesity in children

Allergic versus non-allergic asthma



Childhood onset
IgE mediated
Allergic comorbidities

Adult onset
Non-IgE mediated
Non-allergic co-morbidities



Allergic and non-allergic asthma phenotypes in children and adults

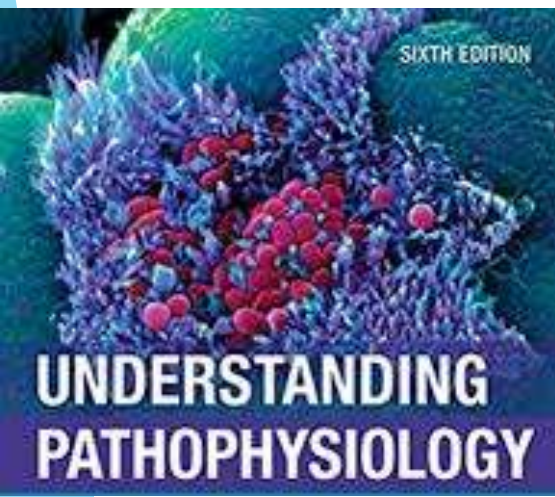
Pathophysiology of Asthma

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Importance of pathophysiology

Pathophysiology helps us understand

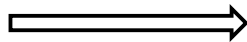
- The clinical features
- The evolution of disease from its causes
- The pattern of symptoms
- The rationale of pharmacotherapy to be used



Symptoms of acute attack of asthma

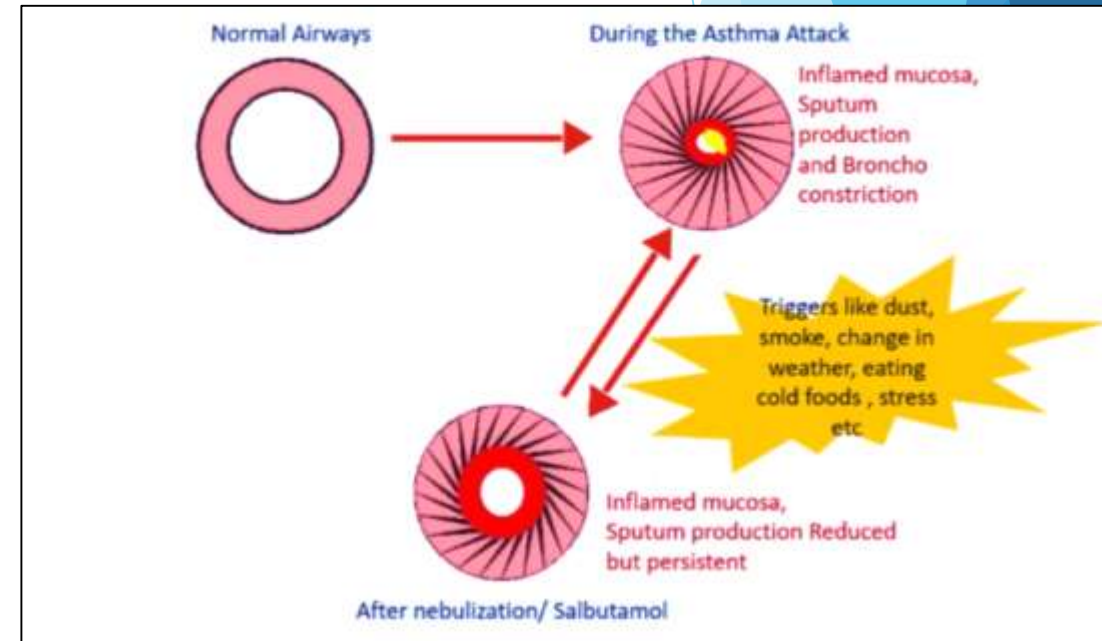
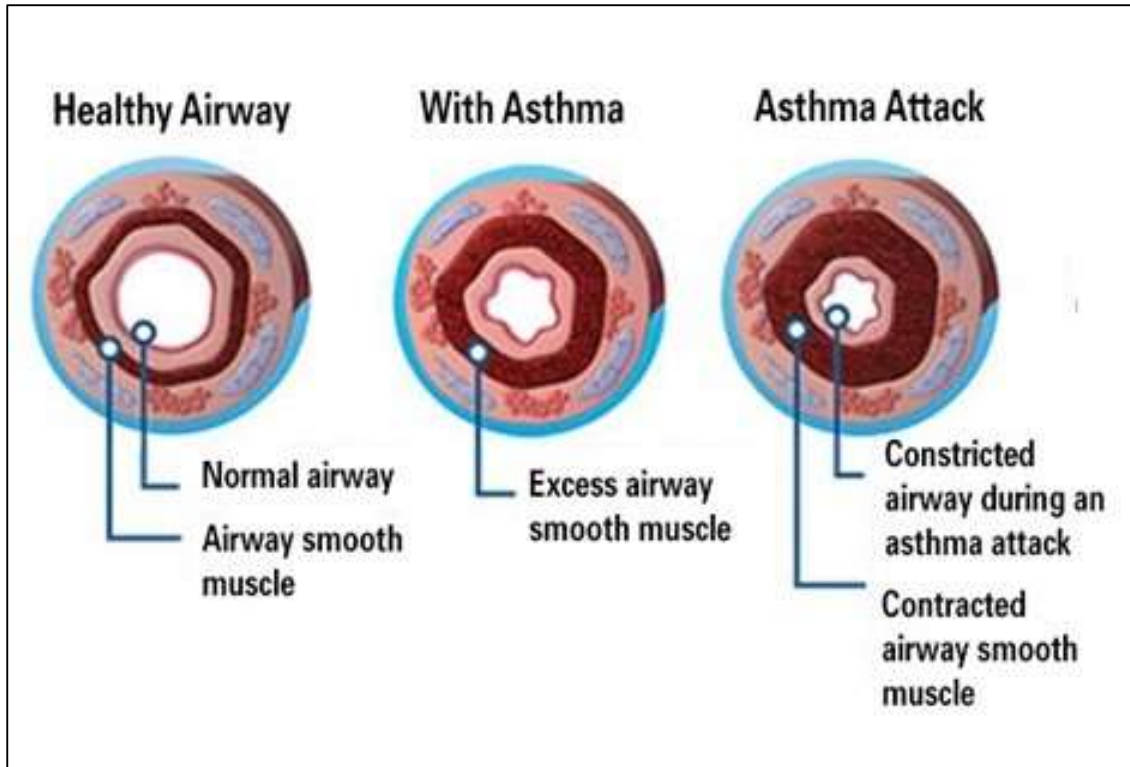
Bronchial hyper-responsiveness is the hallmark of asthma

- Cough
- Breathlessness
- Wheeze
- Chest tightness

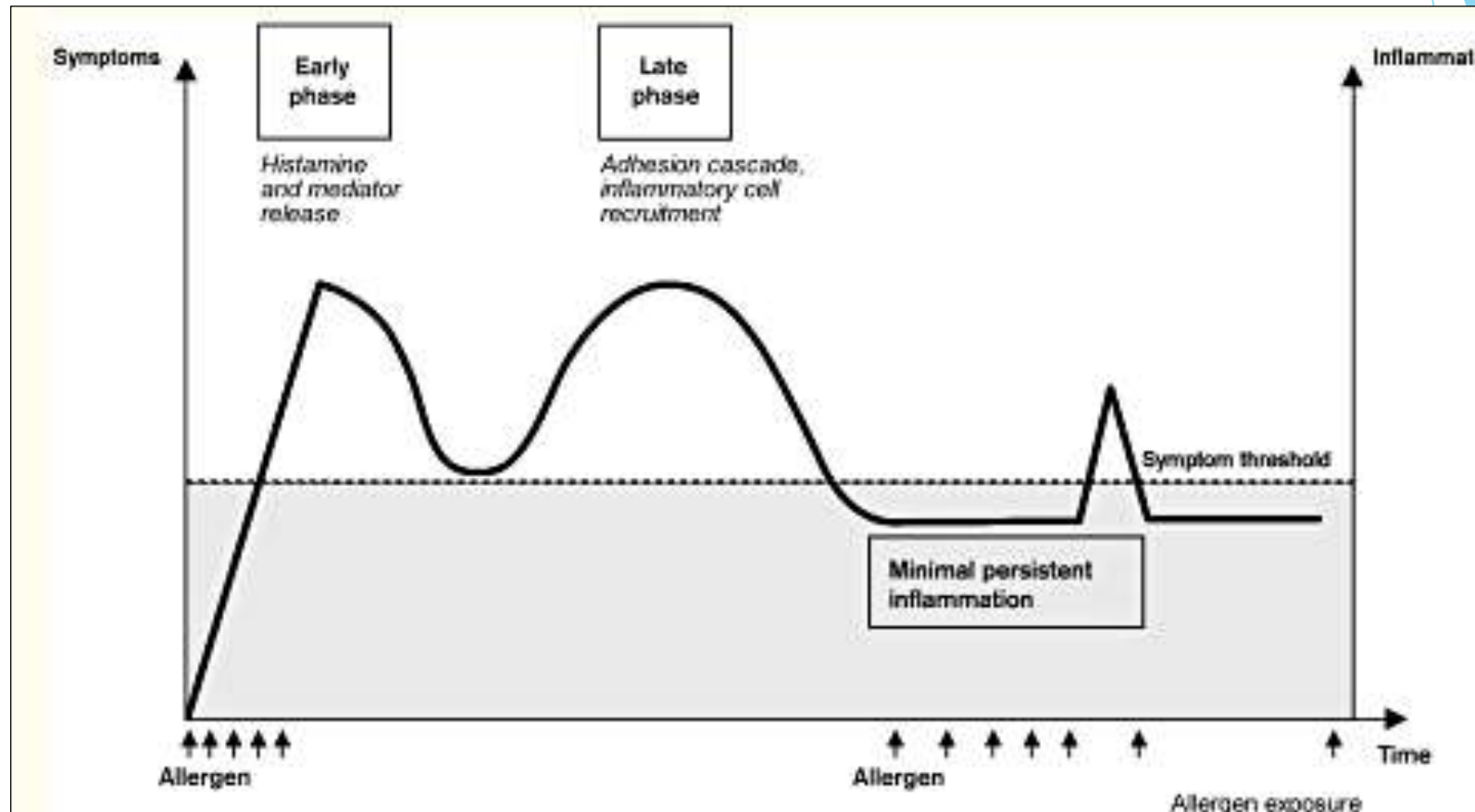


These symptoms occur due to bronchoconstriction and usually treated with bronchodilators.

Airway pathology in asthma

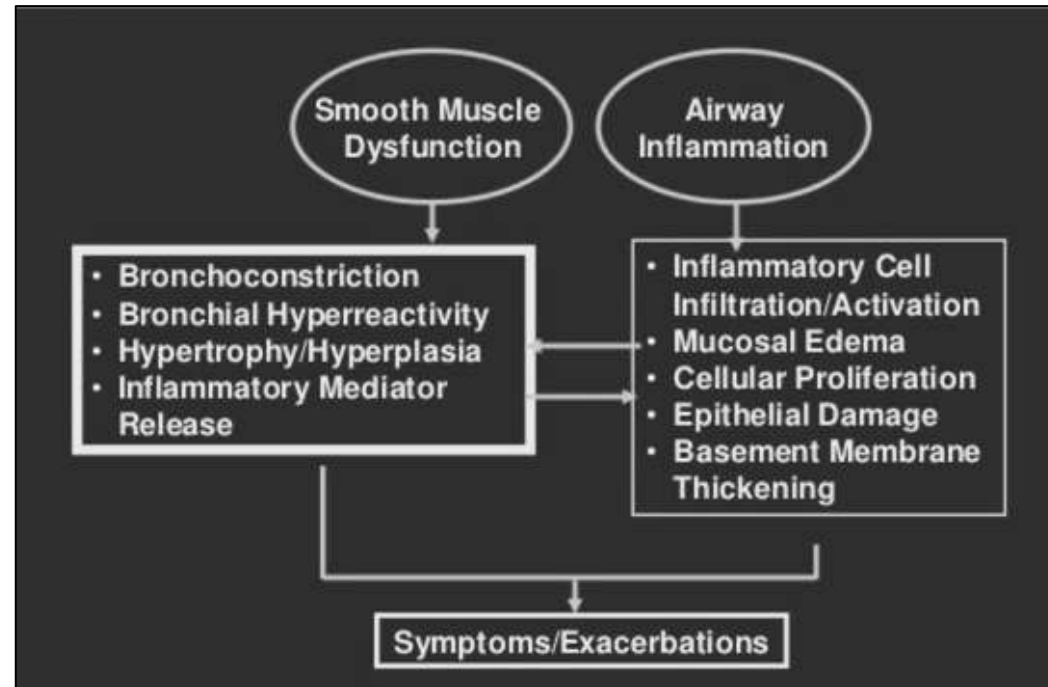


Minimal persistent inflammation



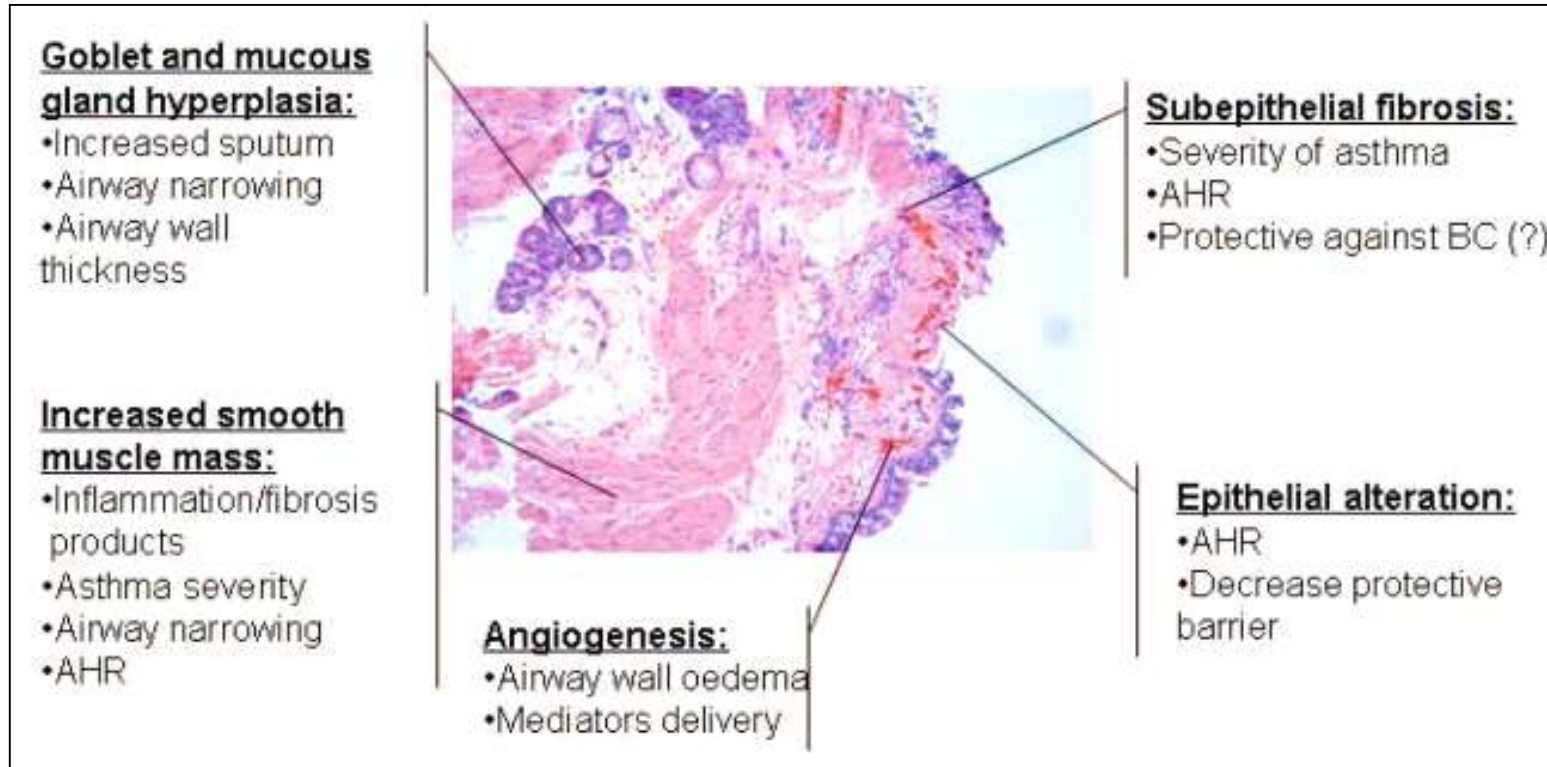
There is always a minimal persistent inflammation in asthmatic patients and if any trigger factor comes in contact then the symptoms appear. Asthma inflammation is variable and self-limiting.

Asthma inflammation



An aberrant immune response to non-pathogenic stimuli in the asthmatic airway leads to a chronic inflammatory response relevant to the pathogenesis of the disease. Asthma inflammation is variable and self-limiting.

Airway remodeling

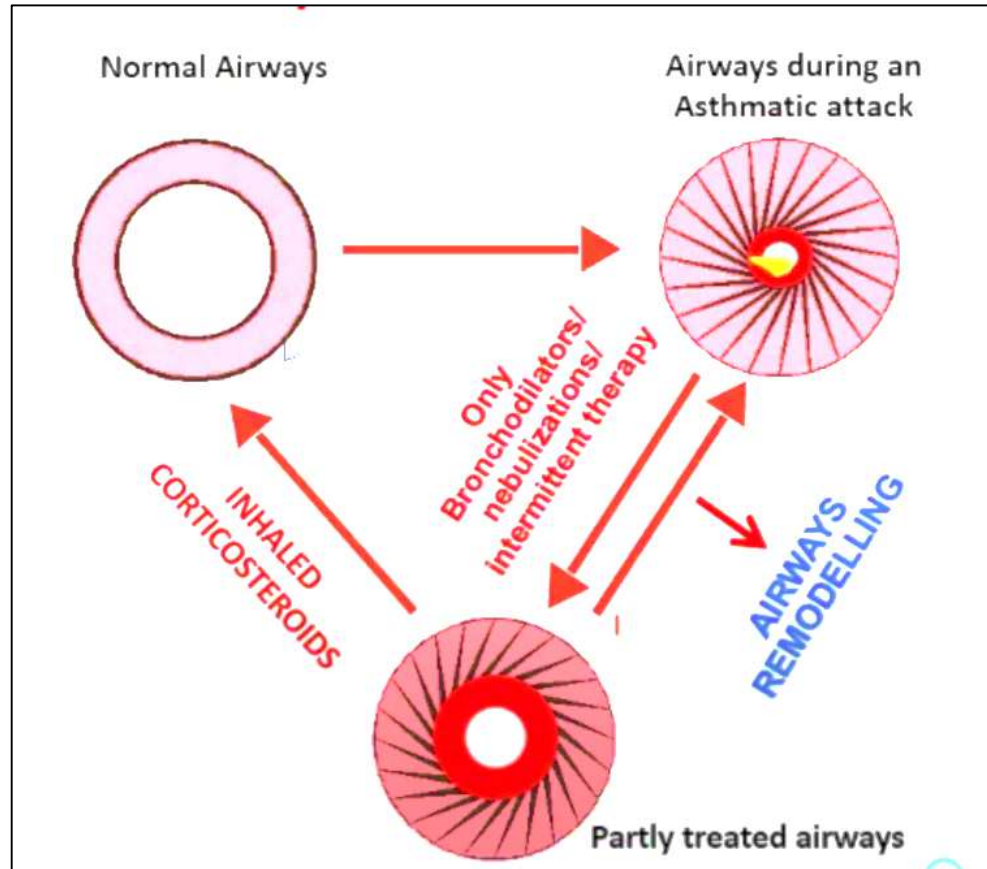


Early diagnosis and prevention of airway remodeling has the potential to decrease disease severity.

Airway remodeling features observed in endobronchial biopsies from a severe asthmatic subject

Airway remodeling involves desquamation of epithelia, collagen deposition, smooth muscle hypertrophy and hyperplasia causing permanent damage to airways. Airway remodeling has significant effects on lung function, including airway hyper-responsiveness and airway obstruction, and is responsible for the chronicity of asthma.

Treating asthma



A wide range of inflammatory mediators are involved in asthma inflammation which are controlled better by inhaled steroids rather than using only bronchodilators or antileukotrienes.

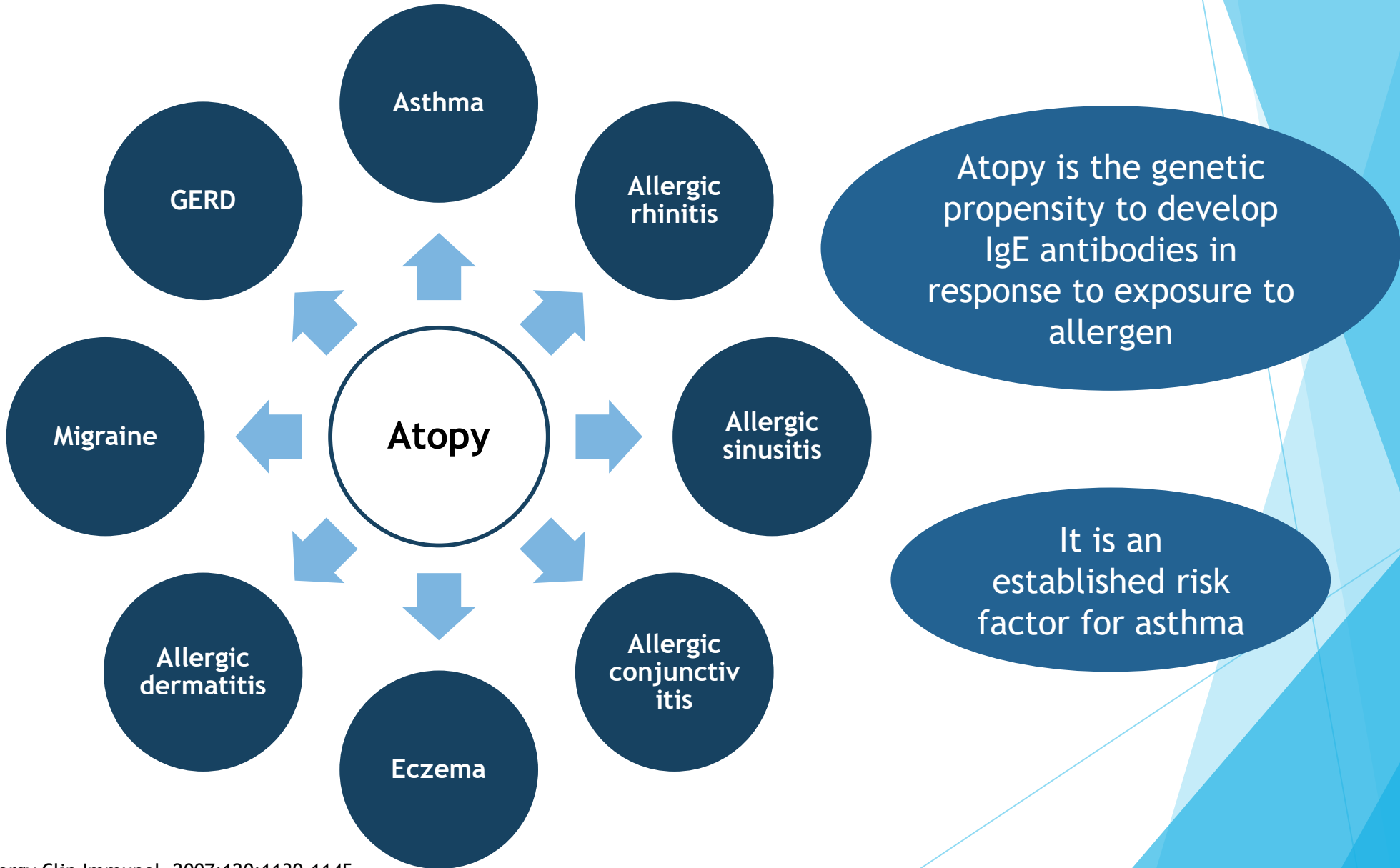
Clinical pearls

- Asthma is a complex interaction between environmental factors and genetic predisposition.
- Asthma is characterized by bronchial inflammation predominantly mediated by activated eosinophils and mast cells.
- Bronchial hyper-responsiveness is the hallmark of asthma.
- Uncontrolled inflammation of asthma causes airway remodeling leading to the development of fixed airway obstruction and COPD phenotype.
- Inhaled corticosteroids are the cornerstone of treatment of inflammation in asthma.
- Controlled inflammation will reduce the frequency and severity of asthma attacks.

Basics of asthma

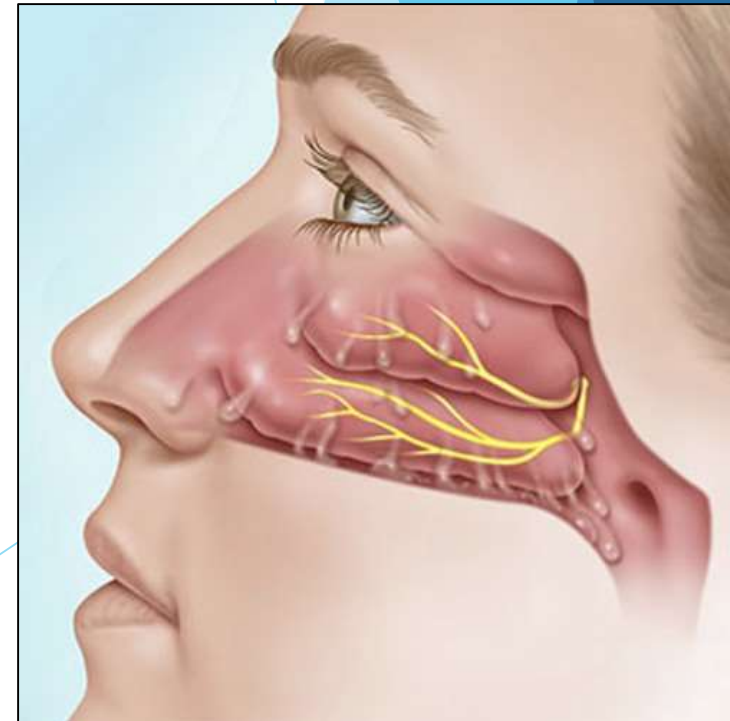
**Co-morbid conditions associated
with asthma**

Atopy



Allergic rhinitis/Hay fever

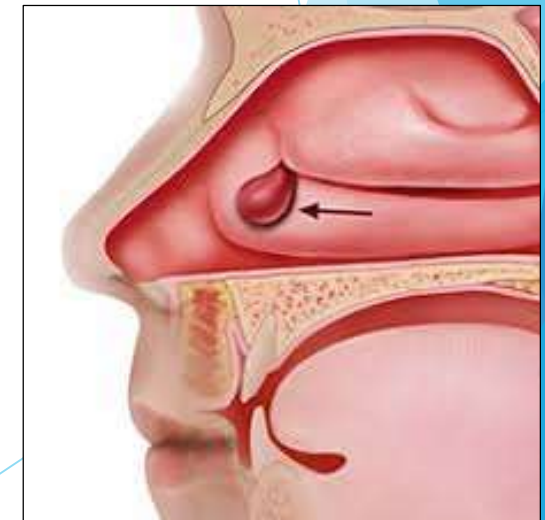
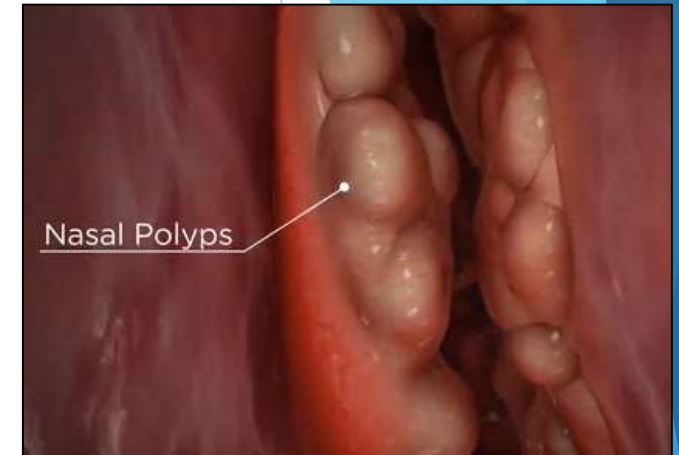
- The most common co-morbid condition associated with asthma.
- Signs and symptoms include a runny or stuffy nose, sneezing, red, itchy, and watery eyes, and swelling around the eyes.
- It should be treated promptly to avoid poor asthma control.
- Intranasal corticosteroids, anti-histamines and decongestants are the treatment options



Nasal polyps

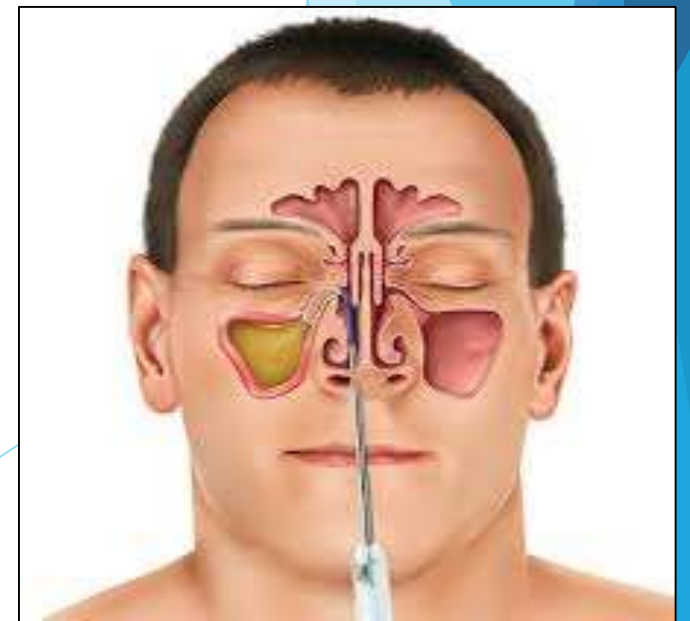
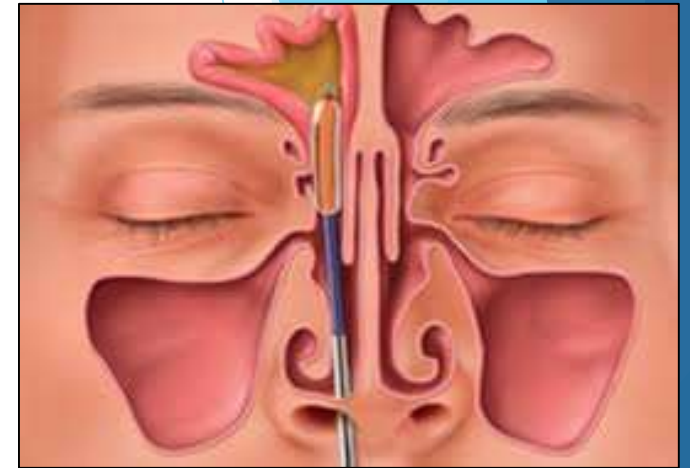
- A painless benign growth on the lining of the nose or sinuses.
- It is caused due to infection, allergies, drug sensitivity or immune disorders.
- Symptoms may include a runny nose, stuffiness or post-nasal drip. In some cases, there may be no symptoms.
- The condition can be treated with intranasal corticosteroids or polypectomy.

Nearly 45% of patients with nasal polyps will develop adult-onset asthma



Chronic sinusitis

- The cavities around the nasal passages become inflamed.
- It lasts up to eight weeks and may be caused by an infection or growths.
- Symptoms include headache, facial pain, runny nose and nasal congestion.
- Treated with nasal decongestants, nasal saline rinses and sometimes antibiotics may be required.
- Surgery to be avoided.



Allergic conjunctivitis

- Allergic conjunctivitis is inflammation of the lining of the eye (conjunctiva) due to allergy.
- Symptoms consist of eye redness, itching and increased tears.
- Treatment includes avoiding the allergen, taking antihistamine medication either by mouth or directly into the eye and local steroid drops.



Eczema/ Allergic dermatitis

- Eczema is an itchy skin rash and very common.
- Symptoms include rashes, redness, blister, fissures, hives, peeling, or ulcers, itching or swelling.
- Medications comprises of steroids, antiseptics, antihistamines and avoiding allergens.



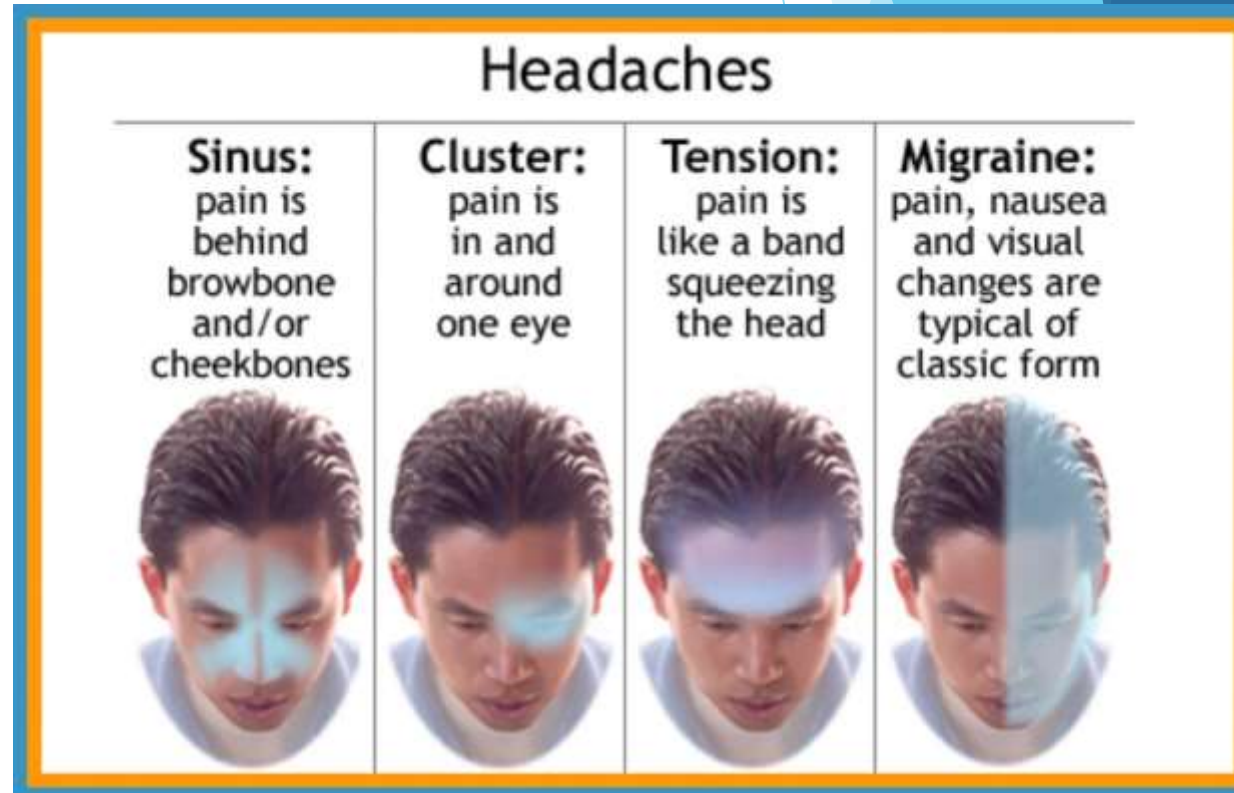
Migraine

Migraine can cause severe throbbing pain or a pulsing sensation, usually on one side of the head. It is caused by:

- Hunger
- Bright light
- Stress
- Dehydration

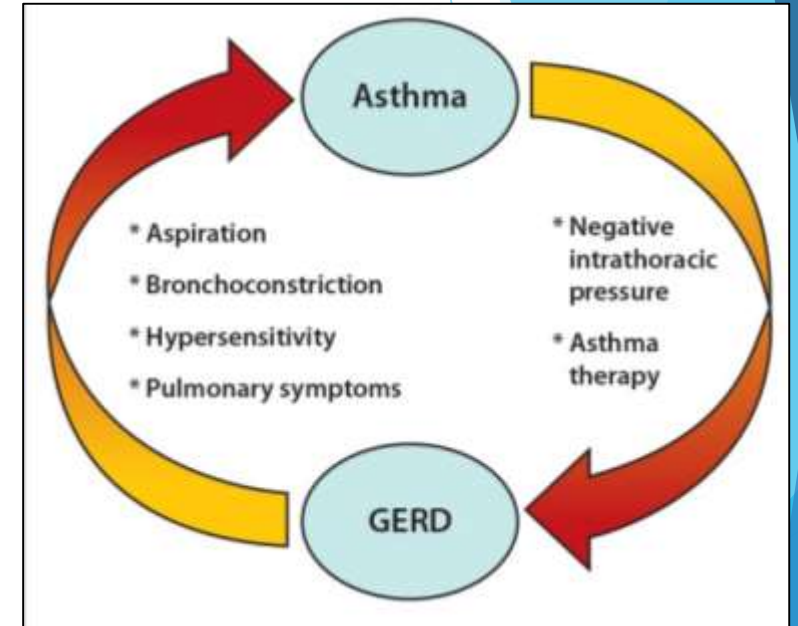
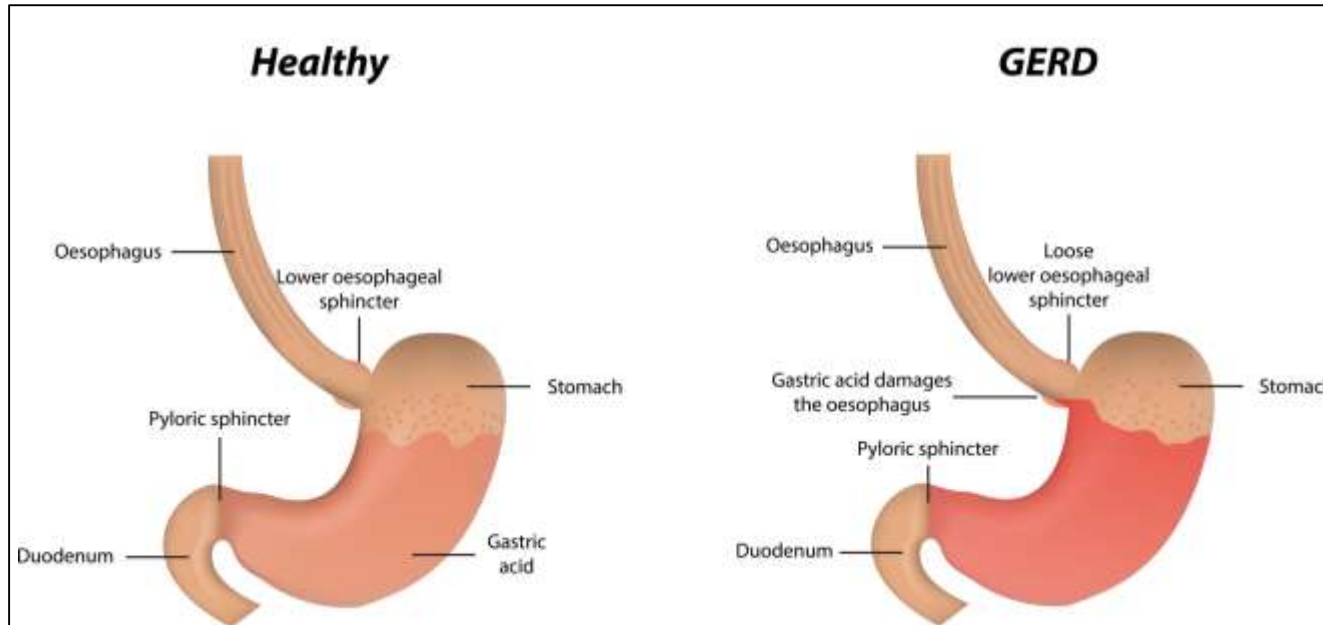
The coexistence of asthma and headaches may be related with a similar pathophysiological mechanism; parental history and common genetic compounds.

Asthma is 1.2-1.6 times more prevalent in those with migraine than in those without it.



Gastroesophageal reflux disease (GERD)

Asthma and GERD may exacerbate each other



- Asthma flare-ups can cause the lower esophageal sphincter to relax, allowing stomach contents to flow back, or reflux, into the esophagus.
- Acid reflux and heartburn more than twice a week may indicate GERD.
- Treatments include lifestyle changes, antacids, proton pump inhibitors.

Q and A