Bronchial asthma

By

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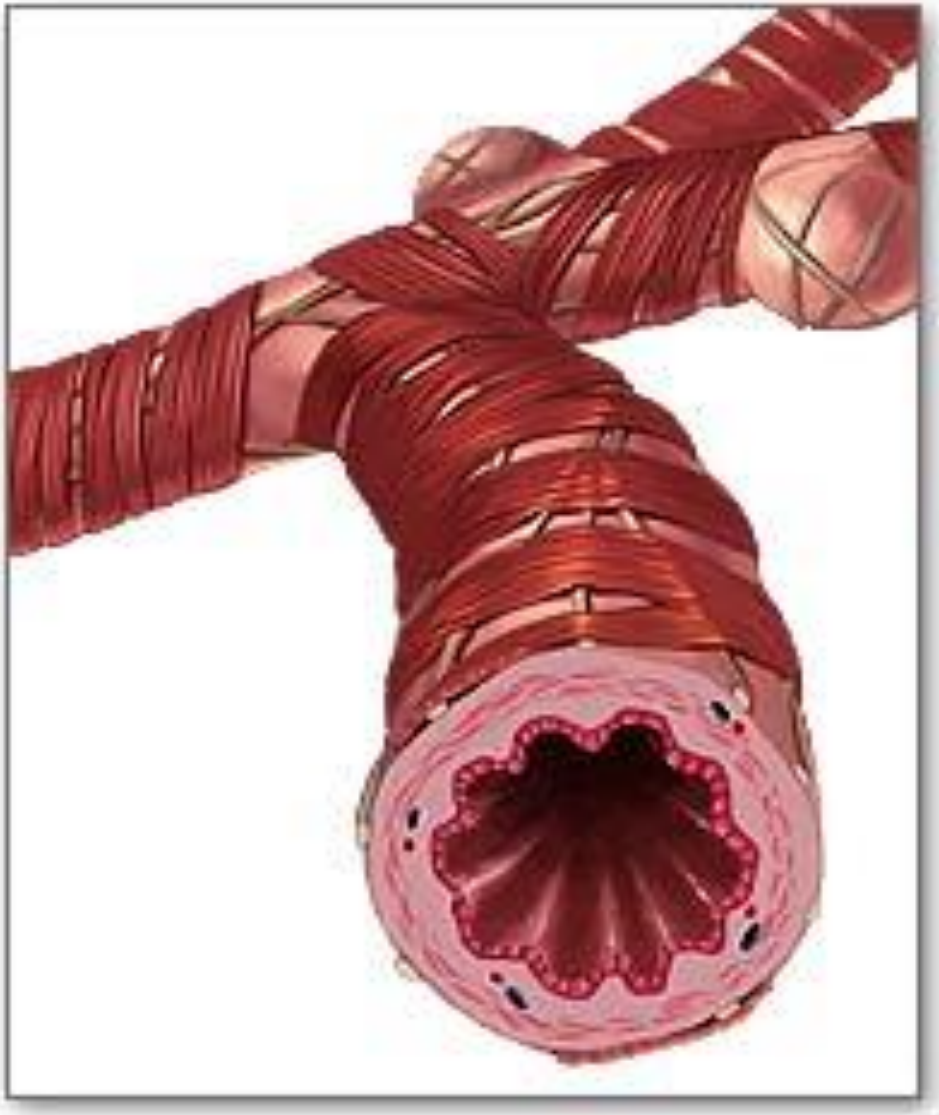
Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary overtime and in intensity, together with variable expiratory airflow limitation.

Normal bronchiole

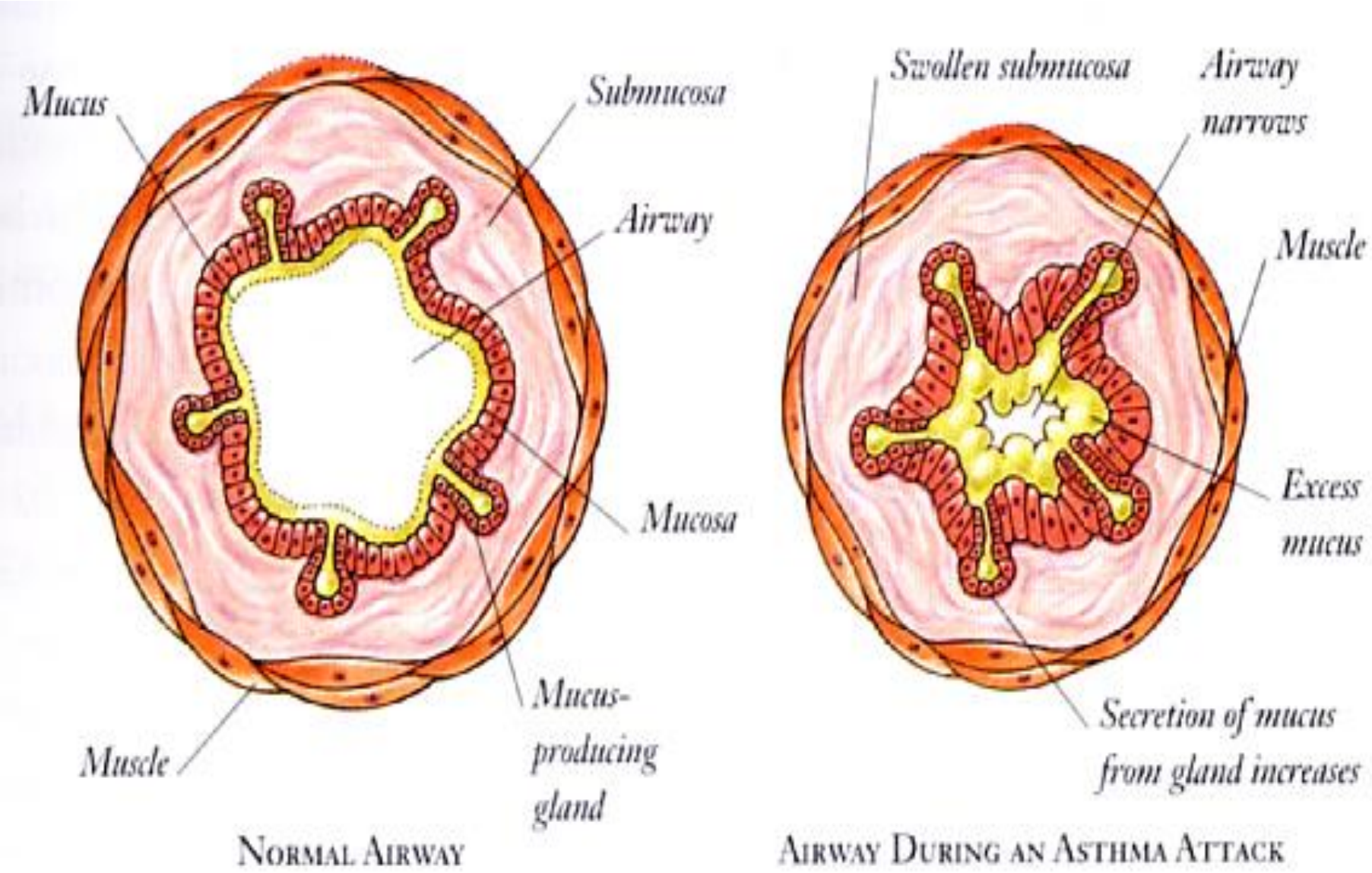
Asthmatic bronchiole



What is an asthma attack?

- When you breathe normally, muscles around your airways are relaxed, letting air move easily and quietly. During an asthma attack, three things can happen:
- **Bronchospasm:** The muscles around the airways constrict (tighten). When they tighten, it makes your airways narrow. Air cannot flow freely through constricted airways.
- **Inflammation:** The lining of your airways becomes swollen. Swollen airways don't let as much air in or out of your lungs.
- **Mucus production:** During the attack, your body creates more mucus. This thick mucus clogs airways

Asthma: Pathological changes



What are Factors Influencing the Development and Expression of Asthma

Factors Influencing the Development and Expression of Asthma

- Asthma is a complex trait
- Heritable and environmental factors contribute to its pathogenesis

Host factors

- Genetic, e.g.
  - Genes pre-disposing to Atopy
  - Genes pre-disposing to airway hyperresponsiveness

- Obesity
- Sex

Environmental factors

- **Allergens**
  - Indoor: Domestic mites, furred animals (dogs, cats, mice), cockroach allergen, fungi, molds, yeasts
  - Outdoor: Pollens, fungi, molds, yeasts
- **Infections** (predominantly viral)
- **Occupational sensitizers**
- **Outdoor/Indoor Air Pollution**
- **Diet**

Contributing Factors

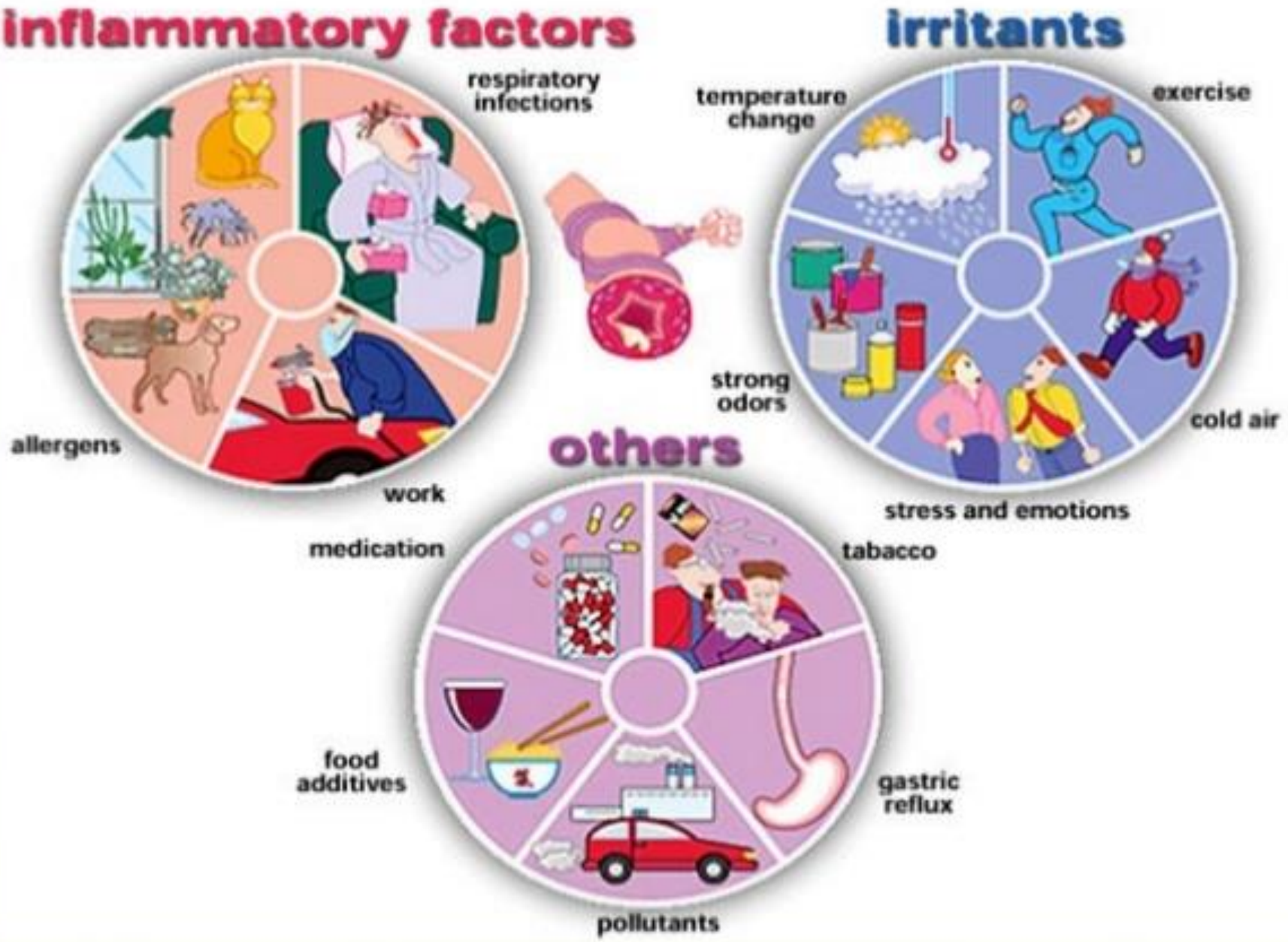
- **Respiratory infections;** The most common cause of acute exacerbation of asthma. Respiratory viruses are the major factors.
- **Physical activity**

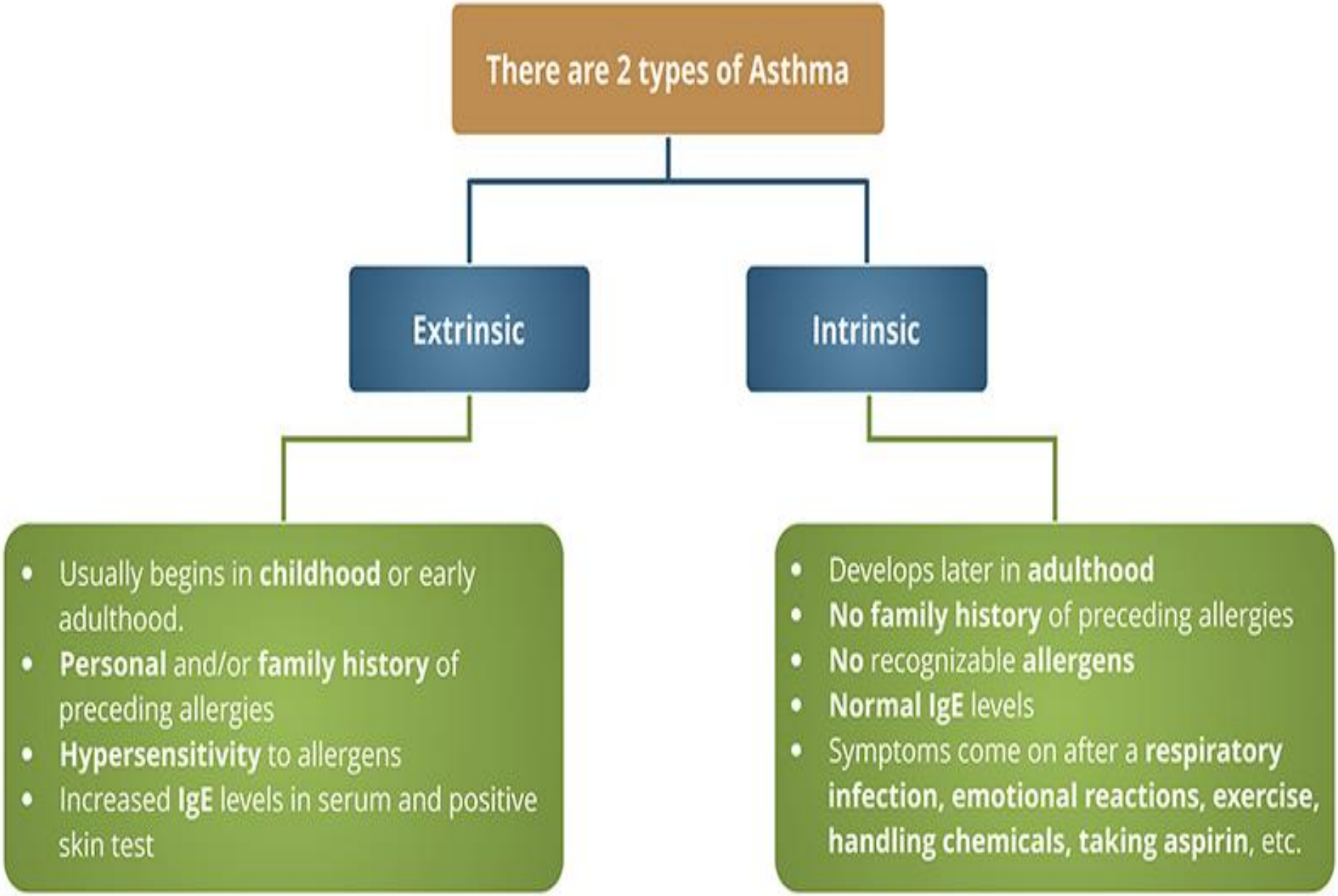
- **Psychological factors**
- **Medication**

- **Gastroesophageal reflux disease**

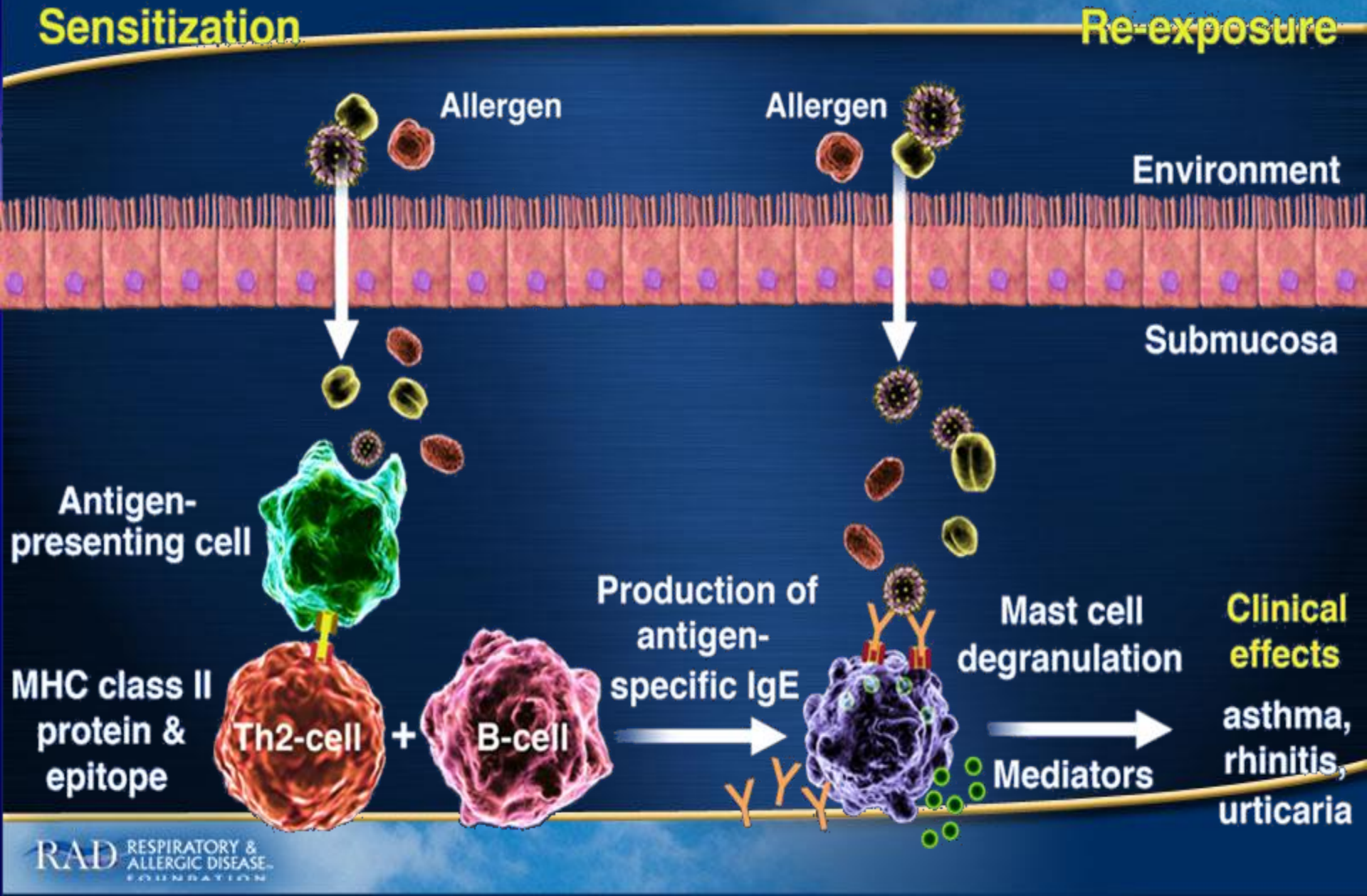
- **Smoking**
  - **Passive Smoking**
  - **Active Smoking**

TRIGGERS


inflammatory factors
respiratory infections
allergens
work
irritants
temperature change
exercise
strong odors
cold air
stress and emotions
others
medication
tabacco
food additives
gastric reflux
pollutants


There are 2 types of Asthma
Extrinsic
Intrinsic
• Usually begins in **childhood** or early adulthood.
• **Personal** and/or **family history** of preceding allergies
• **Hypersensitivity** to allergens
• Increased **IgE** levels in serum and positive skin test
• Develops later in **adulthood**
• **No family history** of preceding allergies
• **No** recognizable **allergens**
• **Normal IgE** levels
• Symptoms come on after a **respiratory infection, emotional reactions, exercise, handling chemicals, taking aspirin**, etc.

Immunology of bronchial asthma



History and patterns of symptoms

Physical examination

Patient History

- Has the patient had an attack or Recurrent episodes of Cough, Wheezing, Chest tightness or SOB?
- Does the patient have a troublesome cough, worse particularly at Night, or early morning?
- Does the patient cough may be triggered or worsened by factors such as;
  - Viral infections,
  - Allergens; eg cats, dust, or perfume
  - Tobacco smoke,
  - Exercise and Stress
  - Particular season , spring and winter (or change of season)?

Patient History

- Do the patient's colds '**go to the chest**' or take more than 10 days to resolve?

- Does the patient use any **medication** (e.g. bronchodilator) when symptoms occur? Is there a response?

If the patient answers "YES" to any of the above questions, suspect asthma.

Physical Examination

- Physical examination in people with asthma
  - Often normal
  - The most frequent finding is wheezing usually heard without a stethoscope or heard with a stethoscope on auscultation, especially on forced expiration

- Wheezing may be absent during severe asthma exacerbations ('silent chest')

- **Remember -**

Absence of symptoms at the time of examination does not exclude the diagnosis of asthma

Complications

-Pneumothorax

-Mediastinal and subcutaneous emphysema due to alveolar rupture.

-Atelectasis due to obstruction

- Dilated right heart chambers (Cor-pulmonale) :
  - from chronic hypoxemia and pulmonary hypertension
- Respiratory failure

Diagnostic testing

Diagnosis of asthma can be confirmed by demonstrating the presence of reversible airway obstruction using PFT ; *Spirometry* or *Peak flow meter*.

Pulmonary Function Tests-Spirometry

- Healthy individuals can exhale 75-80% of VC in 1 second and almost all in 3 seconds
- FEV1
  - Is that volume of air exhaled in 1 second
- FVC
  - Forced vital capacity - volume of air exhaled with maximal forced effort

Reversibility and variability of Airflow Obstruction

- **Confirm presence of airflow limitation**
  - **FEV_1/FVC is reduced + Reduced FEV_1**
  - **FEV_1/ FVC ratio is normally > 0.75 in healthy adults, and > 0.90 in children**

- **Confirm presence of Bronchodilator reversibility**
  - **Increase in FEV_1 > 12%of predicted or >200mL after bronchodilator**

- **If initial testing is negative: Repeat when patient is symptomatic, or after withholding bronchodilators**

Peak Expiratory Flow (PEF)

- Maximal rate of flow that can be produced during forced expiration

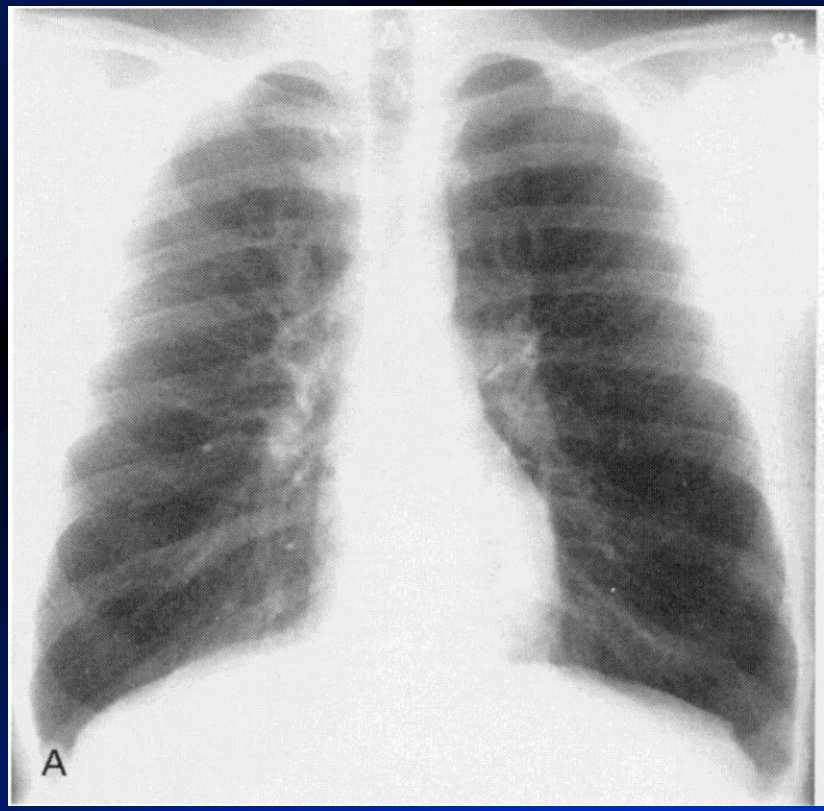
- Useful in ED, at home, at clinic
- Confirm presence of variation in lung function;
  - The greater the variation measured by PEF monitoring , or the more times variation is seen, the greater probability that the diagnosis is asthma

However, PEF is less reproducible than FEV1

CXR

- Most patients with asthma have normal x-rays.

- Signs of Hyperinflation (Diaphragm is down to the 8th rib anteriorly, MCL-ribbon-shaped heart…) as in ASA
- Diagnosis of Complications:
  - Pneumonia
  - Pneumothorax



Exhaled nitric oxide

This test is a measure of airway inflammation.

Blood and sputum eosinophilia

Patients with asthma sometimes have increased numbers of eosinophils in peripheral blood but sputum eosinophilia is a more specific diagnostic finding.

In patients with typical asthma symptoms if spirometry or PEF is not available or negative testing, elevated exhaled NO or blood eosinophilia **can support the diagnosis of asthma**

Key Components of Asthma Therapy

- Patient education
- "Trigger" control
- Pharmacologic therapy
- Assessment and monitoring

I- Patient Education in the Clinic

- Explain nature of the disease (i.e. **inflammation**)
- Explain **action** of prescribed drugs
- Stress need for **regular, long-term** therapy
- **Peak flow** reading
- Treatment diary / booklet

II- Trigger control

- Trigger control is an important step in overall management programs especially for difficult asthma. Environmental exposures to allergens, dusts and smoke require avoidance.

- Both the active tobacco smoking and passive environmental tobacco smoke (ETS) exposure are important and avoidable asthma triggers.

Pharmacological Treatments

- The goal of asthma treatment is to achieve and maintain clinical control.
- Medications to treat asthma can be classified as controllers or relievers.

I-Controllers:

- These are medications taken daily on a long-term basis to keep asthma under clinical control chiefly through their anti-inflammatory effects.

- Controller medications include:
  - Inhaled and systemic glucocorticosteroids,
  - Leukotriens modifiers,
  - Long-acting inhaled B2-agonists, LABA
  - Sustained-release theophylline,
  - Immunomodulators: 1.Omalizumab
    2.Allergen-specific immunotherapy

2-Relievers:

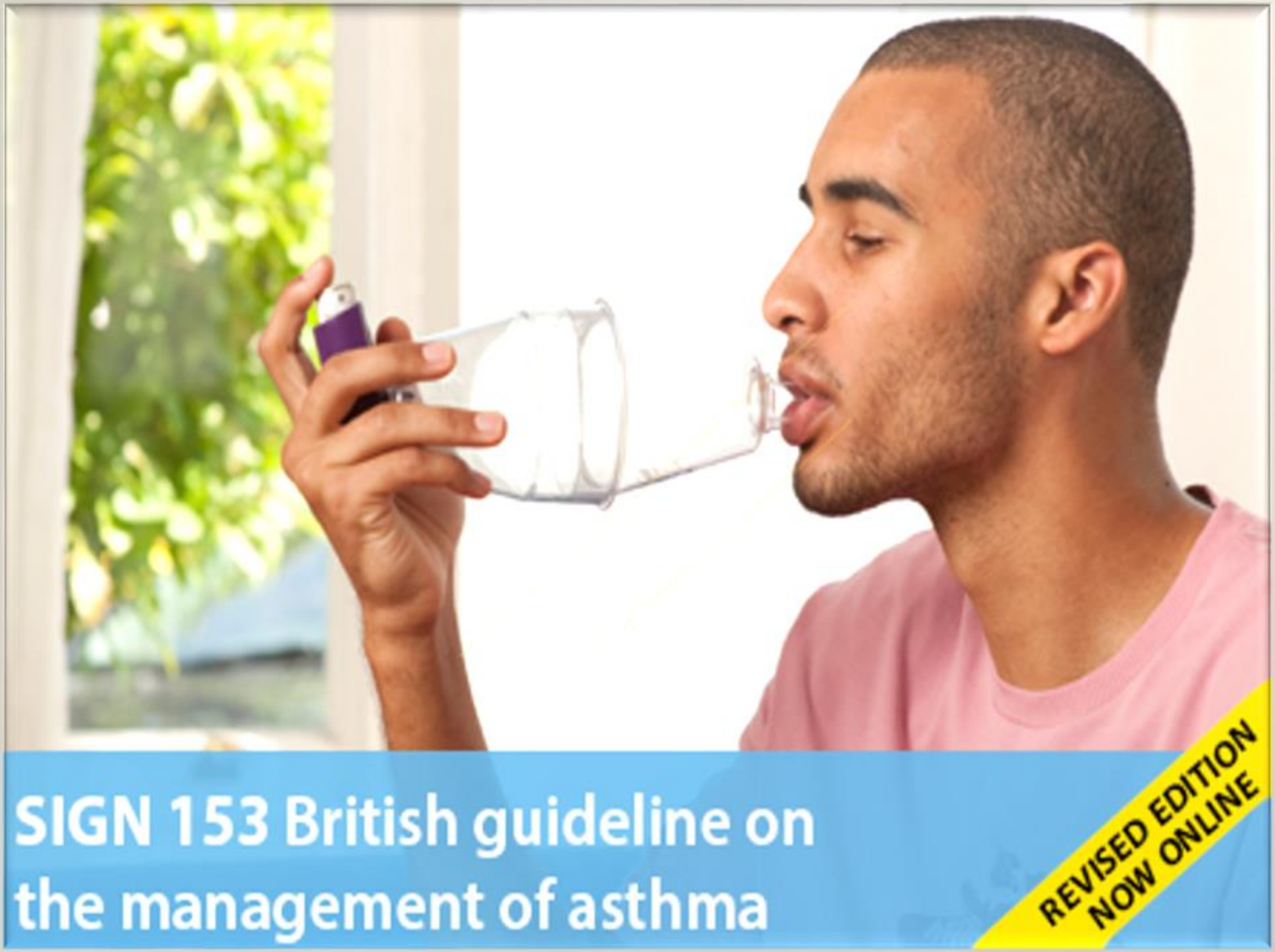
- These are medications used as-needed that act quickly to reverse bronchoconstriction and relieve its symptoms.

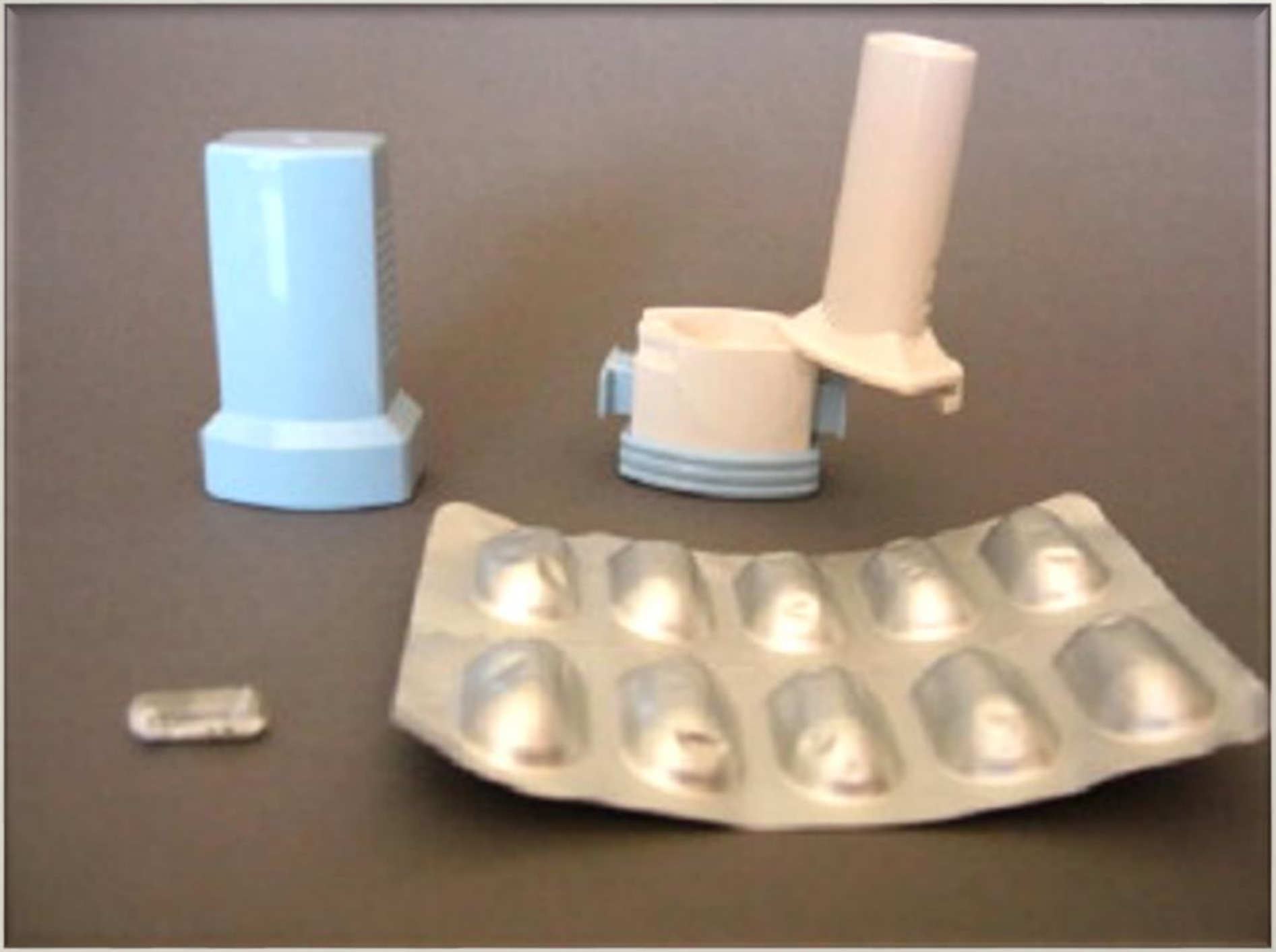
- Relievers medications include:
  - Short-acting inhaled B2- agonists, SABA
  - Inhaled anticholinergic,
  - Short-acting theophylline,

Route of Administration

- **The major advantage of inhaled therapy is:**
  - **Drugs are delivered directly into the airways,**
  - **Producing higher local concentration**
  - **Significantly less risk of systemic side effects.**

- **Inhaled medications for asthma are available as:**
  - **Pressurized metered-dose inhalers (MDIs),**
  - **Turbohailers**
  - **Dry powder inhalers (DPIs),**
  - **Discus,**
  - **Nebulizer .**


SIGN 153 British guideline on the management of asthma
REVISED EDITION NOW ONLINE




100/50


Seretide 500
500


Flixotide
Flixotide
Diskus
500


Symbicort
budesonide/
formoterol
120
doses
Turbuhaler
160/4.5µg/dose
Inhalation powder
160
4.5
AstraZeneca
Symbicort
160

I CAN CONTROL MY ASTHMA

Check my peak flow meter.

Visit my asthma Doctor.

Take my inhalers

Take my meds

Avoid triggers

Inhaled Corticosteroid

- **ICS are the most effective anti-inflammatory medications for the treatment of persistent asthma (Corner Stone) .**

- **Studies have demonstrated their efficacy in:**
  - Controlling airway inflammation,
  - Decreasing airway Hyperresponsiveness,
  - Reducing asthma symptoms,
  - Reducing frequency and severity of exacerbations,
  - Improving lung function,

- **However, they do not cure asthma, and when they are discontinued deterioration of clinical control follows within weeks to months in a proportion of patients.**

Beta-2 agonists

- Most important sympathomimetic used to reverse bronchoconstriction
- Almost given exclusively by inhalation
  - Decreases the systemic dose and adverse effects
  - Occasionally by nebulizer

Management of asthma exacerbations

MILD or MODERATE

- Talks in phrases, prefers sitting to lying, not agitated
- Respiratory rate increased
- Accessory muscles not used
- Pulse rate 100–120 bpm
- O_2 saturation (on air) 90–95%
- PEF >50% predicted or best

SEVERE

- Talks in words, sits hunched forwards, agitated
- Respiratory rate >30/min
- Accessory muscles in use
- Pulse rate >120 bpm
- O_2 saturation (on air) <90%
- PEF ≤50% predicted or best

LIFE-THREATENING

- Drowsy, confused or silent chest

START TREATMENT

-SABA 10 –4puffs by pMDI + spacer, repeat every 20 min for 1 hour
-Prednisolone: adults –40 50 mg
-Controlled O fi)$_2$ 95%–93 tegrat :(elbaliava

TRANSFER TO ACUTE CARE FACILITY

While waiting: give SABA, ipratropium bromide, O_2, systemic corticosteroid

Oxygen Therapy:

- By nasal Cannula or mask to achieve SpO2 > 90%
- Controlled O2 therapy in patients with elevated CO2

Bronchodilators:

- Nebulized B2 agonists Combined with nebulised Ipratropium bromide
- Given continuously for one hour, then every 60 min, after that regularly every 4-6 hours,
- Reduced according to response.

Corticosteroids:

- **Hydrocortisone 100 mg every 6-8 hours to be reduced to Dexamethazone or oral preparation**
- **Later ,then inhaled preparations started.**

Antibiotics：**when signs of bacterial infection**

Aminophylline:

Intravenous infusion every 8 hours to be transformed into oral long acting preparation after improvement of acute attack.

Intravenous magnesium


Thanks!