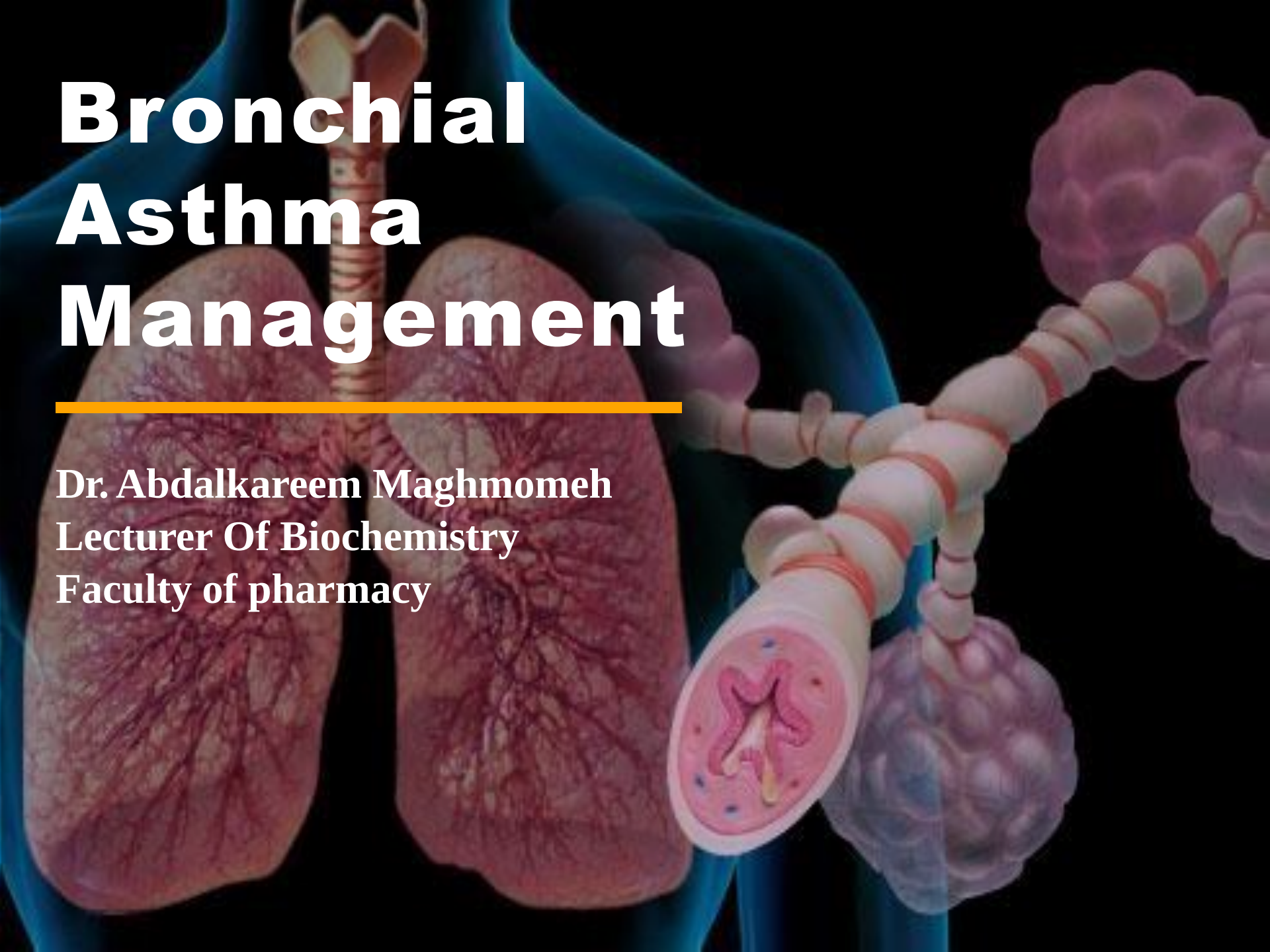
Bronchial Asthma Management



Dr. Abdalkareem Maghmomeh
Lecturer Of Biochemistry
Faculty of pharmacy

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BRONCHIAL

ASTHMA

INTRODUCTION

Introduction

- **Asthma** is a **chronic inflammatory** disorder of the airways that is characterized:
  - *clinically* by recurrent episodes of wheezing, breathlessness, chest tightness, and cough, particularly at night/early morning.
  - *physiologically* by widespread, reversible **narrowing** of the bronchial airways and a marked increase in bronchial responsiveness.

Introduction

- In 2015, 358 million people globally had asthma, up from 183 million in 1990.
- It caused about 397,100 deaths in 2015, most of which occurred in the developing world.

CLASSFICATION

Classification

- **Extrinsic /allergic 70%:**
  - Most common type
  - Environmental agent: dust, pollen, food, animal dander
  - Family history - present
  - Serum IgE levels - increased

Classification

- **Intrinsic /non-allergic(30%)**
- Triggered by **respiratory tract infection**
  - Viruses - most common cause
  - Family history uncommon
  - IgE level normal
  - No associated allergy
  - Cause- hyperirritability of bronchial tree

Classification

➢ Drug induced asthma

- Several pharmacologic agents
- Aspirin sensitive asthma.
  - sensitive to small doses of aspirin.
  - Inhibits COX pathway

Pathophysiology

I. Chronic inflammation

II. Airway Hyperresponsiveness

Pathophysiology

I. Inflammation

- Chronic inflammatory state
- Involves respiratory mucosa from trachea to terminal bronchioles, predominantly in the bronchi.
- Activation of mast cell , infiltration of eosinophils & T-helper type 2 (Th2) lymphocytes

Pathophysiology

I. Inflammation

- Exact cause of airway inflammation is unknown.
- Thought to be an interplay between endogenous and environmental factors.

❑ Endogenous factors

- Genetic predisposition to IgE mediated type I hypersensitivity
- The major risk factor for asthma

Pathophysiology

I. Inflammation

- **Environmental factors**

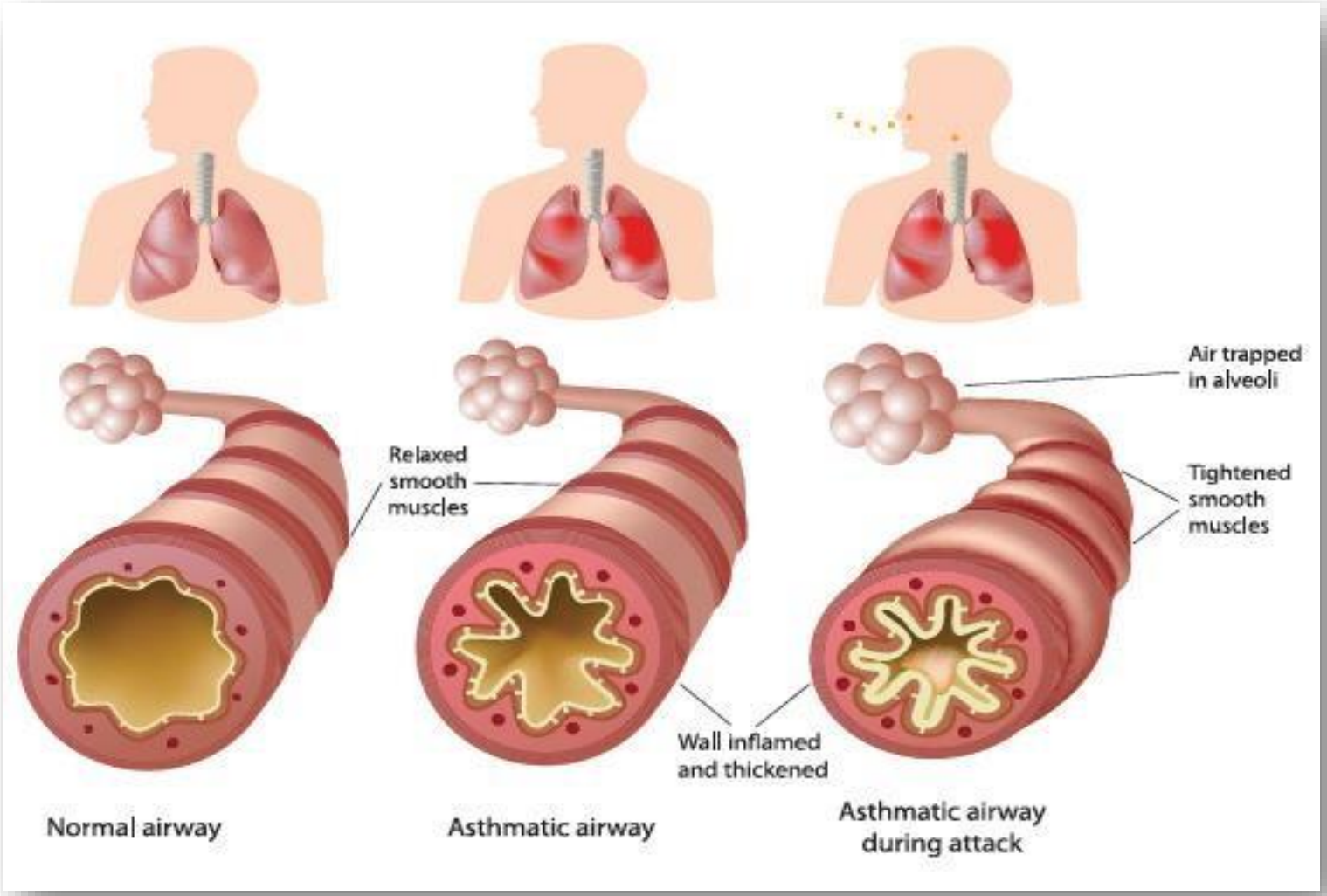
- ***Viral infections***: Mycoplasma, Chlamydia
- ***Air pollution***
- ***Allergens*** :house dust mite

Pathophysiology

II. Airway Hyperresponsiveness (AHR)

- The excessive bronchoconstrictor response to multiple inhaled triggers that would have no effect on normal airways.

Pathophysiology



RISK FACTORS

Risk factors

- **Host factors:**

- predispose individuals to, or protect them from, developing asthma

i. Genetic

ii. Gender (female)

iii. Obesity

Risk factors

- **Environmental factors:**
  - Indoor allergens , Outdoor allergens
  - Occupational sensitizers
  - Tobacco smoke , Air Pollution
  - Respiratory Infections
  - Diet

Triggers

- **Asthma Triggers**
  - Allergens
  - Virus Infections
  - Drugs
  - Exercise
  - Food
  - Air pollutants
  - Physical factors
  - Stress

DIAGNOSIS

Clinical manifestations

➢ Symptoms

- Wheezing, dyspnea and cough.
- Variable – both spontaneously and with therapy.
- Symptoms worse at night.
- Nonproductive cough
- Limitation of activity

Clinical manifestations

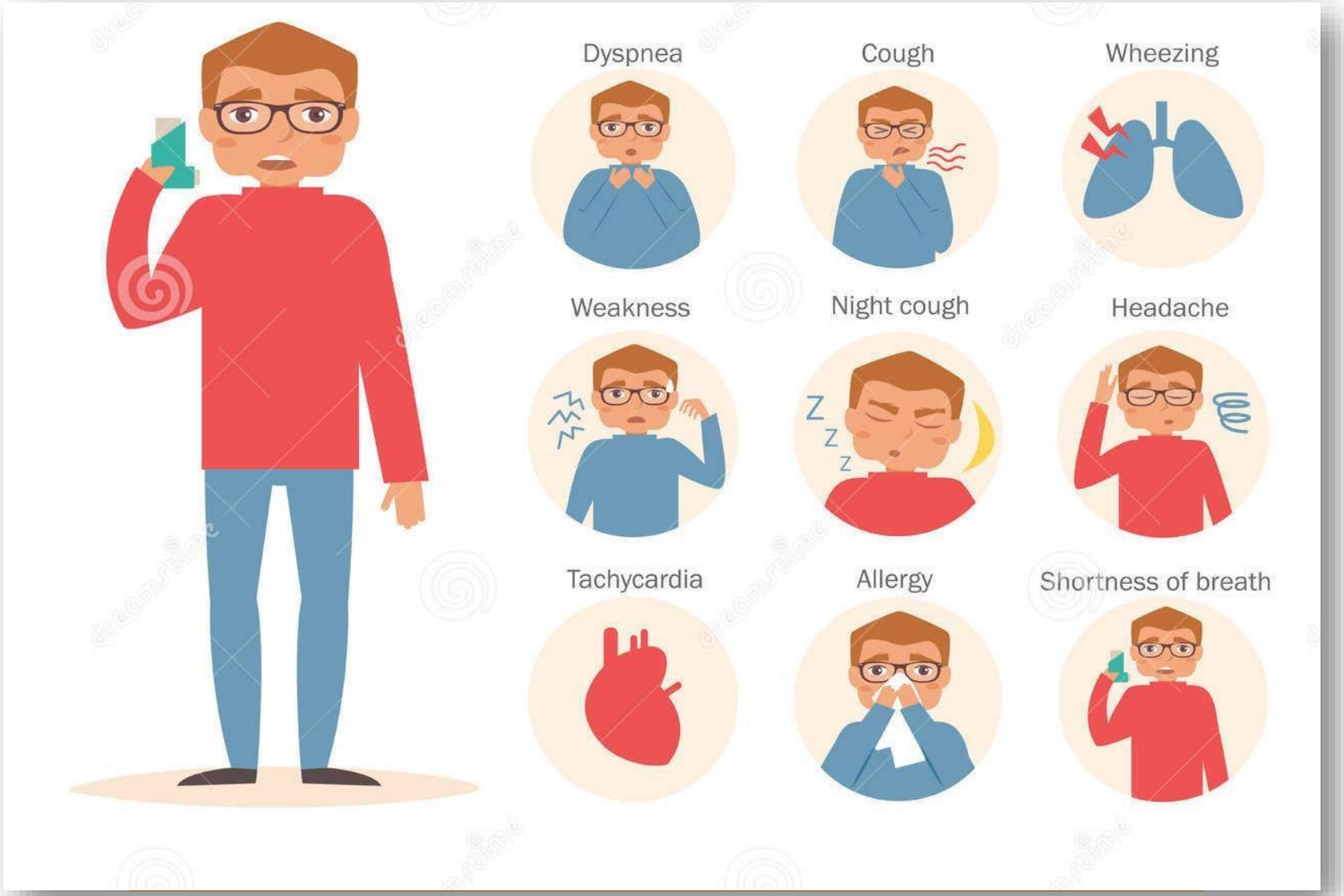
➢ Signs

- ↑ respiratory rate, with use of accessory muscles
- Expiratory sounds
- No findings when asthma is under control

Classification for asthma severity

Grade	Symptoms	Night-time Symptoms
Mild intermittent متقطع	Symptoms ≤ 2 times/week	≤ 2 times/month
Mild persistent متواصل	Symptoms ≥ 2 times/week but ≤ 1/day	≥ 2 times/month
Moderate persistent	Daily Symptoms	≥ 1/week
Severe persistent	Continued Symptoms Limited physical activity	Frequent

Clinical manifestations



Laboratory diagnosis

- **Pulmonary function tests:**
  - Using Spirometry
  - Estimate degree of obstruction.

Laboratory diagnosis

- **Chest X- ray**
- **Arterial blood-gas analysis**
  - hypoxia & hypocarbia
- Sputum & blood eosinophilia
- Elevated serum IgE levels

TREATMENT

Management

I. Non-Pharmacological

II. Pharmacological

Non-Pharmacological

- Reduce exposure to indoor allergens
- Avoid tobacco smoke
- Avoid vehicle emission
- Identify irritants in the workplace

Non-Pharmacological

- **Influenza Vaccination**
  - Should be provided to patients with asthma when vaccination of the general population is advised

Pharmacological treatment

❑ Classification of drugs

➢ **Bronchodilators** : rapid relief, by relaxation of airway smooth muscle

- β2 Agonists
- Anticholinergic Agents
- Methylxanthines

➢ **Controllers** : inhibit the inflammatory process

- Glucocorticoids
- Leukotrienes pathway inhibitors
- Cromones
- Anti-IgE therapy

Pharmacological treatment

➢ β2 Agonists in asthma

- Potent bronchodilators.
- Usually given by inhalation route.
- Effects:
  - Relaxation of airway smooth muscle
  - Inhibition of mast cell mediator release
  - Increased mucociliary transport
  - Inhibition of sensory nerve activation
- No effect on airway inflammation

Pharmacological treatment

➢ β2 Agonists in asthma

a) Short-Acting β2 Agonists

- E.g salbutamol
- Rapid onset,without significant systemic side effect
- Bronchodil. of choice in acute severe asthma
- Used for symptomatic relief
- Only treatment required for mild, intermittent asthma.
- Use >2 times a week indicates need of a regular controller therapy.

Pharmacological treatment

➢ β2 Agonists in asthma

b) Long-Acting β2Agonists

- E.g salmeterol,
- Duration of action - >12 hrs.
- Used in combination with inhaled corticosteroid therapy.
- Improve asthma control
- Should not be used as monotherapy (increased mortality)
- Not effective for acute bronchospasm.

Pharmacological treatment

➢ Anticholinergic agents

- E.g Ipratropium bromide, tiotropium.
- Prevent cholinergic nerve induced bronchoconstriction.
- Less effective than β2 agonists.
- **Use in asthma**
  - Intolerance to inhaled β2 agonist.
  - Status asthmaticus –additive effect with β2 agonist

Pharmacological treatment

- **Anticholinergic agents**
  - **Ipratropium:**
    - Slow
  - **Tiotropium:**
    - longer acting
    - Dryness of mouth

Pharmacological treatment

- **Methylxanthines ميثيل زينتين**
- Medium potency bronchodilator
- E.g Theophylline, theobromine, caffeine
- Recently interest has declined in this class of drugs:
- Still widely used drugs especially in developing countries due to their lower cost.

Pharmacological treatment

- **Methylxanthines**
  - **Adverse effects**
    - Anorexia, nausea, vomiting, abdominal discomfort
    - headache, and anxiety
    - Seizures or arrhythmias
  - **Doxyphylline**
    - long acting,oral

Pharmacological treatment

➢ Corticosteroids in asthma

- Effective drugs for treatment of asthma.
- Development of inhaled corticosteroids is a major advance in asthma therapy.
- Used prophylactically as a controller therapy.
- Reduce the need for β2 agonist.
- Benefit starts in 1week but continues up to several months.

Pharmacological treatment

➢ Corticosteroids in asthma

- **Effects:** Broad anti-inflammatory effects:
  - Marked inhibition of infiltration of airways by inflammatory cells.
  - Modulation of cytokine and chemokine production

Pharmacological treatment

- **Corticosteroids in asthma**
  - **Inhaled corticosteroids(ICS)**
    - Use of β2Agonists >2 times a week indicates need of a ICS
    - E.g Beclomethasone , Fluticasone

Pharmacological treatment

➢ Corticosteroids in asthma

- **Inhaled corticosteroids(ICS)**
- Adverse effects:
  - Oropharyngeal candidiasis, dysphonia
  - Decreased bone mineral density.
  - Skin thinning
  - Growth retardation in children

Pharmacological treatment

➢ Leukotrienes pathway inhibitors

a) Inhibition of 5-lipoxygenase, thereby preventing leukotriene synthesis. Zileuton.

b) Inhibition of the binding of LTD4 to its receptor on target tissues, thereby preventing its action. E.g Montelukast.

- Oral route.
- **Adverse effects**
  - Liver toxicity

Pharmacological treatment

➢ Leukotrienes pathway inhibitors

- They are less effective than ICSs in controlling asthma
- Use in asthma
  - Patients unable to manipulate inhaler devices.
  - Aspirin induced asthma.
  - Mild asthma – alternative to ICS.
  - Moderate to severe asthma – may allow reduction of ICS dose

Pharmacological treatment

➢ Cromones

- E.g Cromolyn sodium
- On chronic use (four times daily) reduce the overall level of bronchial reactivity.
- They are only of value when taken prophylactically.
- Inhalation route

Pharmacological treatment

➢ Cromones

- May act by stabilization of Mast cells with inhibition of mediator release
- **Uses**
  - Asthma - Prevention of asthmatic attacks in mild to moderate asthma
- **Adverse effects**
  - Well tolerated drugs
  - Minor side effects- throat irritation, cough, and mouth dryness, rarely, chest tightness, and wheezing

Pharmacological treatment

- **Anti-IgE therapy**:
  - Omalizumab أومالیزوماب
  - Antibody targeted against IgE.
  - **Action:**
    - IgE bound to omalizumab cannot bind to IgE receptors on mast cells and basophils, thereby preventing the allergic reaction

Pharmacological treatment

- **Anti-IgE therapy**:

- Use in asthma
  - Persons >12 years of age with moderate-to-severe asthma.
- Omalizumab is not an acute bronchodilator
- Expensive drug
- Has to be given under direct medical supervision due to the risk of anaphylaxis

Status asthmaticus (severe acute asthma)

- Severe airway obstruction
  - Severe dyspnea & unproductive cough
  - Sweating , central cyanosis ,tachycardia

Status asthmaticus (severe acute asthma)

- **Treatment of Status asthmaticus**

- High conc. of oxygen through facemask
- Salbutamol in oxygen given immediately
- Ipratopium bromide + salbutamol in oxygen,who don’t respond within 15-30 min

Status asthmaticus (severe acute asthma)

- **Treatment of Status asthmaticus**

- Terbutaline s.c. or i.v.
- Hydrocortisone hemisuccinate i.v. , followed by infusion.
- Endotracheal intubation & mechanical ventilation if above ttt fails

Prophylaxis

- Preservation of the environment, healthy life-style (smoking cessation, physical training) – are the basis of primary asthma prophylaxis.
- These measures in combination with adequate drug therapy are effective for secondary prophylaxis.