D.PHARM • SECOND YEAR

Pharmacotherapeutics

CHAPTER 2.2

Respiratory System



ENGLISH CHAPTER NOTES

DIPLOMA IN PHARMACY

ASTHMA

DEFINITION

Asthma is a chronic inflammatory airway disorder with variable airflow obstruction, usually reversible, and bronchial hyperresponsiveness.

Hyperresponsiveness means the airways narrow too easily in response to triggers.

ETIOPATHOGENESIS

Genetic susceptibility and environmental factors act together.

Family history of asthma or atopy increases risk.

COMMON TRIGGERS

- Allergens: dust mites, pollen and pet dander.
- Respiratory infections.
- Cold air and exercise.
- Smoke, air pollution and occupational irritants.
- NSAIDs and beta-blockers in susceptible people.

AIRWAY CHANGES

Airway inflammation and hyperresponsiveness

↓

Bronchoconstriction + swelling + excess mucus

↓

Variable airflow obstruction

↓

Episodes of wheezing, breathlessness, chest tightness and cough

IMMUNOLOGICAL MECHANISMS

A common allergic/Type 2 pattern, not the only asthma mechanism:

TH2 helper cells → IL-4, IL-5 and IL-13 → allergic and eosinophilic inflammation.

Mast cell degranulation → histamine release → bronchoconstriction.

ASTHMA

CLINICAL MANIFESTATIONS

- Wheezing, especially during expiration.
- Shortness of breath and chest tightness.
- Cough, often worse at night or early morning.
- Prolonged expiration.
- Use of accessory muscles for breathing.
- Tachypnea and tachycardia.

SEVERE OR LIFE-THREATENING ASTHMA

- Cannot speak in full sentences.
- Silent chest: little or no wheeze because airflow is very poor.
- Cyanosis and reduced oxygen saturation.

These signs need immediate emergency assessment.
A silent chest is not improvement.

NONPHARMACOLOGICAL MANAGEMENT

- Reduce exposure to the person's relevant allergens and irritants.
- Avoid smoke; stop smoking.
- Reduce problematic cold-air or occupational exposure.
- Teach and check correct inhaler technique.
- Keep recommended influenza and pneumococcal vaccinations up to date.
- Use suitable regular exercise; manage exercise-related symptoms.
- Reduce excess weight if obese.
- Consider pulmonary rehabilitation in selected patients with functional limitation.

Education, adherence and a written asthma action plan support control.

ASTHMA

PHARMACOLOGICAL MANAGEMENT

Key rule: use ICS-containing treatment. SABA-only treatment is not recommended for adults and adolescents.

RELIEVER MEDICATIONS

- **Low-dose ICS-formoterol:** preferred reliever approach for adults and adolescents, according to the prescribed regimen.
- **Salbutamol (albuterol):** short-acting beta2-agonist (SABA); rapid symptom relief within an ICS-containing plan.
- **Ipratropium:** anticholinergic added in severe acute attacks.

CONTROLLER MEDICATIONS

- **Inhaled corticosteroids (ICS):** beclomethasone, budesonide, fluticasone. Main anti-inflammatory treatment.
- **Long-acting beta2-agonists (LABA):** salmeterol, formoterol. Always use with ICS in asthma.
- **Leukotriene receptor antagonists (LTRA):** montelukast, zafirlukast. Alternative/add-on options in selected patients.
- **Theophylline:** uncommon use; narrow therapeutic index and important interactions.

SEVERE ASTHMA: SPECIALIST BIOLOGICS

Omalizumab → anti-IgE

Mepolizumab → anti-IL-5

Benralizumab → anti-IL-5 receptor alpha

Choose biologics by asthma phenotype and eligibility.
Acute severe attacks may also need systemic corticosteroids and oxygen for hypoxemia.

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