# SNS COLLEGE OF ALLIED HEALTH SCIENCES

SNS Kalvi Nagar, Coimbatore - 35

Affiliated to Dr MGR Medical University, Chennai

**DEPARTMENT :** PHYSICIAN ASSISTANT

**COURSE NAME :** PHARMACOLOGY

**UNIT :** DRUGS ACTING ON RESPIRATORY SYSTEM

**TOPICS :** BRONCHODILATORS, RESPIRATORY STIMULANTS, BRONCHOLYTIC AGENTS

# BRONCHODILATORS

- Bronchodilators are drugs that relax and widen the airways (bronchi and bronchioles) in the lungs.

- By dilating the airways, these medications help to improve airflow, making it easier for individuals to breathe.

# BETA 2 - ADRENERGIC AGONISTS

**Class:** Short-acting (e.g., albuterol), long-acting (e.g., salmeterol), ultra-long-acting.

**Mechanism of Action:** Stimulate beta2 receptors, leading to relaxation of bronchial smooth muscle.

**Pharmacodynamics:** Bronchodilation, increased airflow.

**Pharmacokinetics:**

Absorption: Rapid with inhaled administration, variable with oral administration.

Distribution: Localized effects in bronchial smooth muscle with limited systemic absorption.

Metabolism: Minimal hepatic metabolism, especially with inhaled forms.

Excretion: Eliminated renally, often as metabolites.

**Forms:** Inhalers, nebulizers, oral tablets.

**Indications:** Asthma, COPD.

**Contraindications:** Hypersensitivity.

**Side Effects:** Tachycardia, tremor, hypokalemia.

**Technician Role :** To Monitor Peak flow measurements, heart rate, potassium levels.

# ANTICHOLINERGIC AGENTS (Antimuscarinics)

**Class:** Ipratropium bromide (short-acting), tiotropium (long-acting).

**Mechanism of Action:** Block muscarinic receptors, preventing bronchoconstriction.

**Pharmacodynamics:** Bronchodilation, reduced mucus secretion.

**Pharmacokinetics:**

Absorption: Rapid with inhaled administration, limited systemic absorption.

Distribution: Localized effects in bronchial smooth muscle with minimal systemic distribution.

Metabolism: Minimal hepatic metabolism.

Excretion: Eliminated renally, often as metabolites.

**Forms:** Inhalers, nebulizers.

**Indications:** COPD, sometimes used in asthma.

**Contraindications:** Hypersensitivity.

**Side Effects:** Dry mouth, urinary retention.

**Technician Role:** To Monitor Lung function tests, symptom relief.

# METHYLXANTHINES

**Class:** Theophylline.

**Mechanism of Action:** Inhibit phosphodiesterase, increasing cAMP, resulting in bronchodilation.

**Pharmacodynamics:** Bronchodilation, increased diaphragmatic contractility.

**Pharmacokinetics:**

Absorption: Variable with oral administration, influenced by food and individual variations.

Distribution: Widespread distribution, crosses the blood-brain barrier.

Metabolism: Mainly hepatic metabolism, especially with theophylline.

Excretion: Eliminated renally, primarily as metabolites.

**Forms:** Oral tablets, intravenous.

**Indications:** Asthma, COPD.

**Contraindications:** Hypersensitivity, active peptic ulcer.

**Side Effects:** Nausea, insomnia, tachycardia.

**Technician Role :** To Monitor Serum theophylline levels, signs of toxicity.

# RESPIRATORY STIMULANTS

- Respiratory stimulants are drugs that stimulate the respiratory centers in the brain, leading to an increase in respiratory rate and depth.

- These medications are often used to counteract respiratory depression or apnea.

# XANTHINE DERIVATIVES

**Class:** Doxapram.

**Mechanism of Action:** Central respiratory stimulation.

**Pharmacodynamics:** Increased respiratory rate and depth.

**Pharmacokinetics:**

Absorption: Rapid with intravenous administration.

Distribution: Rapid distribution to the central nervous system.

Metabolism: Metabolized in the liver.

Excretion: Eliminated renally, often as metabolites.

**Forms:** Intravenous.

**Indications:** Respiratory depression or apnea.

**Contraindications:** Seizure disorders, hypersensitivity.

**Side Effects:** Tremor, increased heart rate.

**Technician Role :** To Monitor Respiratory rate, heart rate, blood pressure.

# OPIOID ANTAGONISTS

**Class:** Naloxone.

**Mechanism of Action:** Reversal of opioid-induced respiratory depression.

**Pharmacodynamics:** Competes with opioids at receptor sites.

**Pharmacokinetics:**

Absorption: Rapid with intramuscular, intravenous, or intranasal administration.

Distribution: Rapid distribution to the central nervous system.

Metabolism: Metabolized in the liver.

Excretion: Eliminated renally, often as metabolites.

**Forms:** Intramuscular, intravenous, intranasal.

**Indications:** Opioid overdose.

**Contraindications:** Hypersensitivity.

**Side Effects:** Rapid opioid withdrawal, increased heart rate.

**Technician Role :** To Monitor Respiratory rate, level of consciousness.

# BRONCHOLYTIC AGENTS

- Broncholytic agents include medications that help in the management of respiratory conditions by modifying and improving the properties of respiratory secretions, making them easier to clear.

# EXPECTORANTS

**Class:** Guaifenesin.

**Mechanism of Action:** Increase respiratory tract fluid to facilitate mucus removal.

**Pharmacodynamics:** Enhanced mucus clearance.

**Pharmacokinetics:**

Absorption: Moderate systemic absorption with oral administration.

Distribution: Widespread distribution in the body.

Metabolism: Metabolized in the liver.

Excretion: Eliminated renally, often as metabolites.

**Forms:** Oral tablets, syrups.

**Indications:** Chest congestion.

**Contraindications:** Hypersensitivity.

**Side Effects:** Nausea, vomiting.

**Technician Role :** To Monitor Symptom relief.

# MUCOLYTICS

**Class:** Acetylcysteine.

**Mechanism of Action:** Break down and thin respiratory mucus.

**Pharmacodynamics:** Improved mucus viscosity.

**Pharmacokinetics:**

Absorption: Variable absorption depending on the formulation (e.g., acetylcysteine).

Distribution: Local and systemic effects on respiratory secretions.

Metabolism: Variable, may occur in the liver.

Excretion: Eliminated renally, often as metabolites.

**Forms:** Inhalation, oral.

**Indications:** Conditions with thick, tenacious mucus (e.g., chronic bronchitis).

**Contraindications:** Hypersensitivity.

**Side Effects:** Nausea, Vomiting.

**Technician Role :** To Monitor Symptom relief, improved mucus clearance.

# ASSESSMENT

- What is the Pharmacokinetics of Expectorants ?
- What is the Mechanism of Action of Mucolytics ?