

Respiratory Drugs

1. Bronchodilators

Mechanism of Action (MOA):

Beta-2 Agonists:

- **Short-Acting Beta-2 Agonists (SABAs)** (e.g., Salbutamol, Terbutaline):
 - Stimulate beta-2 adrenergic receptors in the bronchial smooth muscle.
 - Cause rapid bronchodilation and relief of acute bronchospasm.
 - Onset: ~5 minutes, Duration: 3-6 hours.
- **Long-Acting Beta-2 Agonists (LABAs)** (e.g., Salmeterol, Formoterol):
 - Provide prolonged bronchodilation by stimulating beta-2 receptors.
 - Used for maintenance therapy in asthma and COPD.
 - Duration: 12-24 hours.
- **Ultra-Long-Acting Beta-2 Agonists (ULABAs)** (e.g., Indacaterol, Olodaterol, Vilanterol):
 - Provide 24-hour bronchodilation.
 - Used for COPD maintenance therapy.

Muscarinic Antagonists (Anticholinergics):

- **Short-Acting (SAMA)** (e.g., Ipratropium Bromide):
 - Block muscarinic receptors, reducing bronchoconstriction and mucus secretion.
 - Used for acute COPD exacerbations.
- **Long-Acting (LAMA)** (e.g., Tiotropium, Aclidinium, Umeclidinium):
 - Provide prolonged bronchodilation by inhibiting muscarinic receptors.
 - Used in maintenance therapy for COPD.

Methylxanthines (e.g., Theophylline, Aminophylline):

- Non-selective phosphodiesterase inhibitors that increase cAMP levels.
- Cause bronchodilation, anti-inflammatory effects, and diaphragm contractility.
- Narrow therapeutic index, requiring monitoring.

Combination Inhalers:

- **LABA + ICS** (e.g., Salmeterol/Fluticasone, Formoterol/Budesonide):
 - Used in asthma and COPD maintenance therapy.
- **LABA + LAMA** (e.g., Indacaterol/Glycopyrronium, Umeclidinium/Vilanterol):
 - Used in severe COPD to optimize bronchodilation.
- **LABA + LAMA + ICS** (e.g., Fluticasone/Umeclidinium/Vilanterol):
 - Triple therapy for COPD patients with frequent exacerbations.

Important Side Effects (SE):

- **Beta-2 Agonists:** Tachycardia, tremors, hypokalemia.
- **Muscarinic Antagonists:** Dry mouth, urinary retention, blurred vision.
- **Methylxanthines:** Nausea, arrhythmias, seizures (toxicity risk).

Key Notes:

- SABAs are first-line rescue medications for asthma.
 - LABAs should not be used as monotherapy in asthma (must combine with ICS).
 - LAMAs are preferred for COPD maintenance therapy.
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2. Corticosteroids

Mechanism of Action (MOA):

- **Inhaled Corticosteroids (ICS)** (e.g., Beclomethasone, Budesonide, Fluticasone):
 - Reduce airway inflammation, swelling, and mucus production.
 - First-line maintenance therapy in persistent asthma.
- **Systemic Corticosteroids** (e.g., Prednisone, Methylprednisolone, Hydrocortisone):
 - Suppress immune response and inflammation.
 - Used for acute exacerbations of asthma and COPD.
- **Nebulized Corticosteroids** (e.g., Budesonide Nebules, Fluticasone Nebules):
 - Used in pediatric and severe asthma exacerbations.

Important Side Effects (SE):

- **ICS:** Oral candidiasis (thrush), hoarseness, adrenal suppression (long-term use).
- **Systemic Corticosteroids:** Hyperglycemia, osteoporosis, immunosuppression, adrenal suppression.

Key Notes:

- Rinse mouth after ICS use to prevent thrush.
 - Systemic steroids should be tapered to avoid adrenal insufficiency.
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3. Antihistamines

Mechanism of Action (MOA):

H1 Receptor Antagonists:

- **First-Generation (e.g., Diphenhydramine, Chlorpheniramine, Promethazine):**
 - Cross the blood-brain barrier, causing sedation.
 - Used for allergic rhinitis, urticaria, motion sickness.
- **Second-Generation (e.g., Loratadine, Cetirizine, Fexofenadine):**
 - Do not cross the blood-brain barrier significantly.
 - Used for allergic rhinitis, chronic urticaria.

H2 Receptor Antagonists (e.g., Ranitidine, Famotidine):

- Though primarily used for gastric acid suppression, they can have mild anti-allergic effects.

Important Side Effects (SE):

- **First-Generation:** Drowsiness, dry mouth, dizziness.
- **Second-Generation:** Minimal sedation, headache.

Key Notes:

- First-generation antihistamines cause significant sedation and should be used cautiously in the elderly.
 - Second-generation antihistamines are preferred for long-term allergy management.
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4. Cough Medications

Mechanism of Action (MOA):

Cough Suppressants (Antitussives):

- **Opioid Antitussives (e.g., Codeine, Hydrocodone):**
 - Act on the medullary cough center to suppress cough reflex.
 - Used for severe, non-productive cough.
- **Non-Opioid Antitussives (e.g., Dextromethorphan, Benzonatate):**
 - Act centrally to reduce cough reflex sensitivity.
 - Benzonatate numbs stretch receptors in the respiratory tract.

Expectorants (e.g., Guaifenesin):

- Increase mucus production and hydration, making it easier to clear secretions.
- Used in productive coughs.

Mucolytics (e.g., N-acetylcysteine, Dornase Alfa):

- Break down mucus to improve clearance.
- Used in chronic respiratory diseases (e.g., cystic fibrosis, COPD).

Leukotriene Receptor Antagonists (LTRAs) (e.g., Montelukast, Zafirlukast):

- Reduce inflammation and bronchoconstriction.
- Used in allergic rhinitis and asthma-induced cough.

Important Side Effects (SE):

- **Opioid Antitussives:** Sedation, constipation, respiratory depression.
- **Dextromethorphan:** Dizziness, nausea, potential for abuse at high doses.
- **Guaifenesin:** GI upset, dizziness.
- **Mucolytics:** Bronchospasm (N-acetylcysteine).

Key Notes:

- Opioid antitussives should be used cautiously due to addiction potential.
 - Guaifenesin should be taken with plenty of water to maximize effectiveness.
 - Mucolytics are beneficial in chronic mucus-producing conditions.
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