Drugs Affecting the Respiratory System
Drugs Affecting the Respiratory System

Antihistamines, Decongestants, Antitussives, and Expectorants
COUGH

with presence of secretion in bronchi

- muco- and proteolytic drugs

Sputum with significant adhesive properties:
- drugs which stimulate production of surfactant

Decreasing of speed of mucociliary transport with unchanged properties of sputum:
- drugs which stimulate ciliar function

Significant disorders of bronchial permeability, morphological changes of bronchi (atrophy of mucous membrane, bronchial stenosis), excessive production of mucus:
- alkali inhalations

Signs of allergic reaction with increased histamine activity:
- antihistamine drugs

NONPRODUCTIVE

Cataral inflammation (usually viral), reflector and central cough:
- anticough drugs

Signs of allergic reaction:
- antihistamine drugs

Bronchospasm:
- broncholytics

dry

REHYDRANTS IN ALL CASES
Understanding the Common Cold

- Most caused by viral infection (rhinovirus or influenza virus—the "flu")
Understanding the Common Cold

- Virus invades tissues (mucosa) of upper respiratory tract, causing upper respiratory infection (URI).
- Excessive mucus production results from the inflammatory response to this invasion.
- Fluid drips down the pharynx into the esophagus and lower respiratory tract, causing cold symptoms: sore throat, coughing, upset stomach.
Understanding the Common Cold

- Irritation of nasal mucosa often triggers the sneeze reflex.
- Mucosal irritation also causes release of several inflammatory and vasoactive substances, dilating small blood vessels in the nasal sinuses and causing nasal congestion.
Treatment of the Common Cold

- Involves combined use of antihistamines, nasal decongestants, antitussives, and expectorants.
- Treatment is SYMPTOMATIC only, not curative.
- Symptomatic treatment does not eliminate the causative pathogen.
Upper Respiratory Tract
Upper and Lower Respiratory Tracts
Treatment of the Common Cold

- Difficult to identify whether cause is viral or bacterial.
- Treatment is “empiric therapy,” treating the most likely cause.
- Antivirals and antibiotics may be used, but viral or bacterial cause may not be easily identified.
Antihistamines

Drugs that directly compete with histamine for specific receptor sites.

- Two histamine receptors:
  - $H_1$ histamine-1
  - $H_2$ histamine-2
Antihistamines

H₂ Blockers or H₂ Antagonists
– Used to reduce gastric acid in PUD
– Examples: cimetidine (Tagamet), ranitidine (Zantac), or famotidine (Pepcid)
Antihistamines

H₁ antagonists are commonly referred to as antihistamines

- Antihistamines have several effects:
  - Antihistaminic
  - Anticholinergic
  - Sedative
Antihistamines: Mechanism of Action

- BLOCK action of histamine at the receptor sites
  - Compete with histamine for binding at unoccupied receptors.
  - CANNOT push histamine off the receptor if already bound.
Antihistamines: Mechanism of Action

- The binding of $H_1$ blockers to the histamine receptors prevents the adverse consequences of histamine stimulation:
  - Vasodilation
  - Increased gastrointestinal and respiratory secretions
  - Increased capillary permeability
Antihistamines: Mechanism of Action

- More effective in preventing the actions of histamine rather than reversing them
- Should be given early in treatment, before all the histamine binds to the receptors
Histamine vs. Antihistamine Effects

Cardiovascular (small blood vessels)

- **Histamine effects:**
  - Dilation and increased permeability (allowing substances to leak into tissues)

- **Antihistamine effects:**
  - Prevent dilation of blood vessels
  - Prevent increased permeability
Histamine vs. Antihistamine Effects

Smooth Muscle (on exocrine glands)

- **Histamine effects:**
  - Stimulate salivary, gastric, lacrimal, and bronchial secretions

- **Antihistamine effects:**
  - Prevent salivary, gastric, lacrimal, and bronchial secretions
Histamine vs. Antihistamine Effects

Immune System

(Release of substances commonly associated with allergic reactions)

- Histamine effects:
  - Mast cells release histamine and other substances, resulting in allergic reactions.

- Antihistamine effect:
  - Binds to histamine receptors, thus preventing histamine from causing a response.
Antihistamines: Other Effects

Skin:
- Block capillary permeability, wheal-and-flare formation, itching

Anticholinergic:
- Drying effect that reduces nasal, salivary, and lacrimal gland secretions (runny nose, tearing, and itching eyes)

Sedative:
- Some antihistamines cause drowsiness
Antihistamines: Therapeutic Uses

Management of:

- Nasal allergies
- Seasonal or perennial allergic rhinitis (hay fever)
- Allergic reactions
- Motion sickness
- Sleep disorders
Antihistamines

10 to 20% of general population is sensitive to various environmental allergies.

- Histamine-mediated disorders:
  - Allergic rhinitis (hay fever, mold and dust allergies)
  - Anaphylaxis
  - Angioneurotic edema
  - Drug fevers
  - Insect bite reactions
  - Urticaria (itching)
Antihistamines: Therapeutic Uses

Also used to relieve symptoms associated with the common cold:

- Sneezing, runny nose
- Palliative treatment, not curative
Antihistamines: Side effects

- Anticholinergic (drying) effects, most common:
  - Dry mouth
  - Difficulty urinating
  - Constipation
  - Changes in vision
- Drowsiness
  - (Mild drowsiness to deep sleep)
Antihistamines: Two Types

- Traditional
  or
- Nonsedating/Peripherally Acting
Antihistamines:

Traditional

- Older
- Work both peripherally and centrally
- Have anticholinergic effects, making them more effective than nonsedating agents in some cases

Examples: diphenhydramine (Benadryl) chlorpheniramine (Chlor-Trimeton)
Antihistamines:

Nonsedating/Peripherally Acting

- Developed to eliminate unwanted side effects, mainly sedation
- Work peripherally to block the actions of histamine; thus, fewer CNS side effects
- Longer duration of action (increases compliance)

Examples: fexofenadine (Allegra)
loratadine (Claritin)
Nursing Implications: Antihistamines

- Gather data about the condition or allergic reaction that required treatment; also, assess for drug allergies.
- Contraindicated in the presence of acute asthma attacks and lower respiratory diseases.
- Use with caution in increased intraocular pressure, cardiac or renal disease, hypertension, asthma, COPD, peptic ulcer disease, BPH, or pregnancy.
Nursing Implications: Antihistamines

- Instruct patients to report excessive sedation, confusion, or hypotension.
- Avoid driving or operating heavy machinery, and do not consume alcohol or other CNS depressants.
- Do not take these medications with other prescribed or OTC medications without checking with prescriber.
Nursing Implications: Antihistamines

- Best tolerated when taken with meals—reduces GI upset.
- If dry mouth occurs, teach patient to perform frequent mouth care, chew gum, or suck on hard candy (preferably sugarless) to ease discomfort.
- Monitor for intended therapeutic effects.
Decongestants
Nasal Congestion

- Excessive nasal secretions
- Inflamed and swollen nasal mucosa

Primary causes:
- Allergies
- Upper respiratory infections (common cold)
Decongestants

Two main types are used:

- Adrenergics (largest group)
- Corticosteroids
Decongestants

Two dosage forms:
- Oral
- Inhaled/topically applied to the nasal membranes
Oral Decongestants

- Prolonged decongestant effects, but delayed onset
- Effect less potent than topical
- No rebound congestion
- Exclusively adrenergics
- Examples: phenylephrine, pseudoephedrine (Sudafed)
Topical Nasal Decongestants

- Both adrenergics and steroids
- Prompt onset
- Potent
- Sustained use over several days causes rebound congestion, making the condition worse
Topical Nasal Decongestants

- **Adrenergics:**
  - ephedrine (Vicks)
  - naphazoline (Privine)
  - oxymetazoline (Afrin)
  - phenylephrine (Neo Synephrine)

- **Intranasal Steroids:**
  - beclomethasone dipropionate (Beconase, Vancenase)
  - flunisolide (Nasalide)
<table>
<thead>
<tr>
<th>Nasal Decongestants: Mechanism of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site of action: blood vessels surrounding nasal sinuses</td>
</tr>
<tr>
<td>- Adrenergics</td>
</tr>
<tr>
<td>- Constrict small blood vessels that supply URI structures</td>
</tr>
<tr>
<td>- As a result, these tissues shrink and nasal secretions in the swollen mucous membranes are better able to drain</td>
</tr>
<tr>
<td>- Nasal stuffiness is relieved</td>
</tr>
</tbody>
</table>
Nasal Decongestants: Mechanism of Action

Site of action: blood vessels surrounding nasal sinuses

- Nasal steroids
  - Anti-inflammatory effect
  - Work to turn off the immune system cells involved in the inflammatory response
  - Decreased inflammation results in decreased congestion
  - Nasal stuffiness is relieved
Nasal Decongestants: Drug Effects

- Shrink engorged nasal mucous membranes
- Relieve nasal stuffiness
Nasal Decongestants: Therapeutic Uses

Relief of nasal congestion associated with:

- Acute or chronic rhinitis
- Common cold
- Sinusitis
- Hay fever
- Other allergies

May also be used to reduce swelling of the nasal passage and facilitate visualization of the nasal mucosa during endoscopy.
# Nasal Decongestants: Side Effects

<table>
<thead>
<tr>
<th>Adrenergics</th>
<th>Steroids</th>
</tr>
</thead>
<tbody>
<tr>
<td>nervousness</td>
<td>local mucosal dryness and irritation</td>
</tr>
<tr>
<td>insomnia</td>
<td></td>
</tr>
<tr>
<td>palpitations</td>
<td></td>
</tr>
<tr>
<td>tremors</td>
<td></td>
</tr>
</tbody>
</table>

(systemic effects due to adrenergic stimulation of the heart, blood vessels, and CNS)
Nursing Implications: Nasal Decongestants

- Decongestants may cause hypertension, palpitations, and CNS stimulation—avoid in patients with these conditions.
- Assess for drug allergies.
Nursing Implications: Decongestants

- Patients should avoid caffeine and caffeine-containing products.
- Report a fever, cough, or other symptoms lasting longer than a week.
- Monitor for intended therapeutic effects.
Antitussives
Cough Physiology

Respiratory secretions and foreign objects are naturally removed by the

- cough reflex
  - Induces coughing and expectoration
  - Initiated by irritation of sensory receptors in the respiratory tract
Two Basic Types of Cough

- **Productive Cough**
  - Congested, removes excessive secretions

- **Nonproductive Cough**
  - Dry cough
Coughing

Most of the time, coughing is beneficial
- Removes excessive secretions
- Removes potentially harmful foreign substances

In some situations, coughing can be harmful, such as after hernia repair surgery
Antitussives

Drugs used to stop or reduce coughing

- Opioid and nonopioid
  (narcotic and non-narcotic)

Used only for NONPRODUCTIVE coughs!
Antitussives: Mechanism of Action

Opioid

- Suppress the cough reflex by direct action on the cough center in the medulla.

Examples: codeine (Robitussin A-C, Dimetane-DC) hydrocodone
Beta-adrenomimetics
Salbutamol, Ventolin, Berotek, Asthmopent
Antitussives: Mechanism of Action

Nonopioid

- Suppress the cough reflex by numbing the stretch receptors in the respiratory tract and preventing the cough reflex from being stimulated.

Examples: benzonatate (Tessalon) dextromethorphan (Vicks Formula 44, Robitussin-DM)
Antitussives: Therapeutic Uses

- Used to stop the cough reflex when the cough is nonproductive and/or harmful
Oxeladin citrate, Tussuprex
Glaucin hydrochloride (glauvent) + ephedrine + Sage oil
Libexin
Drugs of medical plants

- Althea officinalis
- Thermopsis
- Viola
Drugs of medical plants

Ledum palustrae

Origanum vulgari
Crystal tripsin (Trypsinum crystallisatum)
Ampoules - 0,005 g and 0,01 g
Acetylcystein (Acetylcysteinum)

Forms of production: tablets - 0,1, 0,2 and 0,6, 20 % solution for inhalation in ampoules – 5 and 10 ml; 10 % solution for injection in ampoules - 2 ml and 5 % solution in ampoules – 10ml.
Bromhexin (Bromhexinum)
Mucaltin (Mucaltininum)
Antitussives: Side Effects

Benzonatate
- Dizziness, headache, sedation

Dextromethorphan
- Dizziness, drowsiness, nausea

Opioids
- Sedation, nausea, vomiting, lightheadedness, constipation
Nursing Implications: Antitussive Agents

- Perform respiratory and cough assessment, and assess for allergies.
- Instruct patients to avoid driving or operating heavy equipment due to possible sedation, drowsiness, or dizziness.
- If taking chewable tablets or lozenges, do not drink liquids for 30 to 35 minutes afterward.
Nursing Implications: Antitussive Agents

- Report any of the following symptoms to the caregiver:
  - Cough that lasts more than a week
  - A persistent headache
  - Fever
  - Rash
- Antitussive agents are for NONPRODUCTIVE coughs.
- Monitor for intended therapeutic effects.
Expectorants
Expectorants

- Drugs that aid in the expectoration (removal) of mucus
- Reduce the viscosity of secretions
- Disintegrate and thin secretions
Expectorants: Mechanisms of Action

- Direct stimulation
  or
- Reflex stimulation

Final result: thinner mucus that is easier to remove
Expectorants: Mechanism of Action

Direct stimulation:

- The secretory glands are stimulated directly to increase their production of respiratory tract fluids.

Examples: terpin hydrate, iodine-containing products such as iodinated glycerol and potassium iodide (direct and indirect stimulation)
Expectorants: Mechanism of Action

Reflex stimulation:
- Agent causes irritation of the GI tract.
- Loosening and thinning of respiratory tract secretions occur in response to this irritation.
Examples: guaifenesin, syrup of ipecac
Expectorants: Drug Effects

By loosening and thinning sputum and bronchial secretions, the tendency to cough is indirectly diminished.
Expectorants: Therapeutic Uses

Used for the relief of nonproductive coughs associated with:

- Common cold
- Pertussis
- Bronchitis
- Influenza
- Laryngitis
- Measles
- Pharyngitis
- Coughs caused by chronic paranasal sinusitis
# Expectorants: Common Side Effects

<table>
<thead>
<tr>
<th>guaifenesin</th>
<th>terpin hydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea, vomiting</td>
<td>Gastric upset</td>
</tr>
<tr>
<td>Gastric irritation</td>
<td>(Elixir has high alcohol content)</td>
</tr>
</tbody>
</table>
Nursing Implications: Expectorants

- Expectorants should be used with caution in the elderly, or those with asthma or respiratory insufficiency.
- Patients taking expectorants should receive more fluids, if permitted, to help loosen and liquefy secretions.
- Report a fever, cough, or other symptoms lasting longer than a week.
- Monitor for intended therapeutic effects.
Bronchodilators and Other Respiratory Agents
Asthmatic Response

- excess mucus secretion
- edema
- bronchoconstriction (smooth-muscle contraction)
- mucus plug
- alveolus
Bronchodilators: Xanthine Derivatives

- Plant alkaloids: caffeine, theobromine, and theophylline
- Only theophylline is used as a bronchodilator

Examples: aminophylline, dyphylline, oxtrophyllyline, theophylline (Bronkodyl, Slobid, Theo-Dur Uniphyl)
Drugs Affecting the Respiratory System

- Bronchodilators
  - Xanthine derivatives
  - Beta-agonists
- Anticholinergics
- Antileukotriene agents
- Corticosteroids
- Mast cell stabilizers
Exchange of Oxygen and Carbon Dioxide

- surfactant layer
- alveolar epidermal cell
- alveolar basement membrane
- interstitial space
- capillary basement membrane
- alveolar capillary endodermal cell
- alveolar capillary

Red blood cell filled mainly with oxygen (arterial blood)

Red blood cell filled mainly with carbon dioxide (venous blood)
Bronchodilators: Xanthine Derivatives

Mechanism of Action

- Increase levels of energy-producing cAMP*
- This is done competitively inhibiting phosphodiesterase (PDE), the enzyme that breaks down cAMP
- Result: decreased cAMP levels, smooth muscle relaxation, bronchodilation, and increased airflow

\*cAMP = cyclic adenosine monophosphate
Bronchodilators: Xanthine Derivatives

**Drug Effects**

- Cause bronchodilation by relaxing smooth muscles of the airways.
- Result: relief of bronchospasm and greater airflow into and out of the lungs.
- Also causes CNS stimulation.
- Also causes cardiovascular stimulation: increased force of contraction and increased HR, resulting in increased cardiac output and increased blood flow to the kidneys (diuretic effect).
Bronchodilators: Xanthine Derivatives
Therapeutic Uses

- Dilation of airways in asthmas, chronic bronchitis, and emphysema
- Mild to moderate cases of asthma
- Adjunct agent in the management of COPD
- Adjunct therapy for the relief of pulmonary edema and paroxysmal nocturnal edema in left-sided heart failure
Bronchodilators: Xanthine Derivatives
Side Effects

- Nausea, vomiting, anorexia
- Gastroesophageal reflux during sleep
- Sinus tachycardia, extrasystole, palpitations, ventricular dysrhythmias
- Transient increased urination
Methylxanthines
Theophylline (of prolonged action)
M-cholinoblockers
Atropine sulfate, Solutan, Ipratropii bromidum (Atrovent)
Inhibitors of mast cells degranulation

- **Cromolyn, Ketotifen** and **Nedocromil** antagonize antigen-induced (IgE-mediated) mast cell degranulation.
- They prevent the release of histamine and slow-reacting substance of anaphylaxis (SRS-A) - mediators of type I allergic reactions.
- Their beneficial effects in the treatment of asthma are largely prophylactic.
Ketotifen
Tilade (sodium nedocromil)
Bronchodilators: Beta-Agonists

- Large group, sympathomimetics
- Used during acute phase of asthmatic attacks
- Quickly reduce airway constriction and restore normal airflow
- Stimulate beta$_2$ adrenergic receptors throughout the lungs
Bronchodilators: Beta-Agonists Three types

- **Nonselective adrenergics**
  - Stimulate alpha$_1$, beta$_1$ (cardiac), and beta$_2$ (respiratory) receptors.
  - Example: epinephrine

- **Nonselective beta-adrenergics**
  - Stimulate both beta$_1$ and beta$_2$ receptors.
  - Example: isoproterenol (Isuprel)

- **Selective beta$_2$ drugs**
  - Stimulate only beta$_2$ receptors.
  - Example: albuterol
Bronchodilators: Beta-Agonists Mechanism of Action

- Begins at the specific receptor stimulated
- Ends with the dilation of the airways

Activation of beta$_2$ receptors activate cAMP, which relaxes smooth muscles of the airway and results in bronchial dilation and increased airflow.
Bronchodilators: Beta-Agonists Therapeutic Uses

- Relief of bronchospasm, bronchial asthma, bronchitis, and other pulmonary disease.
- Useful in treatment of acute attacks as well as prevention.
- Used in hypotension and shock.
- Used to produce uterine relaxation to prevent premature labor.
- Hyperkalemia—stimulates potassium to shift into the cell.
## Bronchodilators: Beta-Agonists

<table>
<thead>
<tr>
<th>Side Effects</th>
<th>Alpha-Beta (epinephrine)</th>
<th>Beta(_1) and Beta(_2) (isoproterenol)</th>
<th>Beta(_2) (albuterol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insomnia</td>
<td></td>
<td>cardiac stimulation</td>
<td>vascular headache</td>
</tr>
<tr>
<td>Restlessness</td>
<td></td>
<td>hypotension</td>
<td></td>
</tr>
<tr>
<td>Anorexia</td>
<td></td>
<td>tremor</td>
<td>tremor</td>
</tr>
<tr>
<td>Cardiac stimulation</td>
<td></td>
<td>anginal pain</td>
<td></td>
</tr>
<tr>
<td>Vascular headache</td>
<td></td>
<td>vascular headache</td>
<td></td>
</tr>
<tr>
<td>Vascular headache</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Devices Used in Asthma Therapy

- Metered Dose Inhaler (MDI)
  - Contains medication and compressed air
  - Delivers a specific amount of medication with each puff
Devices Used in Asthma Therapy

- **Metered Dose Inhaler (MDI)**
  - Contains medication and compressed air
  - Delivers a specific amount of medication with each puff

- **Spacer**
  - Used with MDIs to help get medication into the lungs instead of depositing on the back of the throat
Devices Used in Asthma Therapy

- Dry powder inhalers
  - Starting to replace MDIs
  - The patient turns the dial and a capsule full of powder is punctured
  - The patient then inhales the powder
Devices Used in Asthma Therapy

Nebulizer

- Uses a stream of air that flows through liquid medication to make a fine mist to be inhaled
- Very effective
- Must be cleaned and taken care of to reduce risk of contamination
Respiratory Agents: General Nursing Implications

- Encourage patients to take measures that promote a generally good state of health in order to prevent, relieve, or decrease symptoms of COPD.
  - Avoid exposure to conditions that precipitate bronchospasms (allergens, smoking, stress, air pollutants)
  - Adequate fluid intake
  - Compliance with medical treatment
  - Avoid excessive fatigue, heat, extremes in temperature, caffeine
Respiratory Agents: General Nursing Implications

- Encourage patients to get prompt treatment for flu or other illnesses, and to get vaccinated against pneumonia or flu.
- Encourage patients to always check with their physician before taking any other medication, including OTC.
Respiratory Agents: General Nursing Implications

- Perform a thorough assessment before beginning therapy, including:
  - Skin color
  - Baseline vital signs
  - Respirations (should be <12 or >24 breaths/min)
  - Respiratory assessment, including PO₂
  - Sputum production
  - Allergies
  - History of respiratory problems
  - Other medications
Respiratory Agents: General Nursing Implications

- Teach patients to take bronchodilators exactly as prescribed.
- Ensure that patients know how to use inhalers, MDIs, and have the patients demonstrate use of devices.
- Monitor for side effects.
Respiratory Agents: Nursing Implications

- Monitor for therapeutic effects
  - Decreased dyspnea
  - Decreased wheezing, restlessness, and anxiety
  - Improved respiratory patterns with return to normal rate and quality
  - Improved activity tolerance

- Decreased symptoms and increased ease of breathing
Bronchodilators: Nursing Implications

Xanthine Derivatives

- Contraindications: history of PUD or GI disorders
- Cautious use: cardiac disease
- Timed-release preparations should not be crushed or chewed (causes gastric irritation)
Bronchodilators: Nursing Implications

Xanthine Derivatives

- Report to physician:
  - Palpitations
  - Nausea
  - Vomiting
  - Weakness
  - Dizziness
  - Chest pain
  - Convulsions
Bronchodilators: Nursing Implications

Xanthine Derivatives

- Be aware of drug interactions with: cimetidine, oral contraceptives, allopurinol
- Large amounts of caffeine can have deleterious effects.
Bronchodilators: Nursing Implications

Beta-Agonist Derivatives

- Albuterol, if used too frequently, loses its beta\(_2\)-specific actions at larger doses.

- As a result, beta\(_1\) receptors are stimulated, causing nausea, increased anxiety, palpitations, tremors, and increased heart rate.
Bronchodilators: Nursing Implications

Beta-Agonist Derivatives

- Patients should take medications exactly as prescribed, with no omissions or double doses.
- Patients should report insomnia, jitteriness, restlessness, palpitations, chest pain, or any change in symptoms.
Anticholinergics: Mechanism of Action

- Acetylcholine (ACh) causes bronchial constriction and narrowing of the airways.
- Anticholinergics bind to the ACh receptors, preventing ACh from binding.
- Result: bronchoconstriction is prevented, airways dilate.
Anticholinergics

- Ipratropium bromide (Atrovent) is the only anticholinergic used for respiratory disease.
- Slow and prolonged action
- Used to prevent bronchoconstriction
- NOT used for acute asthma exacerbations!
# Anticholinergics: Side Effects

<table>
<thead>
<tr>
<th>Dry mouth or throat distress</th>
<th>Gastrointestinal distress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>Coughing</td>
</tr>
<tr>
<td>Anxiety</td>
<td></td>
</tr>
</tbody>
</table>

No known drug interactions
Antileukotrienes

- Also called leukotriene receptor antagonists (LRTAs)
- New class of asthma medications
- Three subcategories of agents
Antileukotrienes

Currently available agents:
- montelukast (Singulair)
- zafirlukast (Accolate)
- zileuton (Zyflo)
Leukotrienes: Mechanism of Action

- Leukotrienes are substances released when a trigger, such as cat hair or dust, starts a series of chemical reactions in the body.
- Leukotrienes cause inflammation, bronchoconstriction, and mucus production.
- Result: coughing, wheezing, shortness of breath.
Antileukotrienes: Mechanism of Action

- Antileukotriene agents prevent leukotrienes from attaching to receptors on cells in the lungs and in circulation.
- Inflammation in the lungs is blocked, and asthma symptoms are relieved.
Antileukotrienes: Drug Effects

By blocking leukotrienes:

- Prevent smooth muscle contraction of the bronchial airways
- Decrease mucus secretion
- Prevent vascular permeability
- Decrease neutrophil and leukocyte infiltration to the lungs, preventing inflammation
Antileukotrienes: Therapeutic Uses

- Prophylaxis and chronic treatment of asthma in adults and children over age 12
- NOT meant for management of acute asthmatic attacks
- Montelukast is approved for use in children age 2 and older
## Antileukotrienes: Side Effects

<table>
<thead>
<tr>
<th>zileuton</th>
<th>zafirlukast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>Headache</td>
</tr>
<tr>
<td>Dyspepsia</td>
<td>Nausea</td>
</tr>
<tr>
<td>Nausea</td>
<td>Diarrhea</td>
</tr>
<tr>
<td>Dizziness</td>
<td>Liver dysfunction</td>
</tr>
<tr>
<td>Insomnia</td>
<td></td>
</tr>
<tr>
<td>Liver dysfunction</td>
<td></td>
</tr>
</tbody>
</table>

Montelukast has fewer side effects.
Antileukotrienes: Nursing Implications

- Ensure that the drug is being used for chronic management of asthma, not acute asthma.
- Teach the patient the purpose of the therapy.
- Improvement should be seen in about 1 week.
Antileukotrienes: Nursing Implications

- Check with physician before taking any OTC or prescribed medications—many drug interactions.
- Assess liver function before beginning therapy.
- Medications should be taken every night on a continuous schedule, even if symptoms improve.
Corticosteroids

- Anti-inflammatory
- Used for CHRONIC asthma
- Do not relieve symptoms of acute asthmatic attacks
- Oral or inhaled forms
- Inhaled forms reduce systemic effects
- May take several weeks before full effects are seen
Corticosteroids: Mechanism of Action

- Stabilize membranes of cells that release harmful bronchoconstricting substances.
- These cells are leukocytes, or white blood cells.
- Also increase responsiveness of bronchial smooth muscle to beta-adrenergic stimulation.
Inhaled Corticosteroids

- beclomethasone dipropionate (Beclovent, Vanceril)
- triamcinolone acetonide (Azmacort)
- dexamethasone sodium phosphate (Decadron Phosphate Respihaler)
- flunisolide (AeroBid)
Inhaled Corticosteroids: Therapeutic Uses

- Treatment of bronchospastic disorders that are not controlled by conventional bronchodilators.
- NOT considered first-line agents for management of acute asthmatic attacks or status asthmaticus.
Inhaled Corticosteroids: Side Effects

- Pharyngeal irritation
- Coughing
- Dry mouth
- Oral fungal infections

Systemic effects are rare because of the low doses used for inhalation therapy.
Contraindicated in patients with psychosis, fungal infections, AIDS, TB.

Cautious use in patients with diabetes, glaucoma, osteoporosis, PUD, renal disease, CHF, edema.

Teach patients to gargle and rinse the mouth with water afterward to prevent the development of oral fungal infections.
Inhaled Corticosteroids: Nursing Implications

- Abruptly discontinuing these medications can lead to serious problems.
- If discontinuing, should be weaned for a period of 1 to 2 weeks, and only if recommended by physician.
- REPORT any weight gain of more than 5 pounds a week or the occurrence of chest pain.
Mast Cell Stabilizers

- cromolyn (Nasalcrom, Intal)
- nedocromil (Tilade)
Mast Cell Stabilizers

- Indirect-acting agents that prevent the release of the various substances that cause bronchospasm
- Stabilize the cell membranes of inflammatory cells (mast cells, monocytes, macrophages), thus preventing release of harmful cellular contents
- No direct bronchodilator activity
- Used prophylactically
Cellular Makeup of an Alveolus and Capillary Supply
Mast Cell Stabilizers: Therapeutic Uses

- Adjuncts to the overall management of COPD
- Used solely for prophylaxis, NOT for acute asthma attacks
- Used to prevent exercise-induced bronchospasm
- Used to prevent bronchospasm associated with exposure to known precipitating factors, such as cold, dry air or allergens
<table>
<thead>
<tr>
<th>Mast Cell Stabilizers: Side Effects</th>
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<tr>
<td>Coughing</td>
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<td>Bronchospasm</td>
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<td>Taste changes</td>
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<td>Dizziness</td>
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<td>Headache</td>
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</table>
Mast Cell Stabilizers: Nursing Implications

- For prophylactic use only
- Contraindicated for acute exacerbations
- Not recommended for children under age 5
- Therapeutic effects may not be seen for up to 4 weeks
- Teach patients to gargle and rinse the mouth with water afterward
Morphine hydrochloride
(Morphini hydrochloridum)
GANGLIONBLOCKERS
Hygronium, Pentamin
Vasodilators

Nitroglycerin (Nitroglycerinum)

Nitromint
Diuretics
Furosemid (Lazix), Mannit
Modified Bobrov’s apparatus
(Alcohol 55-90 % for inhalation with oxygen – to reduce the foam in alveoli)
Dimedrol, Suprastin, Prednisolone