Breathe Easier
Prehospital Respiratory Pharmacology
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Classes used to Treat Respiratory Emergencies
- Bronchodilators
- Anticholinergics
- Methylxanthines
- Anti-inflammatory Agents
- Antihistamines
- Decongestants
- Antitussives
- Expectorants & mucolytics

Good Respiratory Secretions
Mucus
Watery
- Gel
- Sol

Secretions Gone Bad
Parasympathetic
Dry environments
- Slime & Sludge
- Cement
Bronchoconstriction

- Tracheobronchial tree is smooth muscle
- Double-helix shape
- Bronchoconstriction causes a decrease in both diameter and length

Nervous System Control of Airway

- Parasympathetic = bronchoconstriction
- Sympathetic A1 = bronchoconstriction
- Sympathetic B2 = bronchodilation

Approaches to Treatment

- Relax bronchial smooth muscle
  - beta agonists (beta 2 specific if possible)
  - methylxanthines
  - anticholinergics
- Inhibit release of mediators
  - Corticosteroids (swelling)
  - Antihistamines (mucus)

Bronchodilators

<table>
<thead>
<tr>
<th>Category</th>
<th>Example Drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta agonists</td>
<td>albuterol (Proventil®)</td>
</tr>
<tr>
<td></td>
<td>levalbuterol (Xopenex®)</td>
</tr>
<tr>
<td></td>
<td>metaproterenol (Alupent®)</td>
</tr>
<tr>
<td></td>
<td>isoetharine (Bronkosol®)</td>
</tr>
<tr>
<td></td>
<td>terbutaline (Brethair®)</td>
</tr>
<tr>
<td>Nonselective</td>
<td>epinephrine (Adrenalin®)</td>
</tr>
<tr>
<td>Methylxanthines</td>
<td>theophylline (TheoDur®)</td>
</tr>
<tr>
<td></td>
<td>aminophylline (Aminophylline®)</td>
</tr>
<tr>
<td>Anticholinergics</td>
<td>ipratropium bromide (Atrovent®)</td>
</tr>
</tbody>
</table>
Sympathomimetic Bronchodilators
- Nonselective alpha and beta
  - Big guns!
  - Epinephrine, racemic epi
  - Effective bronchodilators
  - Also causes vasoconstriction, decreased histamine effects, and therefore less inflammation

B2 Selective Sympathomimetics
- B2 selective
  - Albuterol is the archetype
  - Bronchodilation with fewer cardiac side effects
    - albuterol (Proventil, Ventolin)
    - levalbuterol (Xopenex)
    - metaproterenol (Alupent)
    - isoetharine (Bronkosol)
    - terbutaline (Brethine)

Review of Cholinergic Effects
- Parasympathetic nervous system stimulation
- Release of acetylcholine
- Symptoms
  - SLUDGE-M
  - Bradycardia
  - Bronchospasm
  - Bronchorrhea

Anticholinergics
- Also called parasympatholytics
- Decrease secretions and make them hard to expectorate
- Temporary bronchodilation
- Atropine and ipratropium (Atrovent)

Reminder of our Goals
- Bronchodilation
- Anti-inflammatory (steroids)
- Anti-histamines (mucus)

Corticosteroids
- Improve responsiveness of airway muscles to beta agonists
- Stabilize membranes to reduce histamine effects
- Anti-inflammatory (not bronchodilator)
- Aerosolized steroids can worsen acute bronchoconstriction
Corticosteroids
- Examples include:
  - beclomethasone (Beclovent®)
  - budesonide (Pulmicort®)
  - triamcinolone (Azmacort®)
  - fluticasone with salmeterol (Advair®)
  - methylprednisolone (Solu Medrol®)

Addison's Disease
- Adrenal insufficiency
- Too little cortisol and aldosterone
  - Cortisol for sugar and protein use as energy
  - Cortisol to fight infection, handle stress
  - Aldosterone to manage sodium, potassium, and water levels
- Use Solu-Cortef for emergency tx

Anti-Inflammatory Agents

<table>
<thead>
<tr>
<th>Formulation</th>
<th>Drug Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhaled</td>
<td>beclomethasone (Beclovent®)</td>
</tr>
<tr>
<td></td>
<td>fluticasone (Flovent®)</td>
</tr>
<tr>
<td></td>
<td>fluticasone with salmeterol (Advair®)</td>
</tr>
<tr>
<td>Oral</td>
<td>prednisolone (Deltasone®)</td>
</tr>
<tr>
<td>Injected</td>
<td>methylprednisolone (Solu-Medrol®)</td>
</tr>
<tr>
<td></td>
<td>dexamethasone (Decadron®)</td>
</tr>
</tbody>
</table>

Mast cells = histamines
Especially abundant in small blood vessels and bronchial smooth muscle
Histamines = allergic reaction-ish

Simulation of H1 and H2 receptors cause
- Increased local blood flow (heat, redness)
- Increased capillary permeability (edema)
- Vasodilation (headache, hypotension)
- Mucous production (congestion, sneezing, productive cough)
- Bronchoconstriction (wheezing)
- Increased GI acid production (abdominal pain, nausea)
- Motion sickness

Antihistamines
- diphenhydramine (Benadryl®)
- cetirizine (Zyrtec®)
- loratadine (Claritin®)
- fexofenadine (Allegra®)
- montelukast (Singulair®)

Watch for HTN!
Respiratory Drugs

- Bronchodilators
  - ß2 Selective
    - Albuterol (Ventolin)
    - Ipratropium (Atrovent)
  - Anti-cholinergic
    - Ipratropium (Atrovent)

- Steroids
  - Corticosteroids
    - Methylprednisolone (Solu-Medrol)
    - Prednisone
    - Beclomethasone (Beclovent)

- Non-steroidal Anti-Inflammatories
  - Zyrtec

- Antihistamines
  - Allegra

- ß-Blockers
  - Propranolol

- Home meds
  - Advair (salmeterol + fluticasone)
  - Azmacort
  - Pulmicort
  - *Don't allow Pt to take during an asthma attack

- Dries up bronchoshea as well as does bronchodilation

- Zyrtec Claritin Allegra Singular

Switch for HTN

Prep