COPD includes: Asthma, chronic bronchitis, chronic obstructive bronchitis, and emphysema. More than 22 million Americans have Asthma. During the inflammatory process a large amount of histamine is released from mast cells in the respiratory tract causing bronchi constriction and edema occurs. Airways narrow and become tight. Lining of the bronchi swell, extra mucous clogs the Airway.

Bronchodilators

*Two Major groups; B2 Adrenergic agonist( sympathomimetic) and Xanthine derivatives
*B-adrenergic stimulation causes bronchodilation. Can be short or long acting

Adrenergic Bronchodilators MOA

Opens the Bronchi by relaxing the smooth muscles to allow more air to enter the lungs which relieves respiratory distress.

Uses

Used to treat chronic respiratory problems due to bronchoconstriction

* Chronic or acute bronchial Asthma
* Exercise induced bronchospasm
* Bronchitis
* Emphysema
* Bronchiectasis
* Other obstructive pulmonary diseases.

* Adverse Reactions

* TACHYCARDIA, PALPITATIONS, CARDIAC ARRHYTHMIA, HYPERTENSION
* NERVOUSNESS, ANXIETY, INSOMNIA EXCESSIVE USE MAY RESULT IN PARADOXIAL BRONCHOSPASM

* Contraindications

* Hypersensitivity, cardiac arrhythmia associated with tachycardia, organic brain damage, cerebral arteriosclerosis, narrow angle glaucoma, Salmeterol is contraindicated during acute bronchospasm.

* Precautions

* Hypertension, hyperthyroidism, glaucoma, diabetes, BPH, HX seizures, pregnancy and lactation
INTERACTIONS

Adrenergic: Possible additive Adrenergic effects
Tricyclics: Possible hypotension
B-Adrenergic: Inhibition of the Cardiac bronchodilating and vasodilation effects of the adrenergic
Methyldopa: Possible hypotension
Oxytocic Drugs: Possible SEVERE hypotension
Theophylline: increased risk for cardio toxicity.

Short Acting beta 2 agonist Bronchodilators
Used for acute symptom relief
Albuterol: proventil , ventolin (inhalation or nebulizer delivery)
Uses: Bronchospasm, prevention of EIB.
Adverse Reactions: Headache, Palpitations, tachycardia, tremor, dizziness, shakiness, nervousness, hyperactivity.

Epinephrine: Adrenaline, Epi mist, Primatine mist. (inhalation or injection delivery)
Uses: Asthma, Bronchospasm
Adverse Reactions: Palpitations, tremor, dizziness, drowsiness, vertigo, shakiness, nervousness, headache, nausea, vomiting, anxiety, fear, pallor.

Levabuterol: Xopenex (nebulizer treatment)
Uses: Prevent bronchospasm
Adverse Reactions: Tachycardia, nervousness, anxiety, pain, dizziness, rhinitis, cough, cardiac arrhythmia

Long Acting Beta 2 agonist
For long term management of symptoms
Arformoterol: Brovana (inhalation therapy)
Uses: Longterm treatment and prevention of bronchospasm in COPD
Adverse Reactions: nervousness, tremor, dizziness, headache, insomnia, nausea, vomiting leg cramps, back pain, Diarrhea.

Salmeterol: Serevent diskus (inhalation)
Uses: long term treatment and prevention of broncho spasm
Adverse Reaction: SAME + increased risk of stroke
Xanthine Derivative Bronchodilators
Also called methylxanthines are a different class of Adrenergic drugs but also have bronchodilating effects.

Actions
Stimulate the CNS to promote bronchodilation and cause direct smoothing of the muscles in the bronchi

Uses
COPD patients, symptomatic relief of bronchial asthma , reversible bronchospasm associated with chronic bronchitis and emphysema.

Adverse Reactions
Restlessness , irritability, headache, nervousness, tremors, tachycardia , palpitations , electrocardiographic changes increased respiration , nausea vomiting , fever, hyperglycemia, flushing, alopecia.

Contraindications
Hypersensitivity, peptic ulcers, seizure disorder, serious uncontrolled arrhythmia

Precautions
Cardiac disease, hypoxemia, hypertension, CHF, liver disease, older adults, habitual alcohol abuse, pregnancy.

Interactions
DECREASED THEOPHYLLINE LEVELS
Barbiturates, charcoal, hydantoins, ketoconazole, rimfampin, nicotine, adrenergic agents, isoniazid, loop diuretics

INCREASED THEOPHYLLINE LEVEL
Allpurinol, b-adrenergic blockers, calcium channel blockers, cimetidine

Xanthine Bronchodilators

Aminophylline: MONITOR SERUM LEVELS!!!!
Uses: symptomatic relief of bronchial asthma and reversible bronchospasm of chronic bronchitis
Adverse Reactions: Nausea, vomiting, restlessness, nervousness, tachycardia, tremors, headache, palpitations, hyperglycemia, electrocardiographic changes, cardiac arrhythmia.

Theophylline: : theolair ( watch for drug interactions)
Uses: Symptomatic relief of bronchial asthma and reversible bronchospasm from Chronic bronchitis
Adverse Reactions: Same as aminophylline

Anti Asthma drugs
Long term control , used daily , to maintain control of Asthma , most effective when they reduce the underlying inflammation.
**Inhaled Corticosteroids**

The most consistently effective long term control for persistent chronic asthma.

They reduce airway hyperresponsiveness and block reactions to allergens. Increase the sensitivity of the b2 receptors which increase the effectiveness of the b2 receptor agonist.

**Uses**

Management & prophylactic treatment of the inflammation associated with chronic asthma. Can be used intranasally for rhinitis.

**Adverse Reactions**

Throat irritation, hoarseness, upper respiratory tract infection, fungal infection of the mouth and throat.

**Contraindications**

Hypersensitivity, acute bronchospasm, status asthmatics, nonsteroidal medications, and non asthmatic bronchitis

**Precautions**

Compromised immune system, glaucoma, kidney disease, liver disease, convulsive disorders, diabetes, combining ICS with systemic corticosteroids can cause hypothalamic-pituitary-adrenal suppression, pregnancy

**Interactions**

Ketoconizole may increase the plasma levels of fluticasone and budesonide

- **Budesonide**: pulmicort
  **Uses**: Maintenance and treatment of asthma
  **Adverse Reactions**: oral, laryngeal, pharyngeal irritation, fungal infections, suppression of HPA

- **Fluticasone**: Flovent HFA/DISKUS
  **Uses**: prophylactic maintenance and treatment of asthma
  **Adverse Reactions**: Oral, laryngeal, pharyngeal irritation, fungal infections, suppression of HPA

**COMBINATIONS**

- **Budesonide/formoterol**: Symbacort
  **Uses**: long term maintenance of asthma
  **Adverse Reactions**: oral, laryngeal, pharyngeal irritation, fungal infections, suppression of HPA

- **Fluticasone/salmeterol**: Adivair
  **Uses**: long term maintenance of asthma
  **Adverse Reactions**: oral, laryngeal, pharyngeal irritation, fungal infections, suppression of HPA
Cholinergic Blocking. Used for acute symptom relief

**Iopatropium**: atrovent

**Uses**: Bronchospasm associated with COPD, chronic bronchitis, emphysema, rhinorrhea.

**Adverse** Reactions: Dryness of the oropharynx, nervousness, irritation, dizziness, headache, GI distress, dry mouth, exacerbation, nausea, palpitations.

**Tiotropium**: Sprivia

**Uses**: same

**Adverse Reactions**: same, increased stroke risk

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**Mast Cell Stabilizers**

Stabilizes the mast cell membrane preventing the release of leukotrynes.

**Uses**

In combination with other drugs in the treatment of asthma and allergic disorders including allergic rhinitis. Also used to prevent EIB (STEP 2 CARE FOR CHRONIC ASTHMA)

**Adverse Reactions**

Throat irritation and dryness, unpleasant taste, cough or wheeze and nausea

**Contraindications**

Hypersensitivity, during acute asthma attack, may worsen bronchospasm.

**Caution**

Pregnancy, lactation, renal/hepatic impairment
NO SPECIFIC DRUG INTERACTIONS

**Chromolyn:** Gastrocom

**Uses:** Bronchial asthma prevention of bronchospasm, prevention of EIB, (nasal prep, prevent and treat allergic rhinitis)

**Adverse Reactions:** Cough, wheeze, unusual taste, headache, nausea, rash, dry/irritated throat, joint swelling and pain

**LEUKOTRINE MODIFIERS/IMMUNOMODULATORS**

Monoclonal antibody used to treat asthma

Leukotrienes are primarily responsible for bronchoconstriction. When leukotriene inhibitors are administered bronchodilation occurs.

**Uses**

Prophylaxis and chronic treatment of asthma in adults and children over 12

**Adverse Reactions**

Headache, flue like symptoms, immunomodulators may cause anaphylactic reactions have emergency equipment ready.

**Contraindications**

Hypersensitivity, acute asthma attack bronchospasm, liver disease, pregnancy and lactation.

**Interactions**

*Asprin:* increase plasma levels of zlafukast

*Warfarin:* increase anticoagulant effect

*Theophylline:* decreased level of zafirulik. Increase theophylline levels with zileuton  

Erythromycin: decrease level of zafirleukast

**Leukotriene Modifiers**

*Monteleukast:* singular

**Uses:** Chronic asthma, seasonal allergic rhinitis

..: headache, flue like symptoms

*Omalizumab:* xolair

**Uses:** moderate to severe persistent asthma

**Adverse reactions:** Injection site reaction, anaphylaxis