

# Treatment of Asthma

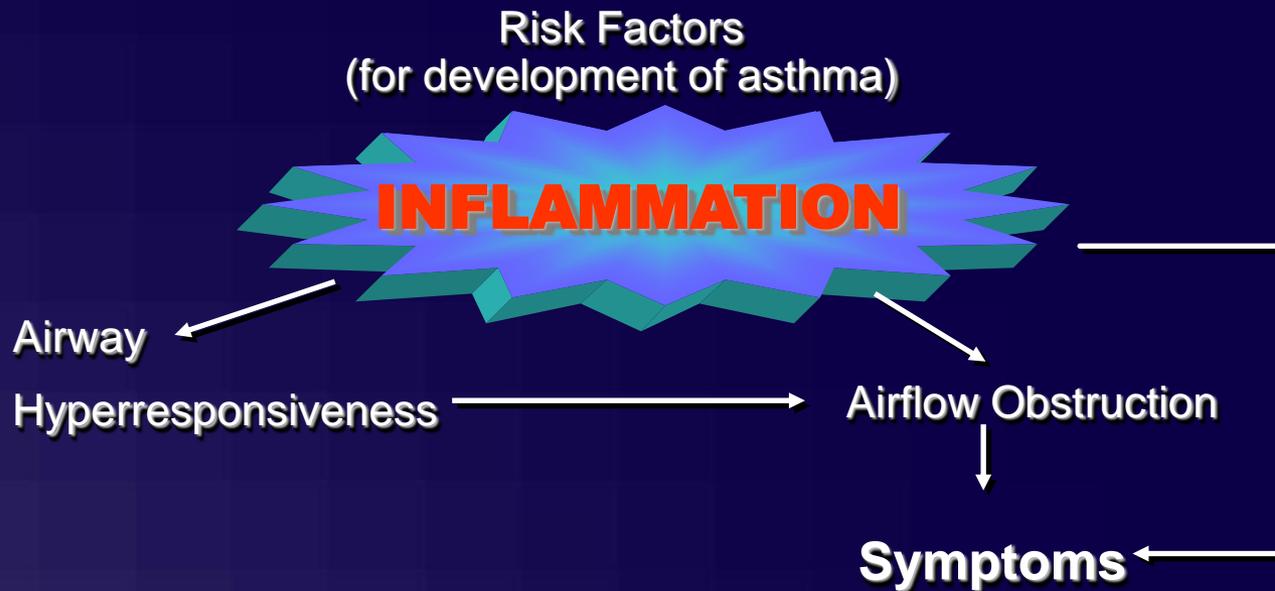
## **Medications and Routes of Administration**

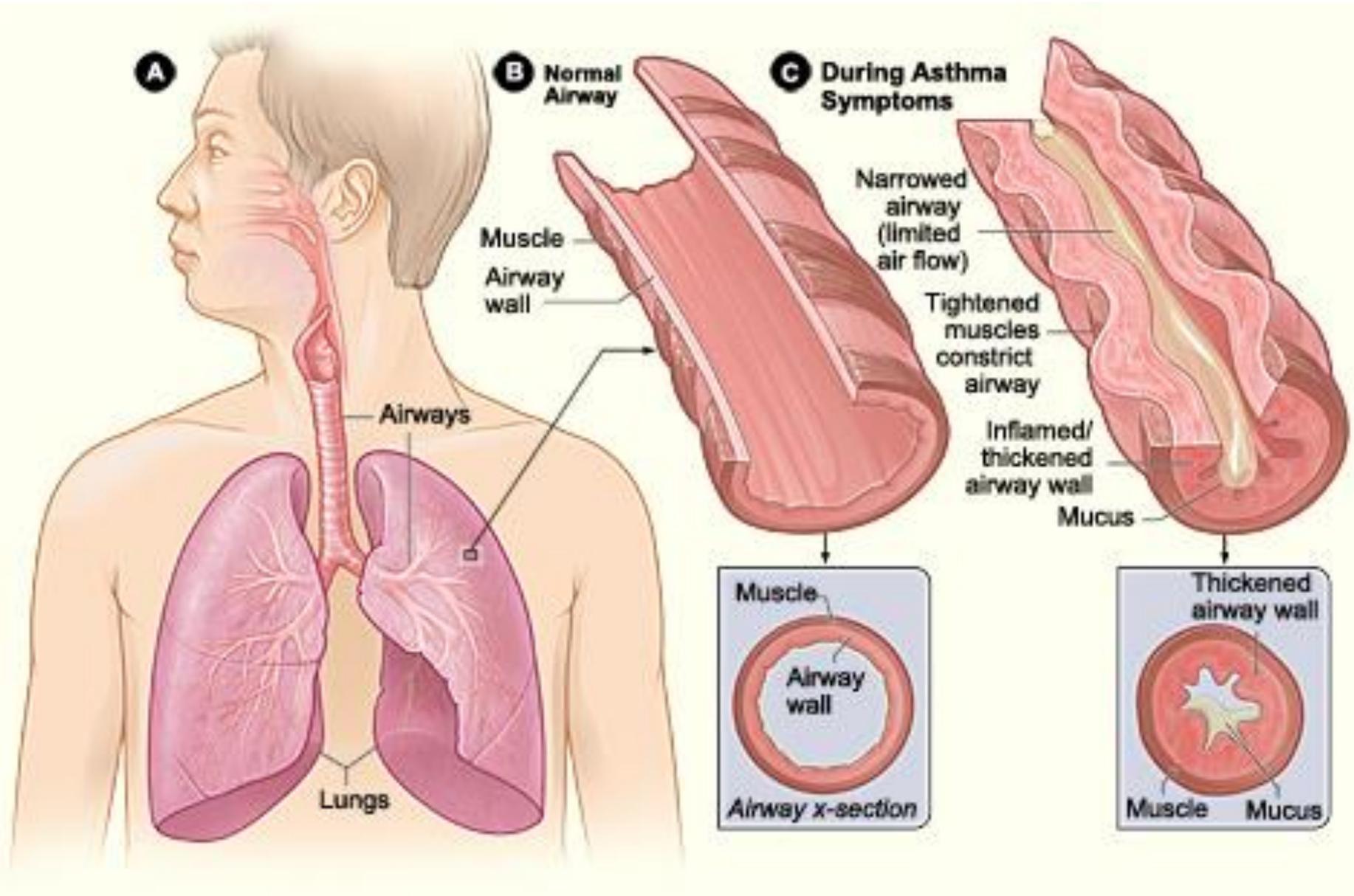
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# Mechanisms Underlying the Definition of Asthma

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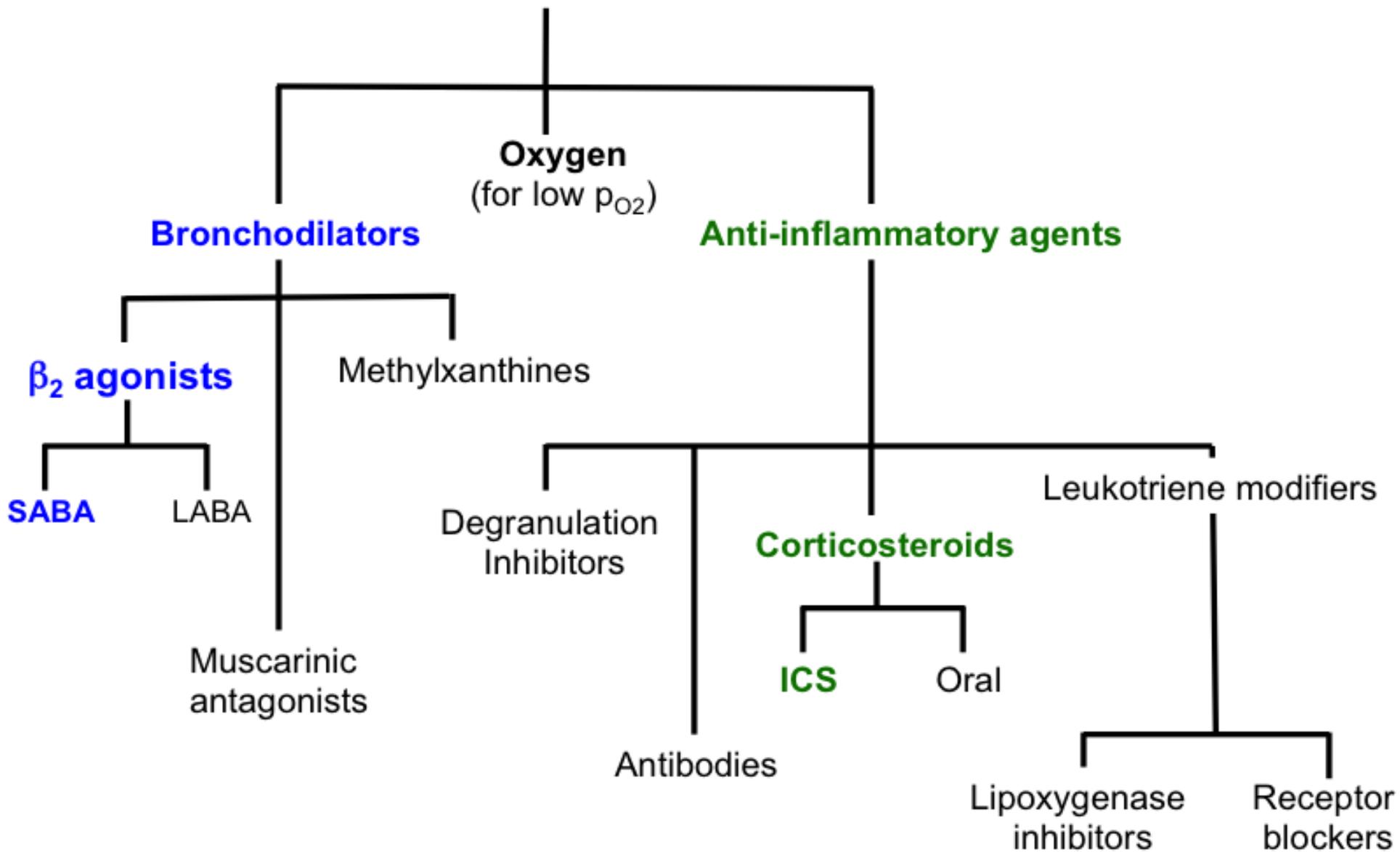


# Medications to Treat Asthma

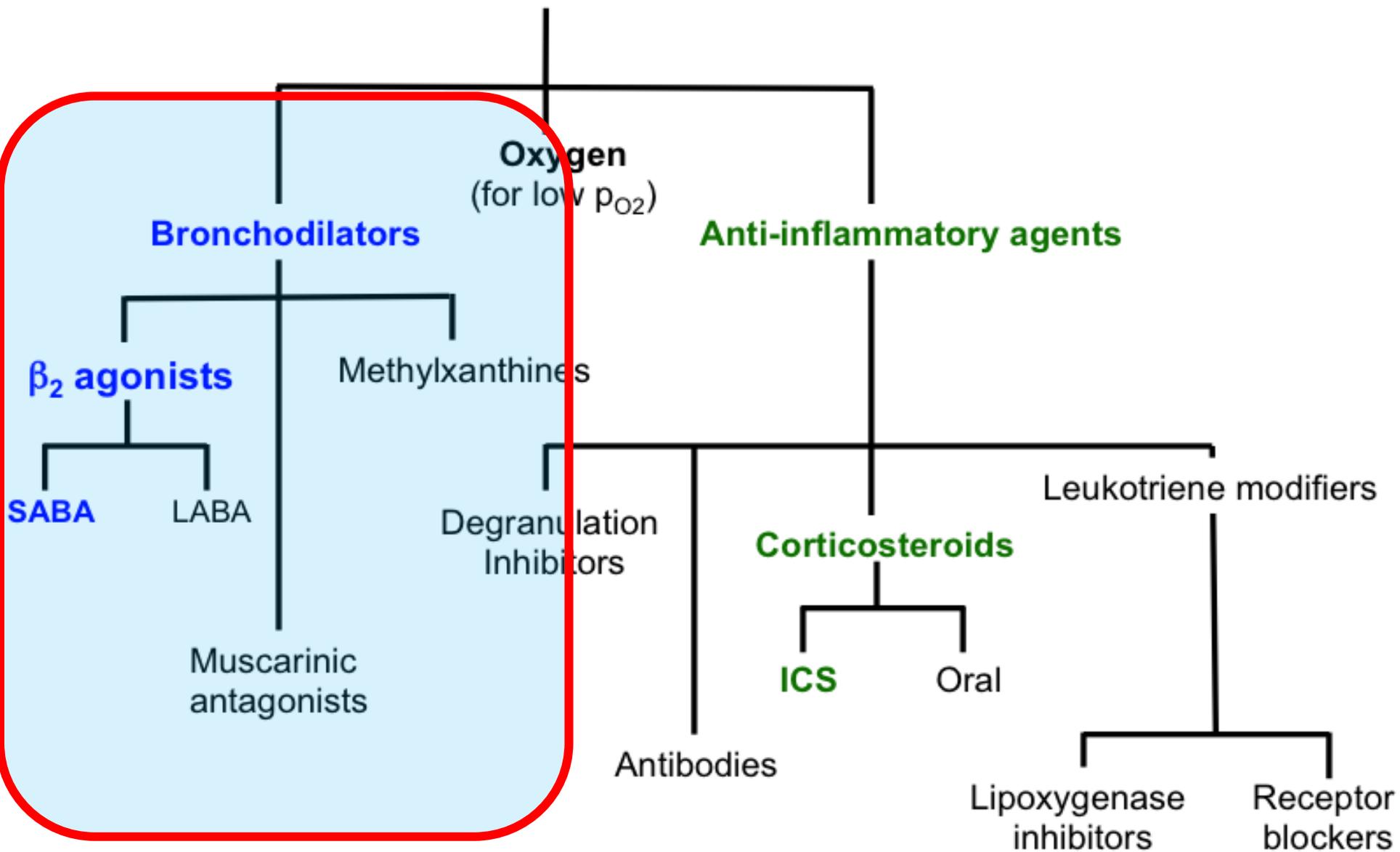
**Two major categories of medications are:**

- **Bronchodilators (Relievers)**
- **Long-term control drugs (Controllers)**

# Drugs Used In Asthma



# Drugs Used In Asthma



# Bronchodilators

- **Sympathomimetics (Salbutamol)**
- **Xanthines (Aminophylline)**
- **Anticholinergics (Atrovent)**

# Sympathomimetics (beta2-agonists)

- **Short-acting  $\beta$ 2-agonists-SABA (6hours)**
  - Salbutamol
  - Terbutaline
  - Fenoterol
- **Long-acting  $\beta$ 2-agonists-LABA (12 hours)**
  - Formoterol
  - Salmeterol

# Short-acting Sympathomimetics (beta2-agonists)

- The medication of choice for **symptoms relief**
- Pretreatment for **exercise-induced bronchoconstriction**
- Short-acting should **never be indicated as regular therapy**
- Increase use, especially daily use, is a warning of deterioration of asthma control



Salbutamol

# Long-acting Sympathomimetics (beta2-agonists)

- Formoterol can be used for **symptoms relief** because of its rapid onset of action
- Long-acting indicated in long-term therapy **always associated with inhaled corticosteroids**
- Indicated when asthma control is not achieved with ICS

# Sympathomimetics (beta2-agonists)

- **Beta2-agonists should never be used as unique medication for long-term control of asthma**
  - Do not halt the underlying inflammatory process
  - Contribute to the deterioration in asthma control
  - Contribute to the increase in asthma deaths
- **Regular dosing with short and long-acting beta2-agonists is not advised unless accompanied by regular use of an inhaled glucocorticoid**

# Sympathomimetics (beta2-agonists)

## Side-effects

- **CNS stimulation**
  - Tremor
  - Nervousness
  - Headache
- **Cardiac stimulation**
  - Palpitations
  - Arrhythmias

# Xanthines

- Indicated for the **symptomatic relief or prevention of asthma**
- The xanthines include;
  - **Theophylline - oral administration (long-term control)**
  - **Aminophylline - IV administration (severe asthma exacerbation)**
- Therapeutic theophylline levels are from 10-20 ug/ml
- Theophylline toxicity occurs when concentration is above 20 ug/ml
- **Weak bronchodilator with modest anti-inflammatory properties**
- It may provide benefit as add-on therapy in patients who do not achieve control on ICS alone
- Less effective than LABA (long-acting beta-agonists)
- Xanthines are no longer in use in many countries (most doctors prefer beta2-agonists)

# Xanthines

- **Side-effects:**
  - **Gastrointestinal symptoms**
    - Nausea
    - Vomiting
    - Pain
  - **Cardiac arrhythmias**
  - **Seizures**

# Anticholinergics

## Ipratropium bromide

- Indicated in COPD
- Used in combination with salbutamol in acute asthma



## Tiotropium

- Indicated in COPD

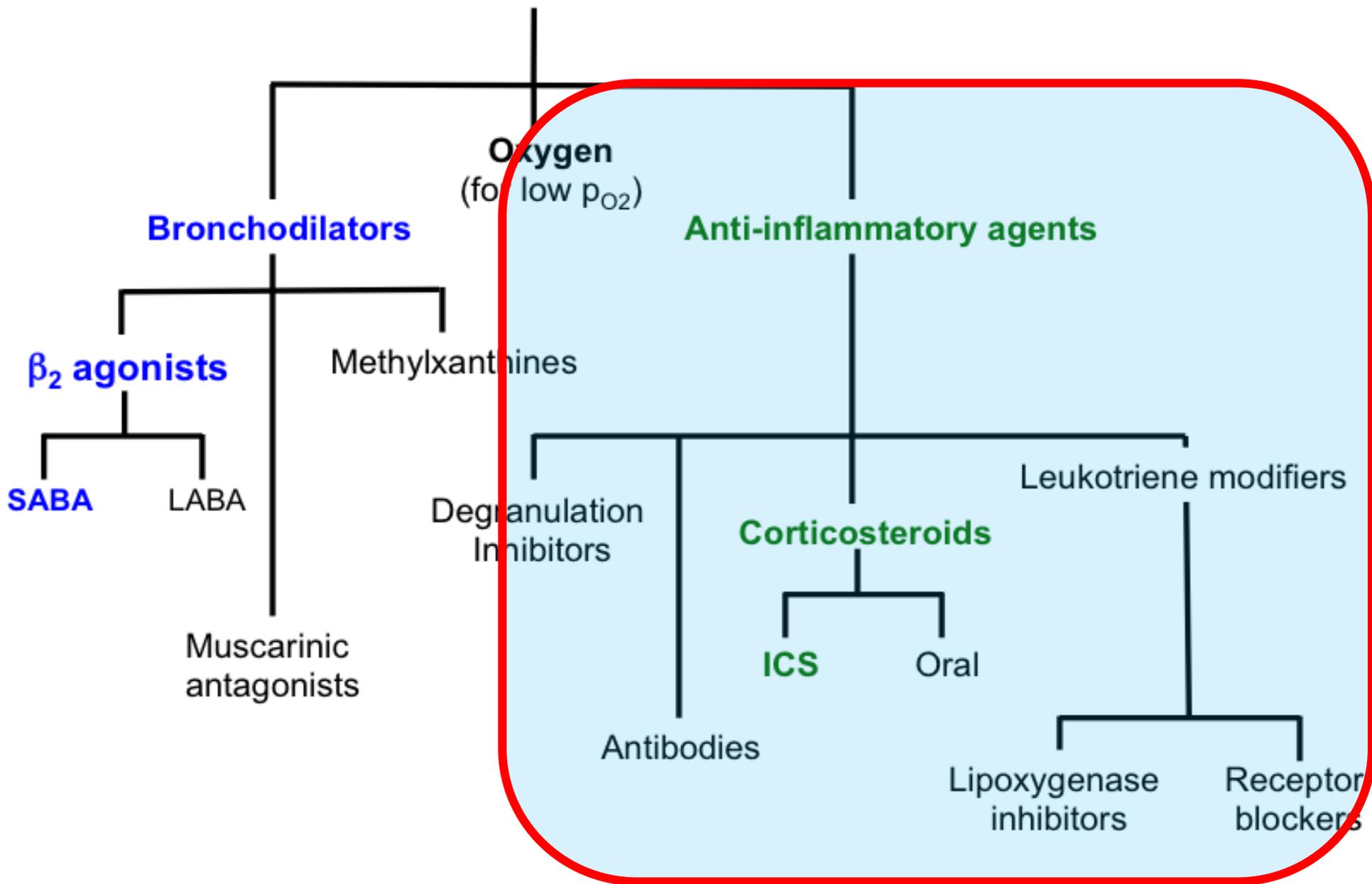


# Medications to Treat Asthma

**Two major categories of medications are:**

- **Bronchodilators (Relievers)**
- **Long-term control drugs (Controllers)**

# Drugs Used In Asthma



# Medications to Treat Asthma: Long-Term Control (Controllers)

- Taken daily over a long period of time
- Used to **reduce inflammation, and improve symptoms as well as lung function**
  - **Corticosteroids**
    - Inhaled
    - Oral
  - **Leukotriene modifiers**

# Inhaled Corticosteroids (ICS)

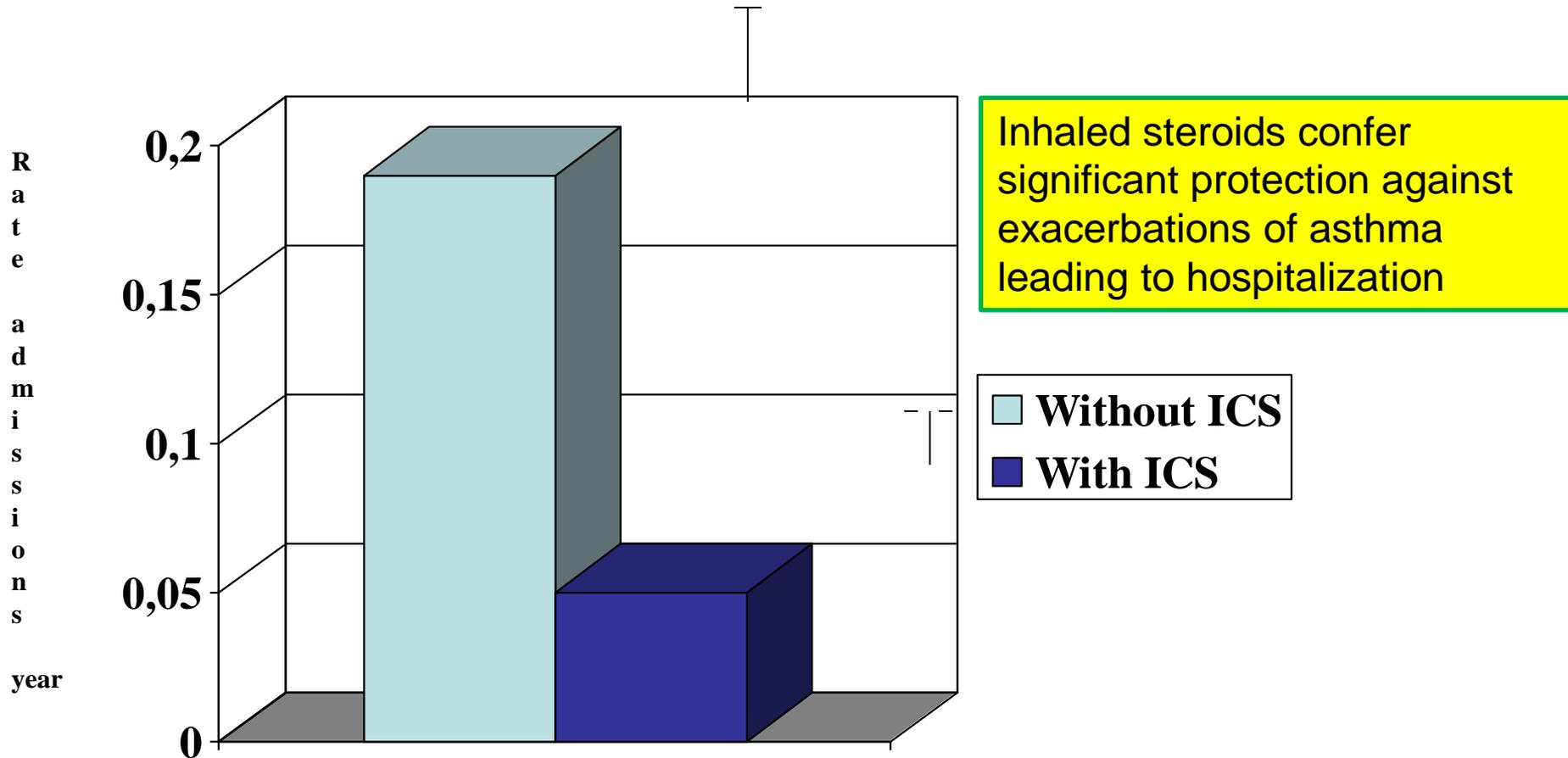
- **Beclomethasone**
- Budesonide
- Fluticasone
  
- Mometasone
- Ciclesonide



# Inhaled Corticosteroids (ICS)

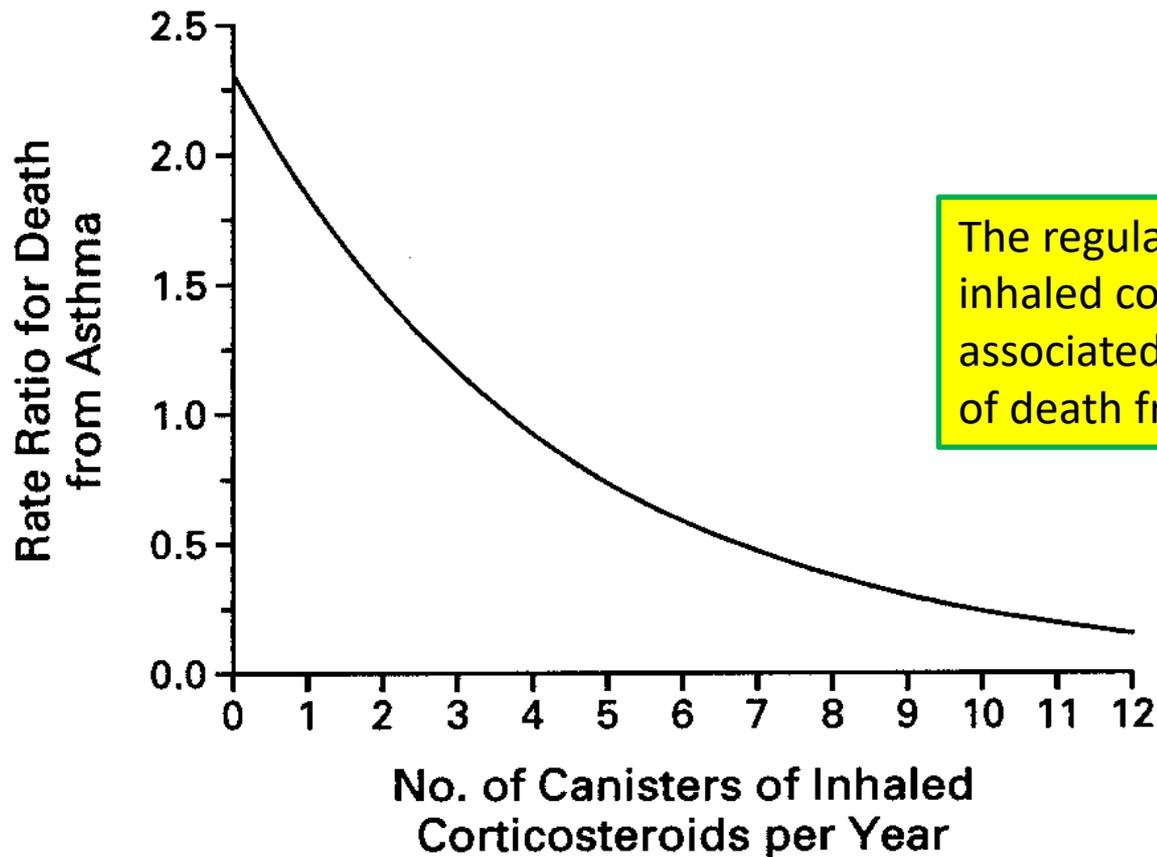
- The **most effective anti-inflammatory medication** for the treatment of asthma
- **Benefits of ICS**
  - Control airway inflammation
  - Reduce symptoms
  - Decrease airway hyperresponsiveness
  - Reduce frequency and severity of exacerbations
  - Improve quality of life
  - Reduce mortality

# Hospital admissions and ICS treatment



Donahue J, et al, JAMA 1997;277:887

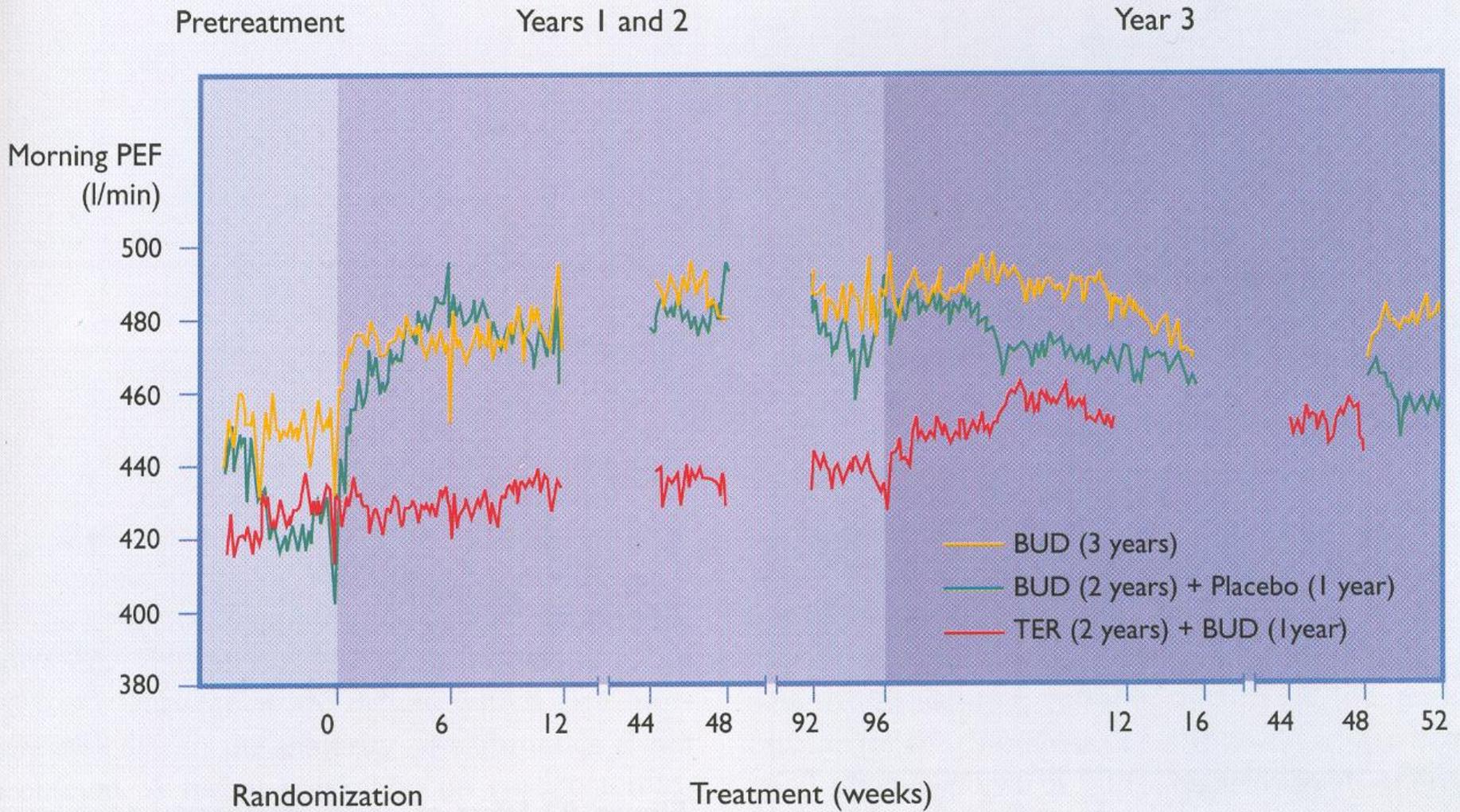
# Asthma deaths and ICS treatment



The regular use of low-dose inhaled corticosteroids is associated with a decreased risk of death from asthma

Suissa S, et al. N Engl J Med 2000;343:332

# ICS treatment is more effective than bronchodilator therapy and should be initiated early in the course of the disease



# Inhaled Corticosteroids (ICS) Side-Effects

- **Systemic effects**
  - **Low to medium dose**
    - Skin thinning and bruises
    - Minor growth delay in children
  - **High daily dose**
    - Skin thinning and bruises
    - Moderate and variable effects on growth in children. (attainment of predicted adult height does not appear to be severely affected)
    - Osteoporosis (high daily dose for several years)
    - Cataracts (high daily dose for several years)

# Inhaled Corticosteroids (ICS) Side-Effects

- **Local effects**
  - Hoarseness of voice
  - Oropharyngeal candidiasis

# Medications to Treat Asthma: Oral Corticosteroids

- Long-term oral corticosteroid therapy **may be required for uncontrolled asthma** despite maximum standard therapy
- **Side-Effects**
  - Osteoporosis, hypertension, diabetes, obesity, cataracts, glaucoma, skin thinning, and muscle weakness

# Antileukotriene Drugs

- **Montelukast**
- **Zafirlukast**
  - Oral administration
  - Mostly indicated in patients with mild persistent asthma
  - Less effective than ICS
  - Provide additive effects when added to ICS

# Routes of Administration of Asthma Medications

- **Inhalation**
- **Systemic**
  - **Oral**
  - **Intravenous**
  - **Subcutaneous**

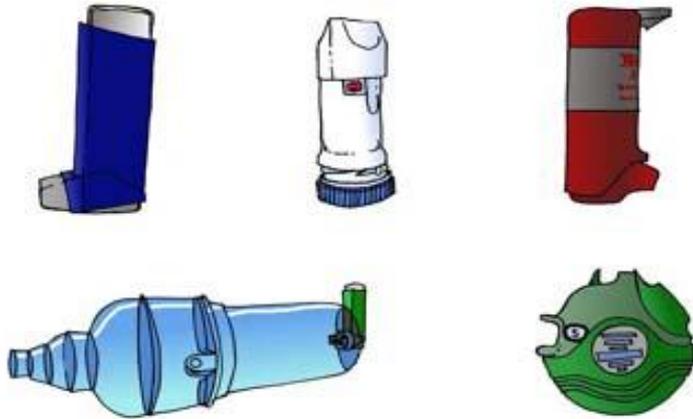
# Medications to Treat Asthma: Inhaled Medications



Are preferred because they deliver the drug directly to the airways resulting in:

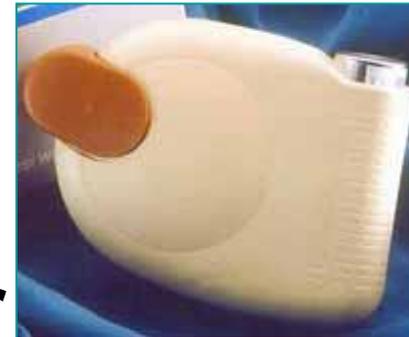
- **Potent therapeutic effects**
- **With fewer systemic side-effects**

## Inhalation Devices



EDUCA Y ENSEÑA, SISTEMAS DE INHALACIÓN J.Gaer, V.Mocion ®

3M Farmacéutica

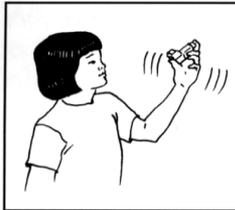


- **Spacers**
- **Metered dose inhaler**
- **Dry powder inhaler**
- **Nebulisers**

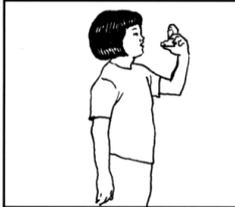
# Medications to Treat Asthma: How to Use a Spray Inhaler



Remember to breathe in slowly.



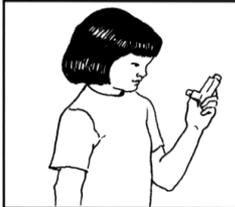
1. Take off the cap.  
Shake the inhaler.



2. Stand up.  
Breathe out.



3. Put the inhaler in your mouth  
or put it just in front of your  
mouth. As you start to  
breathe in, push down on  
the top of the inhaler and  
keep breathing in slowly.



4. Hold your breath for  
10 seconds.  
Breathe out.

**The health-care provider  
should evaluate inhaler  
technique at each visit.**



[https://www.youtube.com/watch?v=Lx\\_e5nXfi5w&feature=emb\\_rel\\_end](https://www.youtube.com/watch?v=Lx_e5nXfi5w&feature=emb_rel_end)

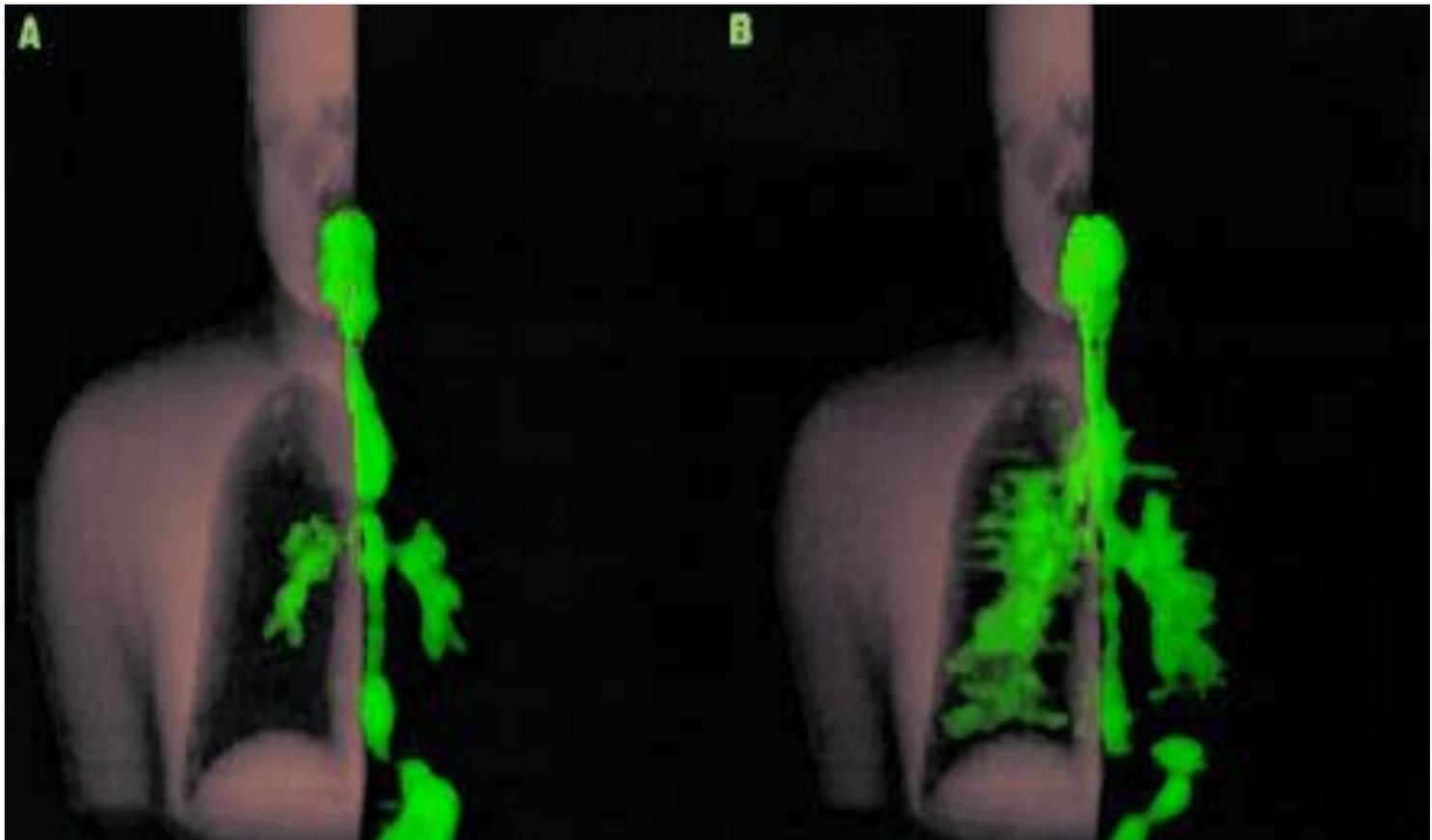
# Medications to Treat Asthma: Inhalers and Spacers



Spacers can help patients **who have difficulty with inhaler use** and can reduce potential for adverse effects from medication



<https://www.youtube.com/watch?v=von7cyXcj2c>



# Medications to Treat Asthma: Nebuliser

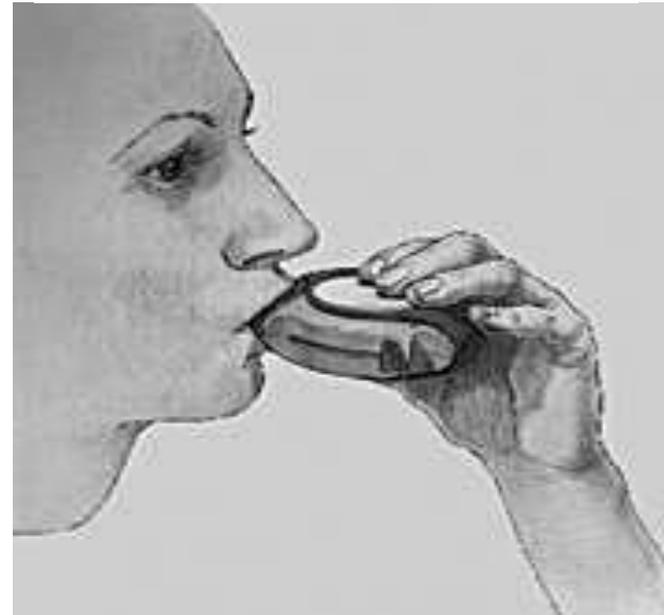
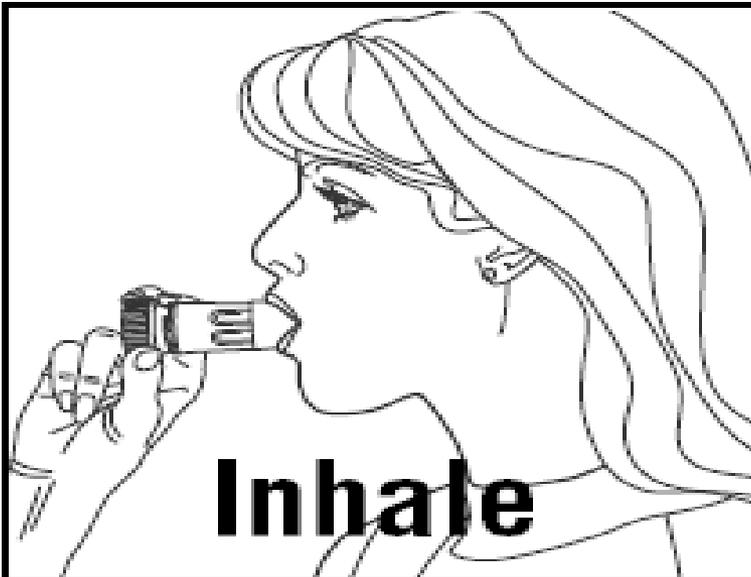
- Machine produces a mist of the medication
- Used for small children or for severe asthma episodes
- No evidence that it is more effective than an inhaler used with a spacer





<https://www.youtube.com/watch?v=9ezTnY00rI4>

# Dry Powder Devices





<https://www.youtube.com/watch?v=bxC48vQEfZI>

# Medications to Treat Asthma Exacerbations: Quick-Relief



- Adrenaline (epinephrine)
- IV methylxantine
- Oral salbutamol

# Medications to treat Asthma Exacerbations: Quick-Relief



**-Adrenaline (epinephrine)**  
**-IV methylxantine**  
**-Oral salbutamol**



**Salbutamol**

# Medications to treat Asthma Exacerbations: Quick-Relief



**Salbutamol**

**Salbutamol administered by repeated single actuations of the MDI into an appropriate large volume spacer, each followed by inhalation.**

# Asthma medications: Summary

- ❑ Asthma is a disease that is not yet preventable or curable.
- ❑ Asthma can be managed with medication that can be used to provide either quick relief or long-term control.
- ❑ Inhaled medications are preferred because they have potent therapeutic effects and fewer systemic effects.

