

# Treatment of Cough


Cough is a useful protective reflex.

Cough is an indicator of an underlying illness.

Mechanical stimulation of large respiratory passages, OR:

Chemical stimulation of alveoli.

After receptor activation, impulses are carried through afferent vagal nerves to a medullary center to initiate deep inspirations, followed by strong expiratory effort against closed glottis leading to increased pressure in the airways. Glottis suddenly relaxes, mouth opened, and air is released at high pressure.



# Treatment of Cough

***Cough is one of the most common reasons patients see physicians, it indicates:***

**Something is wrong.**

**Exhaustion.**

**Insomnia.**

**Musculoskeletal pain.**

**Hoarseness of voice.**

**Urinary incontinence.**

**Dizziness, headache, syncope.**

**Fear of cancer, AIDS, or TB.**

**Nausea, vomiting,, and anorexia.**



# Treatment of Cough

Drug treatment is divided into two main categories:

- a. **Antitussive Drugs**: therapy that controls, inhibits or eliminates cough. Useful to suppress intensity and frequency of coughing when it is unproductive and distressing.
- b. **Protussive Drugs**: therapy that makes cough more effective.



# Specific Treatment of Cough

*Directed on the etiology or pathophysiological mechanism:*

**Bronchial Asthma.**

**allergic or perennial non allergic sinusitis.**

**Gastroesophageal Reflux(GERD).**

**Chronic bronchitis.**

**Sarcoidosis.**

**Congestive heart failure.**

**ACEI-induced cough.**

Sarcoidosis is a disease involving abnormal collections of inflammatory cells that form lumps known as granulomas. The disease usually begins in the lungs, skin, or lymph nodes.

# Nonspecific Treatment of Cough

Directed at the symptom.

Indicated when definitive therapy cannot be given either because:

- a. the cause is unknown

- b. definitive therapy did not have the chance to work or will not work( cancer metastatic to lung).



# Antitussive Drugs

- **Drugs that may alter mucociliary factors.**
- **Drugs acting on the afferent limb.**
- **Drugs acting on the cough center.**
- **Drugs acting on the efferent limb.**
- **Drugs acting on the respiratory skeletal muscles.**



# Antitussive Drugs

- Drugs that may alter mucociliary factors:
  - Increase the volume of the secretions.
  - Decrease the production of mucus.
  - Change the consistency of mucus (i.e. Mucolytics).
  - Increase mucociliary clearance.



# Antitussive Drugs

- **Drugs that may alter mucociliary factors:**
  - **Ipecacuanha and Squill:** are natural products which have direct effect on CNS and locally to principally cause emesis which is preceded by increased secretions.
  - **Volatile oils** (e.g. lemon, anise, pine), have direct action on bronchi.
  - **Iodinated glycerol:** is excreted through bronchial glands and stimulates secretions directly. Widely used but have doubtful efficacy. Can cause congenital hypothyroidism, so contraindicated in pregnancy and during lactation.
  - **Aromatic chest rub.**



# Antitussive Drugs

- Drugs that may alter mucociliary factors:
  - **Bromhexine:** increases lysosome activity leading to increased enzyme secretion and hydrolysis of mucopolysacharides.
  - **Carbocisteine:** an aerosol, works through its SH group to reduce disulfide bonds in mucoproteins leading to enhancement of flow. May irritate the airways in some sensitive patients.
  - **Combination of H1-histamine antagonist and a decongestant.**
  - **Ammonium chloride.**
  - **Hydration:** either orally or intravenously.



# Antitussive Drugs

- Drugs that may alter mucociliary factors:
  - Ipratropium bromide.
  - Beta adrenergic agonists.
  - Theophylline.
  - Sodium chromoglycate.
  - Beclomethasone.

*These drugs are discussed in the treatment of bronchial asthma.*



# Antitussive Drugs

- **Drugs that may alter mucociliary factors.**
- **Drugs acting on the afferent limb=Sensory nerves**
  - **Local anesthetics:**
    - Lidocaine, applied topically, has transient antitussive effect. Intravenously, could have a central effect.
  - **Opioids:**
    - This is besides their primary central effect.



# Antitussive Drugs

- **Drugs that may alter mucociliary factors.**
- **Drugs acting on the afferent limb.**
- **Drugs acting on the cough center:**
  - **Narcotic:**
    - **Codiene:** Is the standard, recently found no more effective than syrup vehicle.
    - **Diamorphine.**
    - **Morphine.**
  - **Non narcotic:**
    - **Dextromethorphan.**
    - **Glaucine.**
    - **Diphenhydramine.**
    - **Pholcodine**

# Antitussive Drugs

- **Drugs that may alter mucociliary factors.**
- **Drugs acting on the afferent limb.**
- **Drugs acting on the cough center.**
- **Drugs acting on the efferent limb:**
  - **Ipratropium Bromide**
    - Given as an aerosol.
    - Effective for asthma, chronic bronchitis, and persistent cough following URTI.
    - Can also have effects on cough receptors by altering mucociliary factors



# Antitussive Drugs

- **Drugs that may alter mucociliary factors.**
- **Drugs acting on the afferent limb.**
- **Drugs acting on the cough center.**
- **Drugs acting on the efferent limb.**
- **Drugs acting on the respiratory skeletal muscles:**
  - **Nondepolarizing blockers like pancuronium.**
  - **May be considered in patients who can not be mechanically ventilated because of uncontrollable spasms of coughing.**



# Protussive Therapy

- This treatment increases cough effectiveness with or without increasing cough frequency.
- They either increase superficial velocity or alter mucus factors.
- Indicated when cough performs a useful function, and needs to be encouraged( e.g. bronchiectasis, cystic fibrosis, pneumonia and postoperative atelectasis).



# Protussive Therapy

- **Hypertonic Saline Aerosol:**
  - Improves cough clearance but not pulmonary function or subjective assessment.
- **Amiloride Aerosol:**
  - For cystic fibrosis.
- **Bronchodilators:**
  - However, with too much relaxation, flow rates may actually decrease.





# Protussive Therapy

- **Mechanical Measures:**
  - Positive insufflation followed by manual compression of the lower thorax and abdomen.
  - Abdominal push manoeuvre to assist expiration.
  - Combining abdominal binding and muscle training of the clavicular portion of pectoralis major.
  - Combination of positive expiratory pressure and chest physiotherapy in patients with chronic bronchitis.



# NEW TREATMENTS

- New opioids

The opioids currently bind the OP3 receptor and are therefore associated with characteristic side effects

- New opioid peptides such as the endomorphins bind to the opioid receptor-like 1 receptor (ORL1)
- Under testing



- New drugs for the treatment of cough may be directed at an extremely heterogeneous group of Targets
- A major distinction in this regard is the ability of certain drugs to inhibit the underlying inflammatory process that under certain conditions cause cough

### Example

- anti-inflammatory
- drugs for the treatment of asthma or COPD
- novel proton pump inhibitors as treatment for gastro-oesophageal reflux
- compounds that are targeted to inhibit sensory nerve activity directly which should, in theory, inhibit cough of any aetiology

