

# Treatment of Cough & Respiratory Stimulants

**Pharmacology-III (BP602)**

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## DRUGS FOR COUGH

- Cough is a protective reflex, its purpose being expulsion of respiratory secretions or foreign particles from air passages.
- It occurs due to stimulation of mechano or chemoreceptors in throat, respiratory passages or stretch receptors in the lungs.

Cough may be useful or useless.

- i. Useless (nonproductive)** cough should be suppressed.
- ii. Useful (productive)** cough serves to drain the airway, its suppression is not desirable, may even be harmful, except if the amount of expectoration achieved is small compared to the effort of continuous coughing. Apart from

Specific remedies (antibiotics, etc. *see* box), cough may be treated as a symptom (nonspecific therapy) with:

## Treatment for Cough

**1. Pharyngeal demulcents:** Lozenges, cough drops, linctuses containing syrup, glycerine, liquorice.

### **1. Expectorants (Mucokinetics)**

(a) Bronchial secretion enhancers: Sodium or Potassium citrate, Potassium iodide, Guaiphenesin, balsum of Tolu, Vasaka.

(b) Mucolytics: Bromhexine, Ambroxol, Acetyl cysteine, Carbocisteine

### **3. Antitussives (Cough centre suppressants)**

(a) Opioids Codeine, Pholcodeine.

(b) Nonopioids Noscapine, Dextromethorphan, Chlophedianol.

(c) Antihistamines Chlorpheniramine, Diphenhydramine, Promethazine.

**4. Adjuvant antitussives:** Bronchodilators like Salbutamol, Terbutalin.

## Specific treatment approaches to cough

### *Etiology of cough*

- Upper/lower respiratory tract infection
- Smoking/chronic bronchitis
- Pulmonary tuberculosis
- Asthmatic cough
- Postnasal drip due to sinusitis
- Postnasal drip due to allergic/perennial rhinitis
- Gastroesophageal reflux
- ACE inhibitor associated cough

### *Treatment approach*

Appropriate antibiotics  
Cessation of smoking/avoidance of pollutants  
Antitubercular drugs  
Inhaled  $\beta_2$  agonists/ipratropium/corticosteroids  
Antibiotic, nasal decongestant, H<sub>1</sub> antihistaminic  
Avoidance of precipitating factor(s), corticosteroid nasal spray, H<sub>1</sub> antihistaminic  
Bed head elevation, light dinner, diet modification, H<sub>2</sub> blocker, proton pump inhibitor, cisapride  
Substitute ACE inhibitor by losartan, calcium channel blocker, NSAID

## Demulcents and Expectorants

- Pharyngeal demulcents soothe the throat and reduce afferent impulses from the inflamed/irritated pharyngeal mucosa, thus provide symptomatic relief in dry cough arising from throat.
- Expectorants (Mucokinetics) are drugs believed to increase bronchial secretion or reduce its viscosity, facilitating its removal by coughing.
- Sodium and potassium citrate are considered to increase bronchial secretion by salt action.
- Guaiphenesin, vasaka, tolu balsum are plant products which are supposed to enhance bronchial secretion and mucociliary function while being secreted by tracheobronchial glands.

## MUCOLYTICS

**Bromhexine:** A derivative of the alkaloid vasicine obtained from *Adhatoda vasica* (Vasaka), is a potent mucolytic and mucokinetic, capable of inducing thin copious bronchial secretion. It depolymerises mucopolysaccharides directly as well as by liberating lysosomal enzymes network of fibres in tenacious sputum is broken. It is particularly useful if mucus plugs are present. Side effects are rhinorrhoea and lacrimation, gastric irritation, hypersensitivity.

## ANTITUSSIVES

They act in the CNS to raise the threshold of cough centre or act peripherally in the respiratory tract to reduce tussal impulses, or both these actions. Antitussives should be used only for dry unproductive cough or if cough is unduly tiring, disturbs sleep or is hazardous (hernia, piles, cardiac disease, ocular surgery).

## Opioids

**Codeine:** An opium alkaloid, qualitatively similar to but less potent than morphine. It is more selective for cough centre and is treated as the standard antitussive; suppresses cough for about 6 hours. **The antitussive action is blocked by naloxone indicating that it is exerted through opioid receptors in the brain.** Abuse liability is low, but present; constipation is the chief drawback. **At higher doses respiratory depression and drowsiness can occur-driving may be impaired.** Like morphine, it is contraindicated in asthmatics and in patients with diminished respiratory reserve.

## BRONCHODILATORS

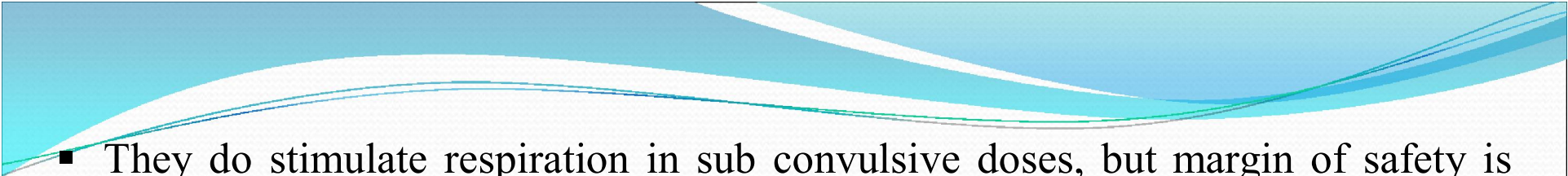
**Bronchospasm can induce or** aggravate cough. Stimulation of pulmonary receptors can trigger both cough and broncho-constriction, especially in individuals with bronchial hyper-reactivity. Bronchodilators relieve cough and improve the effectiveness of cough clearing by increasing surface velocity of airflow during cough.

They should be used only when an element of bronchoconstriction is present and not routinely.

## Respiratory stimulants (Analeptics)

- These are drugs whose primary action is to stimulate the CNS globally or to improve specific brain functions.
- The CNS stimulants mostly produce a generalized action which may, at high doses, result in convulsions.
- These drugs stimulate respiration and can have resuscitative value in coma or fainting.
- A respiratory stimulant is primarily used as noninvasive ventilation (Non invasive ventilation provides ventilatory support to a patient through the upper airways) as a means to help increase the urge to breathe.
- It works by stimulating the central nervous system, resulting in an increase in respiratory rate and tidal volume, which is the amount of air that is inhaled or exhaled during a normal breath.





- They do stimulate respiration in sub convulsive doses, but margin of safety is narrow; the patient may get convulsions while still in coma. Mechanical support to respiration and other measures to improve circulation are more effective and safe.

**The role of analeptics in therapeutics is very limited.** Situations in which they may be employed are:

- (a) As an expedient measure in hypnotic drug poisoning until mechanical ventilation is instituted.
- (b) Suffocation on drowning, acute respiratory insufficiency.
- (c) Apnoea in premature infant.
- (d) Failure to ventilate spontaneously after general anesthesia.

## **Doxapram**

**It acts by promoting excitation of central neurones.** At low doses it is more selective for the respiratory centre than other analeptics. **Respiration is stimulated through carotid and aortic body chemo-receptors** as well. Falling BP rises. Continuous i.v. infusion of doxapram has been found to abolish episodes of apnoea in the premature infant not responding to theophylline.

**Dose:** 40-80 mg i.m. or i.v.; 0.5–2 mg/kg/hr i.v. infusion.



Thanks