



KING SAUD UNIVERSITY  
COLLEGE OF MEDICINE  
1<sup>ST</sup> YEAR, 3<sup>RD</sup> BLOCK

# Treatment of Rhinitis and Cough

# 8

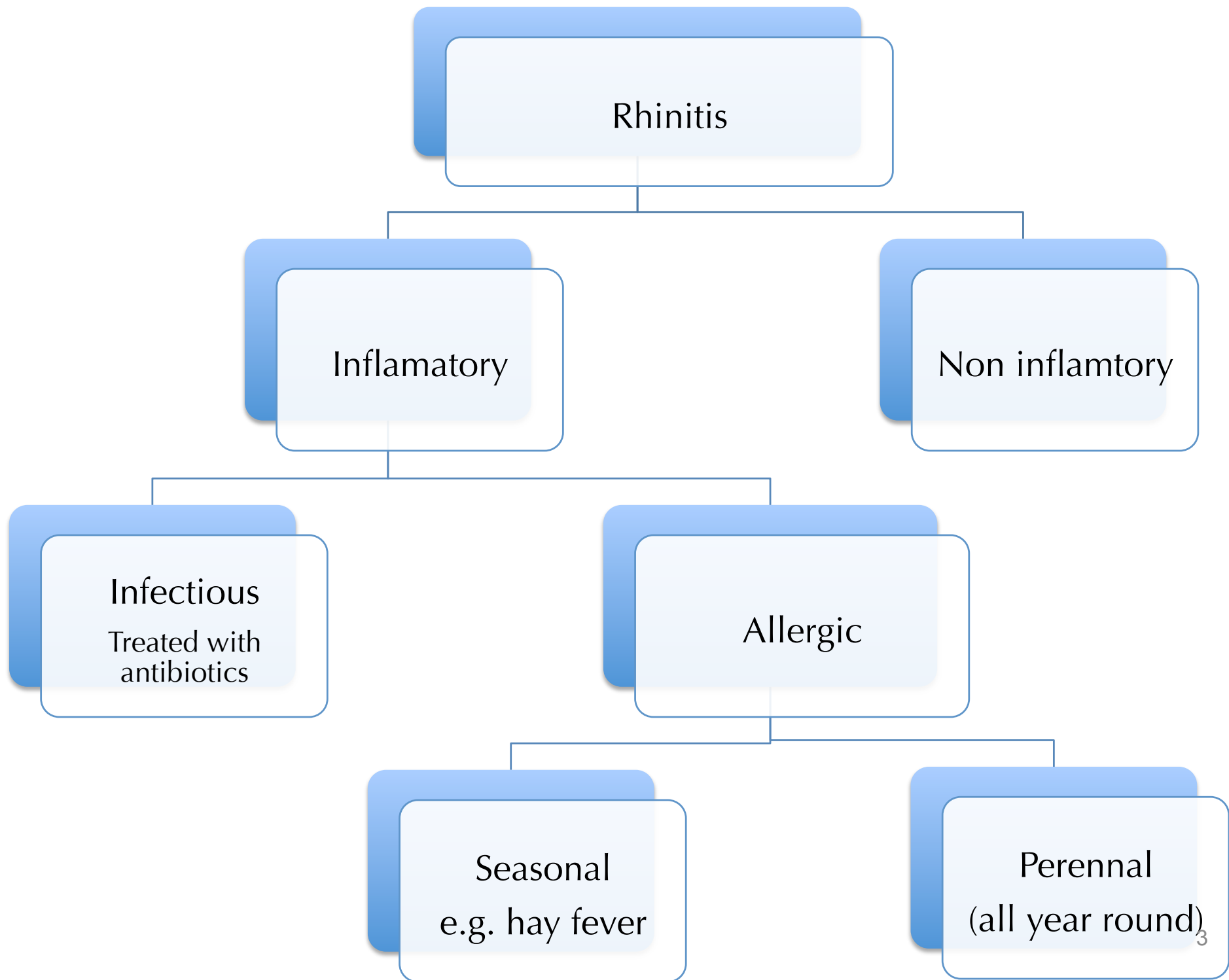


RESPIRATORY BLOCK



## Objectives :

- Classify types of rhinitis.
- Specify preventive versus pharmacotherapeutic strategies.
- Expand on the pharmacology of different drug groups used in treatment as antihistamines, anti-allergics, corticosteroids, decongestants and anti-cholinergic.
- Differentiate between productive versus dry irritant cough.
- Compare pharmacology of different expectorants & mucolytics drugs used in treatment of productive cough.
- Contrast between peripherally and centrally acting antitussives.



Rhinitis

Inflammatory

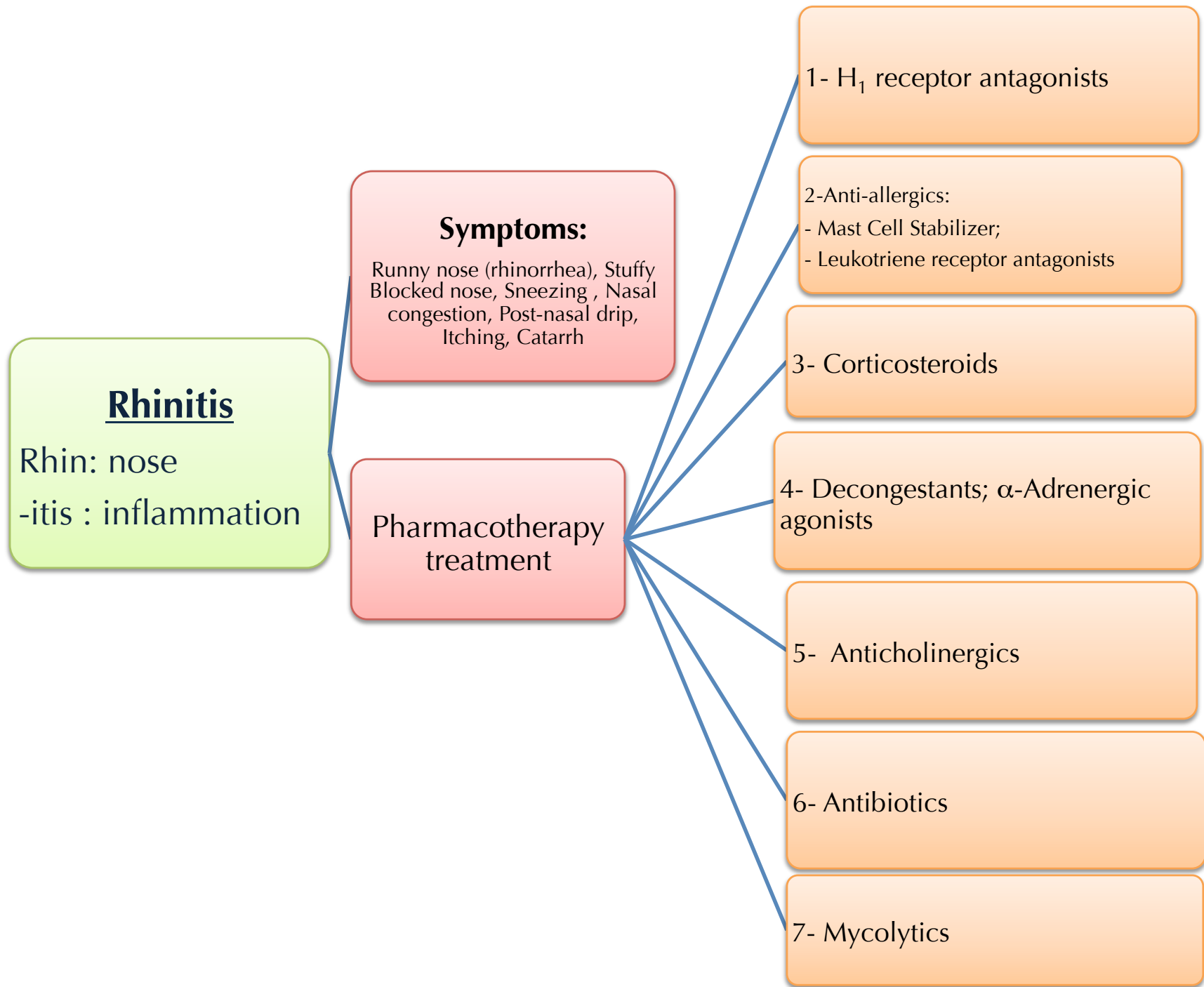
Non inflammatory

Infectious  
Treated with  
antibiotics

Allergic

Seasonal  
e.g. hay fever

Perennial  
(all year round)<sub>3</sub>



# 1 - Anti-Histamines

	<b>1<sup>st</sup> generation</b>	<b>2<sup>nd</sup> generation</b>	<b>3<sup>rd</sup> generation</b>
<b>Example</b>	Diphenhydramine	Loratidine Cetirizine	Desloratidine Levocetirizine
<b>Duration of action</b>	Short	Longer “better control”	Longer “better control”
<b>Selectivity</b>	Non-selective	Selective	More selective
<b>Crossing BBB</b>	Cross	Poor crossing	No crossing
<b>Drug interactions</b>	with enzyme inhibitors [ macrolides, antifungals, calcium antagonists]	No drug interactions	No drug interactions
<b>Sedating effects</b>	Sedating	Non-sedating	Non-sedating
<b>Side effects</b>	additive pharmacodynamic side effects	Minimal side effects	Minimal side effects

\*Anti-histamines block other receptors than H<sub>1</sub> such as: Cholinergic, alpha-Adrenergic, Serotonin  
 But they do not not block Dopamine nor H<sub>2</sub>

## 1 - Anti-Histamines

Indications linked to H <sub>1</sub> blockers	Indications linked to blocking other receptors than H <sub>1</sub>		
	Drugs	Action	Mechanism
<b>Allergies:</b> -Good control of: Rhinitis, Conjunctivitis, Urticaria, Flu (cough and sneezing). - Poor control of Asthma, Otitis, Anaphylaxis, Sinusitis, Atopic dermatitis.	Dimenhydrinate, Diphenhydramine, Promethazine	Vertigo & Motion sickness	-
<b>Itching</b>	Promethazine	Anti-emetic	- Decrease firing from internal ear to vomiting center - Decrease firing to vomiting center + Anticholinergic
<b>Others:</b> Insomnia Sleep aid Vertigo Anxiety Cough	Chlorpheniramine, Dimenhydrinate, Promethazine	Anti-parkinsonism	By anticholinergic action that will decrease the extra-pyramidal effects.
	Cyproheptadine	Increase appetite	By 5-HT modulation ↑ Sedation
	Promethazine, Antazoline	Anti-arrhythmic actions	by Na channel blocking action & local anesthetic effects

## 2 - ANTI-ALLERGICS

### Mast cell stabilizers

### Leukotrienes Antagonists

example

**Cromolyn, Nedocromyl**

**Zafirlukast, Montelukast, Pranlukast**

**Mechanism of action**

Decrease Histamine release [ by inhibiting Cl channels ]  
\*It does not antagonize released histamine

Block leukotriene actions

**Uses**

In children for prophylaxis of perennial allergic rhinitis

(not used a lot in Asthma, work better in upper respiratory tract allergy)

-Prophylaxis of lower respiratory tract allergies  
e.g. perennial allergen, exercise or aspirin-induced asthma

(Work good in Asthma, less actions in upper respiratory tract allergy)

**Side effects**

Cough, wheezes, headache, rash.

Elevation of liver enzymes, headache, dyspepsia.

### 3 - CORTICOSTEROIDS

<b>example</b>	Beclomethasone, Budesonide, Fluticasone
<b>Mechanism of action</b>	Inhibition of phospholipase A2 ↓ prostaglandin and leukotrienes
<b>Uses</b>	severe intermittent or moderate persistent symptoms
<b>Side effects</b>	Nasal irritation, fungal infection, hoarseness of voice

### 4 . D E C O N G E S T A N T S ( α - A d r e n e r g i c a g o n i s t s )

	<b>Systemic</b>	<b>Topical</b>
<b>Example</b>	Pseudoephedrine	Phenylethylamines, Imidazoline
<b>Uses</b>	<b>For treatment of nasal stuffiness</b>	
<b>Side effects</b>	Nervousness, insomnia, tremors, palpitations, hypertension.	Rebound nasal stuffiness

### 5 . A N T I C H O L I N E R G I C S

<b>Example</b>	Ipratropium
<b>Uses</b>	<ul style="list-style-type: none"> <li>- Bronchodilator in asthma.</li> <li>- Control rhinorrhea (excess nasal secretion &amp; discharge).</li> <li>- Effective in <b>vasomotor rhinitis</b> (watery hyper-secretion).</li> </ul>
<b>Side effects</b>	minimal systemic side effects



**The respiratory tract  
is protected by:**

**Mucociliary Clearance :**

Ensures optimum tracheo-  
bronchial clearance by forming  
sputum

(in optimum quantity &  
viscosity ) exhaled by ciliary  
movements.

**Cough Reflex :**

Exhales sputum out, if not  
optimally removed by the  
mucociliary  
clearance mechanisms.

# Treatment of cough

For productive cough

expectorants

mucolytics

N-  
acetylcystein

bromhexine

pulmozyme

For dry cough

Anti tussive

Peripheral  
acting

Central acting

# Expectorants

Act by removal of mucus through:

## Reflex stimulation

## Direct stimulation

### Example

**Guaifenesin**

Iodinated glycerol,  
Na or K iodide/acetate ,  
Ammonium chloride,  
**Ipecacuahna**

### Mechanism of action

Irritate GIT → stimulate gastro-pulmonary  
vagal reflex → loosening & thinning of  
secretions.

Stimulate secretory glands → increase  
respiratory fluids production.

### Side effects

Dry mouth (Xerostomia)  
chapped lips  
risk of kidney stones (↑uric acid  
excretion)

Unpleasant metallic taste  
hypersensitivity  
Hypothyroidism  
swollen of salivary glands (overstimulation  
of salivary secretion)  
flare of old TB.

### Indications

Final outcome is that cough is indirectly diminished

Common cold, Bronchitis, Laryngitis, Pharyngitis, Influenza, Measles, Chronic paranasal  
sinusitis, Pertussis.

# Mucolytics

Act by altering biophysical quality of sputum → becomes easily exhaled by mucociliary clearance or by less intense coughing

	<b>N-Acetylcysteine</b>	<b>Bromhexine, Ambroxol</b>	<b>Pulmozyme (Dornase Alpha or DNAse)</b>	<b>Hypertonic Saline &amp; NaHCO<sub>3</sub></b>	<b>Steam inhalation</b>
<b>overview</b>	A free radical scavenger used in Acetaminophen overdose. (an antidote for it)	They increase immune defense: ↓ antibiotics usage ↓ pain in acute sore throat.	A recombinant of human deoxyribo-nuclease-1 enzyme that is neubilized. Full benefit appears within 3-7 days		
<b>Mechanism of action</b>	Breakdown S-S bonds in Glycoproteins by its reducing SH Gp → <u>less viscid mucous</u>	Synthesize serous mucus (sialomucins of smaller-size) so it is: <u>Secretolytic + activate ciliary clearance &amp; transport</u>	<u>Cleavage of extracellular bacterial DNA</u> , that contributes to viscosity of sputum in case of infection	Decrease viscoelasticity by increasing the water content.	Decrease the adhesiveness.
<b>Indications</b>	<ul style="list-style-type: none"> <li>- Most mucolytics → effective as adjuvant therapy in COPD, asthma, bronchitis, (whenever there is excessive and/or thick mucus)</li> <li>- In bronchiectasis, pneumonia &amp; TB → they are of partial benefit.</li> <li>- Hardly any benefit in cystic fibrosis &amp; severe infections → Give rhDNAase</li> </ul>				
<b>Side effects</b>	Bronchospasm stomatitis, rhinorrhea, rash, nausea & vomiting.	Rhinorrhea, lacrymation, gastric irritation, hypersensitivity	Voice changes, pharyngitis, laryngitis, rhinitis, chest pain, fever, rash		

# Anti-tussive Agents

Stop or reduce cough by acting either primarily on the peripheral or CNS components of cough reflex.

## PERIPHERALLY ACTING ANTITUSSIVES

### A. Inhibitors of airway stretch receptors:

- In Pharynx: Use Demulcents → form a protective coating

**Lozenges & Gargles**

- In Larynx: Use Emollients → form a protective coating

**Menthol & Eucalyptus.**

-In Tracheobronchial Airway → Use aerosols or inhalational of hot steam

**Tincture Benzoin Compound & Eucalyptol**

-During bronchoscopy or bronchography → Use local anaesthetic aerosols

**Lidocaine, Benzocaine, and Tetracaine**

### B. Inhibitors of pulmonary stretch receptors in alveoli:

**Benzonatate:** ↓ sensitivity (numbing) of receptors by local anesthetic action.

#### Side effects:

drowsiness, dizziness, dysphagia, allergic reactions

- Overdose → mental confusion, hallucination, restlessness & tremors.

## CENTRALLY ACTING ANTITUSSIVES

### A. OPIOIDS:

activating  $\mu$  opioid receptors

**Codeine & Pholcodine**

### B. NON-OPIOIDS:

Antihistaminics (>sedating)

**Dextromethorphan:**

- It increase threshold at cough center.

- It has benefits over opioids in being →

1. As potent as codeine.
- 2- But no drowsiness.
- 3- Less constipating
- 4- No respiratory depression.
- 5- No inhibition of mucociliary clearance.
- 6- No addiction.

#### Side effects:

Nausea, vomiting, dizziness, rash & pruritis in normal doses

In high doses, hallucinations + opiate like side effects on respiration & GIT

# SUMMARY

	<b>Mechanism of action</b>	<b>Clinical uses</b>	<b>Side effect</b>
<b>2)anti allergics:-</b> <b>a) Acromolyn &amp; Nedocromyl</b>  <b>b) Leukotriene receptor antagonists</b>	a)Mast cell stabilizer  b) Block leukotriens action	Treatment of rhinitis and act as prophylactic	a)Rash,cough,headache,wheeze  b) Elevation of liver enzymes, headache, dyspepsia.
<b>3)corticosteroids:-</b> <b>Fluticasone &amp; Budesonide</b>	Block phospholipase A2=anti inflammatory drug	Treatment of rhinitis and in allergy cases	Nasal irritation, infection,hoarseness of voice
<b>4)decongestants:-</b> <b>a)topical Imidazoline &amp; Phenylethylamines</b>  <b>b)systemic pseudoephedrine</b>	Adrenergic agonists	Treatment of rhinitis and nasal stuffiness	A) Rebound nasal stuffiness  B) Nervousness, insomnia, hypertension
<b>5)anticholinergics:</b>  <b>Ipratropium</b>	Stop over activity of parasympathetic	Treatment of rhinitis and effective in vasomotor rhinitis (watery hyper secretion)	

# M C Q S

**1- An old man with a productive cough is on one of its medications. But after a while he got Xerostomia and chapped lips. What's the drugs that he's taking?**

- A. Antazoline
- B. Guaifenesin
- C. N-Acetylcysteine
- D. Benzonatate

**2- A medical student who's having an exam after two days, came to the hospital complaining of his runny nose and continuous sneezing and congestions in his nose. What's the best drug to prescribe him with?**

- A. Ipecacuahna
- B. Promethazine
- C. Diphenhydramine
- D. Levocetirizine

**3- A patient with productive cough is on a medication for this cough, but he thinks his voice changes because of this medication. What is it ?**

- A. Ipratropium
- B. Zafirlukast,
- C. Dextromethorphan:
- D. Pulmozyme

1-B, 2-D, 3-D

We hope we made this lecture easier for you  
Contact us for any questions or comments  
Good Luck !

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