

# Treatment of acute and chronic rhinitis and cough

**EDITING FILE**

**COLOR INDEX :**

- MAIN TEXT
- IMPORTANT
- GIRLS SLIDES
- BOYS SLIDES
- NOTES
- EXTRA





# Objectives:

- Define rhinitis and cough
- Classify drugs used in the treatment of **rhinitis**
- Expand on the pharmacology of different drug groups used in the treatment as; antihistamines, leukotriene antagonists, corticosteroids, decongestants & anticholinergics
- Describe the pharmacology of different **expectorants** & mucolytics used in the treatment of productive cough
- Describe the pharmacology of **antitussives** (cough suppressants).



# Rhinitis

Rhin=nose  
 itis=inflammation  
 Rhin + itis = nasal inflammation

<b>Definition</b>	Rhinitis is the irritation or inflammation of the mucous membranes inside the nose.		
<b>Types</b>	<p>1- Allergic (seasonal; hay fever &amp; perennial).                      2- Infectious (infection with bacteria, fungi &amp; viruses).</p> <p>Hay fever, also called allergic rhinitis, causes cold-like signs and symptoms, such as a runny nose, itchy eyes, congestion, sneezing and sinus pressure. But unlike a cold, hay fever isn't caused by a virus</p>		
<b>Duration</b>	1- Acute: persist 7-14 days.    2- Chronic: persistent more than 6 weeks.		
<b>Causes</b> <small>Extra information from previous slides</small>	1-grass. 2-mold.	3-grains. 4-mites.	5-Animal allergens. 6-Occupational allergens.
<b>Signs and symptoms</b>  <small>igE loaded basophils with histamine will be degranulated and cause these symptoms</small>	<ul style="list-style-type: none"> <li>● Runny nose (rhinorrhea; excess nasal secretion &amp; discharge).</li> <li>● Sneezing.</li> <li>● Nasal congestion/stuffy blocked nose.</li> <li>● Post nasal drip (the feeling of mucus secretions moving down the back of your throat, often causing cough)</li> <li>● Systemic effects may be (fever, body aches,.....).</li> </ul>		

# Treatment of Rhinitis

## 1 Prevention Therapy:

Non pharmacological approach

مانستخم فيها أدوية

1.Environmental Control (dust control, pets). **Best treatment is knowing the cause and avoiding it.**

2. Allergen immunotherapy.

تطعيمات

### EXTRA INFO

From team 439:(desensitization immunotherapy):  
What is the aim? to induce tolerance to the allergen by reducing its tendency to induce IgE production.  
How? People are desensitized through the administration of escalating doses of allergen that gradually decreases the IgE-dominated response.  
Why? to direct the immune response away from humoral immunity and toward cellular immunity, thereby encouraging the body to produce fewer IgE antibodies and more CD4+ T regulatory cells that secrete IL-10 and TGF- $\beta$ , which skews the response away from IgE production

## 2 Pharmacotherapy:

1. Anti-histamines (H1-receptor antagonists)

2. Anti-allergics

a) Cromolyn sodium (mast cell stabilizer).

b) Montelukast (Leukotriene receptor antagonists).

Involved in stopping the inflammation that initiate the allergy

3. Corticosteroids. ( **inhaler** )

4. Decongestants **مضادات الاحتقان**  
(alpha- adrenergic agonists)  **$\alpha 1$**

5. Anti-cholinergics **to reduce secretions** .like Ipratropium

6. Antibiotics (if bacterial infection occur).



# What is Histamine?



**Histamine** is a chemical messenger mostly generated in **mast cell** that mediates a wide range of cellular responses, including:

- Allergic and inflammatory reactions. (H1)
- Gastric acid secretion (H2).
- Neurotransmission in parts of the brain. (H3)

Histamine has **no clinical application** but **antihistamines** have important **therapeutic applications**.

## Antihistamines:

The term antihistamine refers to the **classic H<sub>1</sub> – receptor blockers**

These drugs **do not interfere** with the formation or release of histamine.

They **block** the receptor-mediated response of a target tissue.

**H<sub>1</sub> Blockers** have **Good Control of:** Conjunctivitis, Urticaria, Flu.

**H<sub>1</sub> Blockers** have **Poor Control of:** Asthma, Otitis, Anaphylaxis, Sinusitis, Atopic dermatitis.



you have to know the difference between the generations and why we use each specific generation

<u>team 434</u>	First generation	Second generation	Third generation
<b>Duration</b>	Short duration	Longer duration = better control	
<b>Selectivity</b>	Non-selective	Selective	More selective
<b>Crossing BBB</b>	Cross	No crossing	
<b>Drug interaction</b>	They tend to interact with other receptors, producing a variety of unwanted adverse effects	No drug interactions	
<b>Sedating effect</b>	Sedating	Non-sedating	
<b>Side effect</b>	Additive pharmacodynamic effect	Minimal side effect	

# Antihistamine (H<sub>1</sub>-Receptor Antagonist)

Classification	First generation	Second generation	Third generation
<b>Alkylamine</b>	Chlorpheniramine	-	-
<b>Ethanolamine</b>	Dimenhydrinate & Diphenhydramine		
<b>Ethylenediamine</b>	Antazoline		
<b>Phenothiazin</b>	Promethazine		
<b>Piperazine</b>	Cyclizine	Cetirizine	Levocetirizine
<b>Piperidine</b>	Azatiidine	Loratadine	Fexofenadine & Desloratadine
<b>Miscellaneous</b>	Ketotifen & Cyproheptadine	-	-
	Short duration <b>Interaction with enzyme inhibitors like:</b> [macrolides antibiotics, antifungals, calcium antagonists] + <b>additive pharmacodynamic ADRs</b>	Longer duration = better control No drug interactions & minimal ADRs	
	<ul style="list-style-type: none"> <li>•The older first generation drugs is still widely used because they are effective and inexpensive.</li> <li>•These drugs <b>penetrate the blood brain barrier (BBB)</b> and cause <b>sedation</b>.</li> <li>•They tend to interact with other receptors, producing a variety of <b>unwanted adverse effects</b> (non selective, can produce other side effects).</li> </ul>	<ul style="list-style-type: none"> <li>•Second generation (non-sedating) agents are specific for H<sub>1</sub> receptors.</li> <li>•They carry <b>polar</b> groups, they <b>do not penetrate the BBB causing less CNS depression</b>.</li> </ul>	

All are used systemically or topically  
**IV or Oral - Topical**



# Antihistamine



Indications **Not** linked to H<sub>1</sub> block

Cholinergic

↑ Dry mouth  
↑ Urinary retention  
↑ Sinus tachycardia

α-Adrenergic

↑ Hypotension  
↑ Dizziness  
↑ Reflex tachycardia

Serotonin

↑ Appetite

Histamine H<sub>1</sub>

↓ Allergic inflammation, itching, sneezing, rhinorrhea  
↓ Neurotransmission in CNS  
↑ Sedation  
↓ Cognitive & psychomotor performance  
↑ Appetite

~~Histamine H<sub>2</sub>~~

Antihistamines don't effect H<sub>2</sub> re

Side effects interaction

Allergies

Itching (Even if non allergic)

Others

Indications Linked to H<sub>1</sub> Block

**Insomnia**, Sleep aid,  
Vertigo, Anxiety, Cough.



# 1- Antihistamines Drugs

## Actions

- The action of all the H<sub>1</sub> receptor blocker is qualitatively similar.
- They are much more effective in preventing symptoms than reversing them once they have occurred.
- Most of these drugs have additional effects unrelated to their blocking H<sub>1</sub> receptors (not selective) **especially the 1st generation**, which probably reflect binding of H<sub>1</sub> antagonists to:
  1. Cholinergic receptors.
  2. Adrenergic receptors.
  3. Serotonin receptors.

## Therapeutic Uses

1. **Allergic rhinitis:** relieves rhinorrhea, sneezing, and itching of eyes and nasal mucosa.
2. **Common cold:** dries out the nasal mucosa. Often combined with nasal decongestant and analgesics.
3. **Motion sickness.** **Ex of drugs used (cyclizine , Diphenhydramine.)** ( they're a 1st generation) تعطيه لو انا عند رحلة بحرية او مسافر بالقطار
4. **Allergic dermatoses:** can control itching associated with insect bites.
5. **Nausea and vomiting** (Promethazine). (1st generation )

## P.K.

1. H<sub>1</sub> receptor blockers are **well absorbed after oral** administration.
2. Maximum serum levels occurring at **1-2** hours.
3. Average plasma half life is **4 to 6** hours.
4. H<sub>1</sub>- receptor blockers have **high bioavailability** and distributed to all tissues including CNS (lipid soluble can cross BBB).
5. Metabolized by the hepatic cytochrome P450 system.
6. Excretion occur via kidney except **fexofenadine** excreted in **feces** unchanged.

Dr.: as a case, can give to patient with kidney failure.

# 1- Antihistamines Drugs

## ADRs

1. Sedation.
2. Tinnitus.(ear buzzing) ( ringing in the ear )
3. Fatigue.
4. Dizziness.
5. Blurred vision.
6. Dry mouth.

## Drug interaction

1. CNS depressants because can cross BBB. (sedation)
2. Cholinesterase inhibitors.

it works by increasing the Ach , while the antihistamine doing the opposite, thats why they interact with each other.

must give without antidepressants

## Over-dose

The most common and dangerous effects of **acute poisoning** are those on **CNS**; including hallucinations, excitement, ataxia ( اضطراب الحركة ) & convulsions.

## 2- Anti-Allergic

Type	Mast cell stabilizer	Leukotriene receptor antagonists
Example	<ul style="list-style-type: none"><li>• Cromolyn</li><li>• Nedocromil</li></ul>	Montelukast
M.O.A	Decrease histamine release (by <b>inhibiting Cl channels</b> ) i.e. can act only <b>prophylactic</b> , it does not antagonize released histamine	Block leukotriene actions
Uses	Used more <b>in children</b> for prophylaxis of <b>perennial allergic rhinitis</b> Should be given on daily base and never stop abruptly when stop it suddenly mast cell will excessive release histamine and lead to bronchospasm and anaphylaxis.	for <b>prophylaxis</b> of <b>lower respiratory tract allergies</b> (e.g. perennial allergen, exercise or aspirin induced asthma) <b>more than</b> on <b>upper respiratory tract allergies</b> (e.g. chronic rhinosinusitis)
ADRs		<b>As in asthma</b> <ul style="list-style-type: none"><li>• increase liver enzymes.</li><li>• headache.</li><li>• dyspepsia.</li></ul>



## 3- Corticosteroids



<b>Example</b>	Topical (inhaled); steroid spray; <b>examples of corticosteroids that we give it for rhinitis:</b> beclomethasone & fluticasone
<b>M.O.A</b>	Anti-inflammatory → <b>block phospholipase A2</b> → decrease arachidonic acid synthesis → decrease prostaglandins & leukotrienes
<b>Uses</b>	Given if severe* intermittent or moderate persistent symptoms
<b>ADRs</b>	<ul style="list-style-type: none"><li>• Nasal irritation ( <b>with chronic use</b> )</li><li>• Fungal infection ( <b>with chronic use</b> , because it's <b>immunosuppressant</b>,so it will increase the fungal infection)</li><li>• Hoarseness of voice</li></ul>

# 4- Decongestants



Type	Systemic	Topical
<b>Example</b>	<p><b>Pseudoephedrine</b> ( very commonly used)</p> <p>438 note: *has many side effects because of the ephedrine which is a sympathomimetic (stimulating sympathetic nerves).</p>	<p><b>1-Phenylethylamines:</b></p> <ul style="list-style-type: none"> <li>● Phenylephrine (most common to use)</li> <li>● Methoxamine</li> </ul> <p><b>2-Imidazoline:</b></p> <ul style="list-style-type: none"> <li>● Naphazoline</li> <li>● Oxymetazoline HCL</li> <li>● Xylometazoline HCL</li> </ul>
<b>M.O.A</b>	<p><b><math>\alpha</math>-adrenergic agonists</b></p> <p>They cause vasoconstriction of blood vessels in nasal mucosa &amp; reduce the rhinorrhea (commonly known as a runny nose).</p>	
<b>Uses</b>	<p><b>Treatment of nasal stuffiness</b></p>	
<b>ADRs</b>	<p>Nervous , insomnia, tremors, palpitations, and hypertension.</p>	<p>We use it for short Time period if we <b>prolonged</b> using it ,can cause <b>Rebound</b> nasal stuffiness (repeated administration &gt; 10 days -2 weeks).</p>
<b>Contraindications</b>	<p><small>There is a MCQ for this drug , in the end of the lecture</small></p> <p><b>Hypertension, heart failure</b>, angina pectoris, <b>hyperthyroidism</b>, glaucoma.</p>	-

# 5- Anticholinergics

cholinergic system is responsible for secretion, that why we have to give him a anticholinergic

## Example

Ipratropium  
M.O.A.) Anticholinergic (blocks muscarinic receptor)

## Uses

Nasal drops to control rhinorrhea (excess nasal secretions & discharge), so very effective in vasomotor rhinitis\* (watery hyper-secretion).

Its indication as bronchodilator in asthma

## ADRs

(Dry mouth and sedation)  
(discussed in the Asthma & COPD)

# What is coughing?

IS SUDDEN EXPULSION OF AIR FROM THE LUNGS THROUGH THE EPIGLOTTIS AT AN AMAZINGLY FAST SPEED (~100 MILES/ HR) TO GET RID OF UNWANTED IRRITANTS.

- ABDOMINAL & INTERCOSTAL MUSCLES CONTRACT, AGAINST THE CLOSED EPIGLOTTIS → PRESSURE INCREASES → AIR IS FORCEFULLY EXPELLED TO DISLodge THE TRIGGERING IRRITANT.



## TYPES OF COUGH

PRODUCTIVE/WET  
(USEFUL)

There is a SAQ for this part ,  
in the end of the lecture

**TREATMENT BY:**  
**1. MUCOLYTICS**  
**2. EXPECTORANTS**  
(طاراد للبلغم)

DRY/IRRITANT  
(NOT USEFUL)  
SECONDARY TO IRRITANT VAPORS,  
GASES, INFECTIONS, AND CANCER

**TREATMENT BY:**  
**ANTITUSSIVE**  
**AGENTS (COUGH**  
**SUPPRESSION)**

## EXTRA INFO

The respiratory tract is protected mainly by:




- 1- Mucociliary Clearance → ensures optimum tracheobronchial clearance by forming sputum (in optimum quantity & viscosity) exhaled by ciliary movements
- 2- Cough Reflex → exhales sputum out, if not optimally removed by the mucociliary clearance mechanism



# Expectorants

Act by removal of mucous through different types of stimulations



Type	Reflex stimulation	Direct stimulation
Example	Guaiifenesin	Iodinated glycerol, Na or K iodide/acetate, Ammonium chloride. Ipecacuanha(عرق الذهب)  
M.O.A	 Irritation of GIT which leads to stimulation of gastropulmonary vagal reflex causing loosening and thinning of secretions	Stimulation of secretory glands causes an increase in respiratory fluids production
Indications	<b>Final outcome is that cough is indirectly diminished:</b> 1.Common cold 2.Bronchitis 3.Pharyngitis 4.Chronic paranasal sinusitis	
ADRs	Dry mouth, chapped lips, risk of kidney stones (increases uric acid excretion).	ADRs of iodide preparation: - Unpleasant metallic taste. - Hypersensitivity. - Hypothyroidism.(IODIDE effect) - Swollen salivary glands (overstimulation of salivary secretion). - Flare (activation) of old TB.



# Mucolytics

Mucolytic agents are used to dissolve or break down mucus in the respiratory tract. They make the mucus less viscous so that it can be coughed up with more ease.

Example of drug	Hypertonic Saline & NaHCO <sub>3</sub>	Steam inhalation	N-Acetyl Cysteine	Bromhexine & Ambroxol	Pulmozyme (Dornase Alpha)
<b>Overview</b>	-	-	<ul style="list-style-type: none"> <li>- Breakdown S-S bonds in glycoproteins.</li> <li>- A free radical scavenger.</li> <li>- Used in acetaminophen overdose.</li> </ul> <p>use in paracetamol toxicity</p>	<ul style="list-style-type: none"> <li>- Ambroxol is a metabolite of Bromhexine.</li> <li>- Synthesize serous mucus.</li> <li>- Increase immune defence.</li> <li>- Decrease antibiotics usage.</li> <li>- Decrease pain in acute sore throat.</li> </ul>	<ul style="list-style-type: none"> <li>- rhDNAase = A recombinant human-deoxyri bonuclease-I enzyme that is nebulized ( used as inhaler)</li> <li>-Hydrolyze the DNA present in the sputum/mucus &gt;&gt;&gt; reduce viscosity &amp; increase clearance.</li> <li>- Full benefit appears within 3-7 days</li> </ul>
<b>M.O.A</b>	Decrease viscoelasticity by increasing water content	Decrease Adhesiveness	Breakdown S-S bonds in glycoprotein (in mucus) → less viscid mucus	Synthesize serous mucus (watery secretion from the submandibular gland) + activate ciliary clearance	Cleavage of extracellular bacterial DNA, that contributes to viscosity of sputum in case of bacterial infection only

<b>Uses</b>	Effective as adjuvant therapy in COPD, asthma, bronchitis, etc. (when there is excessive or thick mucus)
-------------	--

# Antitussive agents

for dry cough

Stop or reduce cough by acting either peripherally or centrally

## 1-Peripherally acting Acts on the receptors of the respiratory center

	Location	Use	Drug
<b>Inhibitors of airway stretch receptors</b>	In pharynx	Demulcents (forms a protective coating)	1. Lozenges 2. Gargles غرغرة
	In larynx	Emollients (forms a protective coating)	1. Menthol 2. Eucalyptus
	In tracheobronchial airway	Aerosols or inhalation of hot steam	1. Tincture benzoin compound. 2. Eucalyptus
	During bronchoscopy or bronchography	Local anesthetic aerosols	1. Lidocaine 2. Benzocaine 3. Tetracaine
<b>Inhibitors of pulmonary stretch receptors in alveoli</b>	<b>M.O.A:</b> Decrease sensitivity (numbing) of receptors by local anesthetic action		<b>Benzonate</b>

## 2-Centrally acting (acts on the cough center itself)

### Opioids

Activating  $\mu$  opioid receptors. Cause addiction  
e.g

- 1- **Codeine** (very potent)
- 2- Pholcodine

Both have similar effects to morphine but weaker

ولا عندك المورفين والهيريون كلها تعتبر cough suppressor وكانت تستخدم قديما

بس عشانها تسبب الادمان وتوقفت وحاولوا يغيرون في تركيبتها وتصير  
ولكن Codeine وانتجوا وادخلوها في السوق اخيرا صنعوا  
استهلكوها الناس مثل المخدرات وسحبوها من السوق اخيرا صنعوا  
semisynthetic drug بدون

Dextromethorphan اللي هو ADS اثار الادمان وبدون  
codeine حقتة ؟ ADS طيب وش هي ال

1-constipation

2-depression of R.C (ال) 3-drug dependant (addiction)

### Non Opioids

Antihistamines (> sedating) cross BBB  
e.g **Dextromethorphan**

increases threshold at cough center.  
Benefits over opioids:

1. As potent as codeine.
2. Less constipating.
3. No respiratory depression.
4. No inhibition of mucociliary clearance.
5. **No addiction.**

May come SAQs questions found down in question4

ADRs for dextromethorphan:

1. Normal dose:  
Nausea, vomiting, dizziness, rash & pruritus.
1. High dose:  
Hallucinations + opiate like side effects on respiration & GIT.

# “ study smarter , not harder “

## Active recall



For Anki flash cards click the icon



Take active quizzes in our team channel to test your understanding.



click the icon to get free flash cards

## summary



# MCQs

1

A patient is experiencing nasal stiffness and is already using antihypertensive drugs , Which of the following medications would be contraindicated in this case?

**A** Pseudoephedrine

**B** Antazoline

**C** Cetirizine

**D** Cyclizine

2

Which of the following is a 3rd generation anti-histamine drug?

**A** Promethazine

**B** Ketotifen

**C** Cyproheptadine

**D** Fexofenadine

3

Which drug has a mechanism of action to be a mast cell stabilizer?

**A** Omalizumab

**B** Nedocromyl

**C** Montelukast

**D** Salbutamol

4

Which of the following drugs act as a prophylactic and decreases inhibiting Cl channels?

**A** Methoxamine

**B** Montelukas

**C** Diphenhydramine

**D** Cromolyn

# MCQs

**5** A patient suffering from vasomotor rhinitis and took ipratropium bromide, what does it treat?

**A** Runny nose

**B** Nasal stuffiness

**C** Sneezing

**D** Common cold

**6** A 20 years old patient came to the hospital suffering from a dry, irritating and annoying cough. What is the drug of choice?

**A** Guaifenesin

**B** Dextromethorphan

**C** N-Acetyl Cysteine

**D** Steam inhalation

**7** which one of the following is example for topical decongestants ?

**A** Pseudoephedrine

**B** Cromolyn

**C** Methoxamine

**D** Ipratropium

**8** which drug of mucolytics Breakdown S-S bonds in glycoprotein ?

**A** Bromohexine

**B** Pulmozyme

**C** N-acetyl cysteine

**D** Dimenhydrinate

# SAQs

1

What's the difference between first and second generation of H1 receptor blockers?

◆ slide 6

2

What is the drug that you can give it to a patient with kidney failure?

◆ fexofenadine

3

what are the type and what the M.O.A for each type of Expectorants?

◆ Slide 15

4

Why dextromethorphan best than codeine?

◆ slide 19

# SAQs

1

Mention two ways to treat a productive cough.

◆ 1-Mucolytics  
2-Expectorants

2

What is the best method to treat a dry cough?

◆ antitussive  
agents

3

How can nasal stiffness be treated?

◆ By using  
Decongestants

4

How can watery hypersecretion be treated?

◆ By using  
Anticholinergic drugs





# Team leaders

**Ritaj Alsubaie**

**Raseel Aldajany**

**Eyad Alzubaidi**

## Team members

Madaen Alarifi

Haya Alateeq

Noreen Almarabah

Janan Alsayari

Norah Alnoshan

Alanoud alnajawi

Sahar Alfallaj

 Samiyah sulaiman

shaden Alotaibi

Roaa Alhajri

Rimaz Alhammad

Ali Al-Abdulazem

Waleed Alanazi

Abdulaziz Sahhari

 Abdulrahman Almalki

khalid Alghamdi

Abdulaziz Alanazi

Abdulrahman Alnafisah

Abdullah Alzoom

Ahmed Alabbad



Contact us at : [pharmacology.444ksu@gmail.com](mailto:pharmacology.444ksu@gmail.com)