







# Treatment of acute and chronic rhinitis and cough

# COLOR INDEX: • MAIN TEXT • IMPORTANT • GIRLS SLIDES • BOYS SLIDES • NOTES • EXTRA







- 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
Definition	Rhinitis is the irritation or inflammation of the mucous membranes inside the nose.	
Types	1- Allergic (seasonal; hay fever & perennial).	2- Infectious (infection with bacteria, fungi & viruses).
	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	

3-grains.

4-mites.

• Nasal congestion/stuffy blocked nose.

of your throat, often causing cough)

• Systemic effects may be (fever, body aches,...,...).

1- Acute: persist 7-14 days. 2- Chronic: persistent more than 6 weeks.

• Post nasal drip (the feeling of mucus secretions moving down the back

• Runny nose (rhinorrhea; excess nasal secretion & discharge).

5-Animal allergens.

6-Occupational allergens.

Duration

Causes

Extra information

Signs and

symptoms

histamine will be

1-grass.

2-mold.

Sneezing.

## **Treatment of Rhinitis**

## 1 Prevention Therapy:

2

### Pharmacotherapy:

Non pharmacological approach مانستخدم فيها أدوية

- 1.Environmental Control (dust control, pets). Best treatment is knowing the cause and avoiding it.
- 2. Allergen immunotherapy. تطعیمات

### **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

- 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 allerey
- 3. Corticosteroids. (inhaler)
- 4. Decongestants مضادات الاحتقان (alpha- adrenergic agonists) α1
- 5. Anti-cholinergics to reduce secretions ,like Ipratropium
- 6. Antibiotics (if bacterial infection occur).



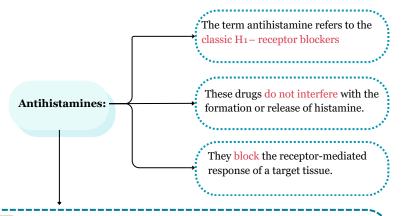
## What is Histamine?



**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.



H1 Blockers have Good Control of: Conjunctivitis, Urticaria, Flu.
H1 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

team 434

First generation

Second generation

Third generation

Longer duration = better control

No crossing

No drug interactions

Non-sedating

Minimal side effect

More selective

Selective

Short duration

Non-selective

Cross

They tend to interact with other receptors,

producing a variety of

unwanted adverse

effects

Sedating

Additive pharmacodynamic

effect

Duration

Selectivity

Crossing

**BBB** 

Drug

interactio

n

Sedating

effect

Side effect

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

mitimistamme (111-Receptor mitagomst)			
Classification	First generation	Second generation	Third generation

Cetirizine

Loratadine

Longer duration = better control No

drug interactions & minimal ADRs

·Second generation (non-sedating) agents

•They carry polar groups, they do not

penetrate the BBB causing less CNS

are specific for H1 receptors.

depression.

Levocetirizine Fexofenadine &

Desoloratadine

Chlorpheniramine

Dimenhydrinate & Diphenhydramine Antazoline

Promethazine

Cyclizine

**Azatidine** 

Ketotifen & Cyproheptadine Short duration Interaction with enzyme

inhibitors like: [macrolides antibiotics. antifungals, calcium antagonists] + additive

pharmacodynamic ADRs

. The older first generation drugs is still widely used because they are effective and inexpensive.

and cause sedation.

can produce other side effects).

•These drugs penetrate the blood brain barrier (BBB)

•They tend to interact with other receptors, producing a

All are used systemically or topically IV or Oral - Topical

variety of unwanted adverse effects (non selective,

Alkylamine

Ethanolamine

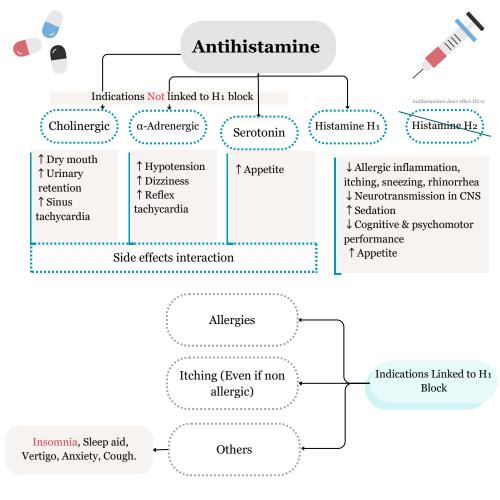
Ethylenediamine

Phenothiazin

**Piperazine** 

**Piperidine** 

Miscellaneous



## 1- Antihistamines Drugs

	<ul> <li>The action of all the H<sub>1</sub> receptor blocker is qualitatively similar.</li> <li>They are much more effective in preventing symptoms than reversing them</li> </ul>
	once they have occurred.
	• Most of these drugs have additional effects unrelated to their blocking H <sub>1</sub>
Actions	receptors (not selective) especially the 1st generation, which probably reflect
110010115	binding of H <sub>1</sub> antagonists to:

3. Serotonin receptors. 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

1. Cholinergic receptors. 2.Adrenergic receptors.

Therapeu tic Uses generation) نعطیه لواحد عنده رحلة بحریه او مسافر بالطائره 4. Allergic dermatoses: can control itching associated with insect bites. 5. Nausea and vomiting (Promethazine). (1st generation)

P.K.

Dr.: as a case,

kidney failure.

can give to patient with

1. H1 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. H1- 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.

## 1- Antihistamines Drugs 1. Sedation.

2. Tinnitus.(ear buzzing) (ringing in the ear)

hallucinations, excitement, ataxia (اضطراب الحركة ) &

must give

without

antidepressants

Drug

interacti

on

Over-

dose

**ADRs** 

5. Blurred vision. 6. Dry mouth. 1. CNS depressants because can cross BBB. (sedation)

3. Fatigue.

4 Dizziness

Cholinesterase inhibitors.

it works by increasing the Ach, while the antihistamine doing the opposite, thats why they interact with each other. The most common and dangerous effects of acute poisoning are those on CNS; including

convulsions.

# Type Mast cell stabilizer Leukotriene receptor antagonists

Montelukast

Block leukotriene actions

for prophylaxis of lower

respiratory tract allergies

(e.g. perennial allergen, exercise

or aspirin induced asthma)

more than on upper

respiratory tract allergies

(e.g. chronic rhinosinusitis)

As in asthma

• increase liver enzymes.

headache.dyspepsia.

Cromolyn

Nedocromil

Decrease histamine release (by **inhibiting Cl channels**) i.e. can act

only **prophylactic**, it does not antagonize released histamine

Used more in children for

prophylaxis of **perennial allergic** 

**rhinitis** Should be given on daily

base and never stop abrutly

when stop it suddenly mast cell will

excesive release histamine and lead to

bronchospasm and anaphylaxis.

Exampl

e

M.O.A

Uses

**ADRs** 



## 3- Corticosteroids



Example
---------

Topical (inhaled); steroid spray; examples of corticosteroids that we give it for rhinitis: beclomethasone & fluticasone

M.O.A

arachidonic acid synthesis → decrease prostaglandins & leukotrienes

Hoarseness of voice

Uses

Nasal irritation (with chronic use) Fungal infection ( with chronic use , because it's immunosuppressant, so it will increase the fungal infection)

Anti-inflammatory  $\rightarrow$  block phospholipase A2  $\rightarrow$  decrease

ADRS

Given if severe\* intermittent or moderate persistent symptoms

## **4- Decongestants**

α-adrenergic agonists

They cause vasoconstriction of blood vessels in nasal mucosa & reduce the rhinorrhea (commonly known as a runny nose).

Treatment of nasal stuffiness

Methoxamine

2-Imidazoline:Naphazoline

Oxymetazoline HCLXylometazoline HCL

We use it for short Time period if we

**prolonged** using it ,can cause

**Rebound** nasal stuffiness (repeated administration > 10 days -2 weeks).

Туре	Systemic	Topical
	Pseudoephedrine ( verv	1-Phenylethylamines: • Phenylephrine (most common to

commonly used)

438 note: \*has many side effects because of the

(stimulating sympathetic nerves).

Nervous, insomnia, tremors,

palpitations, and hypertension.

Hypertension, heart failure, angina pectoris, hyperthyroidism, glaucoma.

There is a MCQ for this drug, in the end of the lecture

**Example** 

M.O.A

Uses

ADRS

Contraindicatio

ns

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

Example	Ipratropiu M.O.A.) Anticholinergic (block

ım

Uses

**ADRs** 

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

(Dry mouth and sedation)

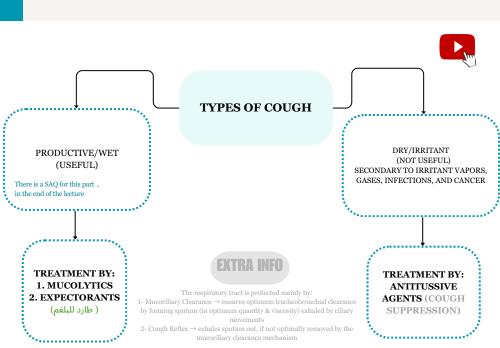
(discussed in the Asthma & COPD)

ks muscarinic receptor)

## 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.





Туре

Guaifenesin

Irritation of GIT which leads to

stimulation of gastropulmonary

vagal reflex causing loosening

and thinning of secretions

Dry mouth, chapped lips, risk of kidney

stones (increases uric acid excretion).

Act by removal of mucous through diffe	rent types of simulations
	1

Type	

**Example** 

M.O.A

Indication

S

**ADRs** 

Final outcome is that cough is indirectly diminished: 1. Common cold 2. Bronchitis 3. Pharyngitis 4. Chronic paranasal sinusitis

Iodinated glycerol, Na or K iodide/

Stimulation of secretory glands

causes an increase in respiratory

fluids production

ADRs of iodide preparation: - Unpleasant metallic taste. - Hypersensitivity.

- Hypothyroidism.(IODIDE effect)

- Swollen salivary glands (overstimulation of salivary secretion). - Flare (activation) of old TB.

acetate, Ammonium chloride. ( عِرق الذهب) Ipecacuanha

**Reflex stimulation Direct stimulation** 

## 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

Example

of drug

Overview

Uses

Hypertoni Steam c Saline & inhalation NaHCO3

**Brombexine & Ambroxol** - Ambroxol is a

metabolite of

Bromhexine.

mucus.

defence.

usage.

- Synthesize serous

- Increase immune

Decrease antibiotics

- Decrease pain in acute

**Pulmozyme** 

(Dornase

Alpha)

- rhDNAase =

A recombinant humandeoxyri bonuclease-1

enzyme that is

nebulized (used as

inhaler)

sputum/mucus >>> reduce viscosity &

- Full benefit appears

within 3-7 days

Cleavage of

in case of bacterial

infection only

sore throat. Breakdown S-S bonds in Synthesize serous mucus extracellular bacterial (watery secretion from the DNA, that contributes glycoprotein (in submandibular gland) + to viscosity of sputum  $mucus) \rightarrow less$ activate ciliary clearance

Effective as adjuvant therapy in COPD, asthma, bronchitis, etc. (when there is

excessive or thick mucus)

Decrease viscoelasti Decrease city by Adhesive M.O.A increasing ness water viscid mucus content

**Mucolytics** 

ease.

N-Acetyl

Cysteine

- Breakdown S-S

bonds in

glycoproteins.

- A free radical

scavenger.

- Used in

acetaminophen

overdose.

use in paracetamol

toxicity

### **Antitussive agents** for dry cough Stop or reduce cough by acting either peripherally or centrally

Location

In pharynx

In larynx

In tracheobronchial

airway

During bronchoscopy or bronchography

M.O.A: Decrease sensitivity (numbing) of

receptors by local anesthetic action

Inhibitors of airway stretch

receptors

Inhibitors of

pulmonary stretch

receptors in alveoli

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

Use

Demulcents

(forms a protective

coating)

**Emollients (forms** 

a protective

coating)

Aerosols or

inhalation of hot

steam

Local anesthetic

aerosols

Drug

1. Lozenges

غرغرة 2.Gargles

1. Menthol

2. Eucalyptus

1.Tincture benzoin

compound.

2. Eucalyptus

1. Lidocaine 2.

Benzocaine 3. Tetracaine

Benzonatate

# (acts on the cough center itself) **Opioids**

# Antihistamines (> sedating) cross BBB

2-Centrally acting

Activating µ opioid receptors. Cause addiction 1- Codeine (very potent) 2- Pholcodine

Both have similar effects to morphine but weaker

ولا عندك المورفين والهيروين كلها تعتبر cough suppressor وكانت تستخدم قديما

ىدەن semisynthetic drug Dextromethorphan اللي هو ADs اثار الادمان وبدون حقتھ ؟ ADs طّيب وش هي ال

بس عشانها تسبب الادمان توقفت وحاولوا يغيرون في تركيبتها وتصير ولكن Codeine وانتجوا Codeine وانتجوا استهلكوها الناس مثل المخدرات وسحبوها من السوق اخيرا صّنعوا 2-depression of R.C (لأنه جنب ال cough center) 3-drug dependant (addiction)

2. Less constipating. 3. No respiratory depression. 4. No inhibition of mucociliary clearance. 5. No addiction.

May come SAQs questions found down in question4

**Non Opioids** 

e.g Dextromethorphan

increases threshold at cough center.

Benefits over opioids:

1. As potent as codeine.

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



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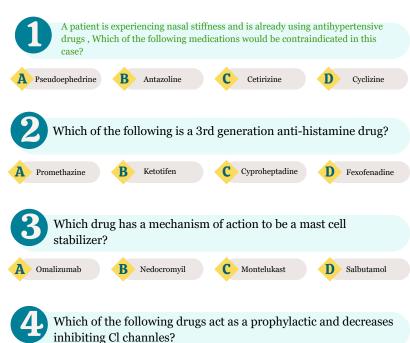


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### summary



## **MCQs**





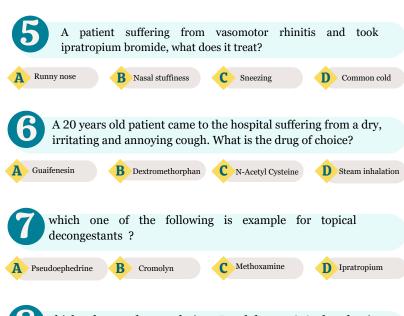
Diphenhydramine

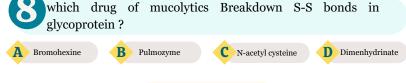
Cromolyn

Montelukas

Methoxamine

## **MCQs**





## **SAQs**





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

exofenadine 🔷

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

Slide 15 🔷

Why dextromethorphan best than codeine?

## **SAQs**

1 Mention two ways to treat a productive cough.

1-Mucolytics 🔷 2- Experctorants

What is the best method to treat a dry cough?

antitussive 🔷

B How can nasal stiffness be treated?

By using Decongestants

4 How can watery hypersecretion be treated?

Anticholinergic drugs



## **Team leaders**

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