
بسم الله الرحمن الرحيم
وَأَمَّا مَا يَنفَعُ ٱلنَّاسَ فَيَمْكُثُ فِى ٱلْأَرْضِ
but as for that which benefits the people, it remains on the earth.
Quran 13:17 (Surah ar-Ra'd)

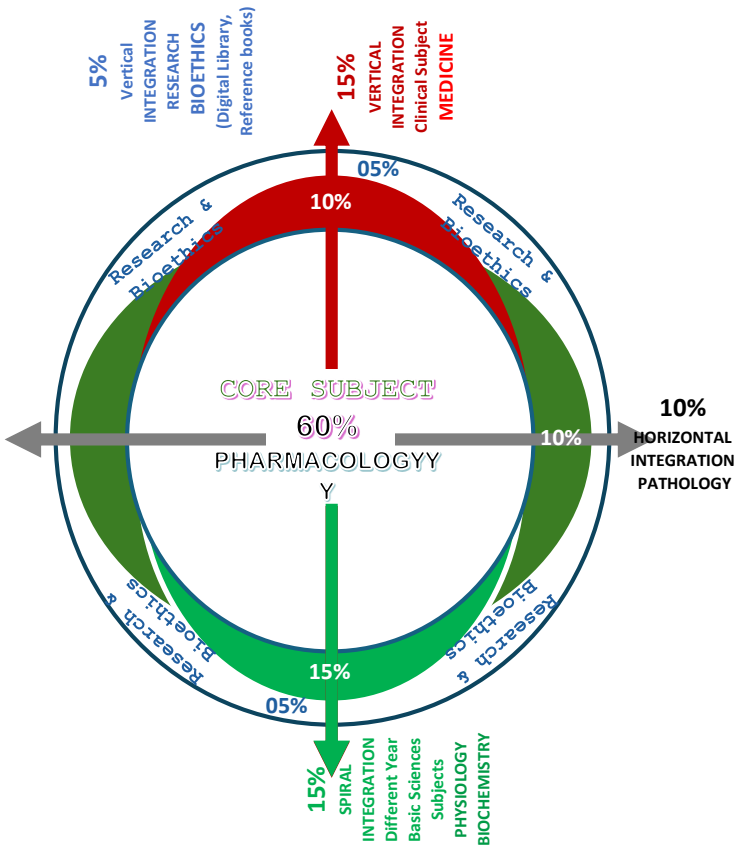
MOTTO AND VISION

To impart evidence based research oriented medical education

To provide best possible patient care

To inculcate the values of mutual respect and ethical practice of medicine

Prof. Umar's Clinically Oriented Integration Model
For Basic Sciences Interactive Lectures



3rd Year Pharmacology SGD	
Core Subject – 60%	
Pharmacology	
Horizontal Integration – 10%	
Same Year Subjects	• Pathology (10%)
Vertical Integration – 10%	
Clinical Subjects	• Medicine (15%))
Spiral Integration – 15%	
Different Year Basic Sciences Subjects	• Physiology (10%)
Vertical Integration – 05%	
Research & Bioethics	

CVS & RESPIRATION MODULE
3RD year MBBS

ANTI-TUSSIVES
EXPECTORANTS
MUCOLYTICS

SGD

LEARNING OBJECTIVES

01

Classify Antitussives

02

Describe the Antitussives,mucolytics & expectorants

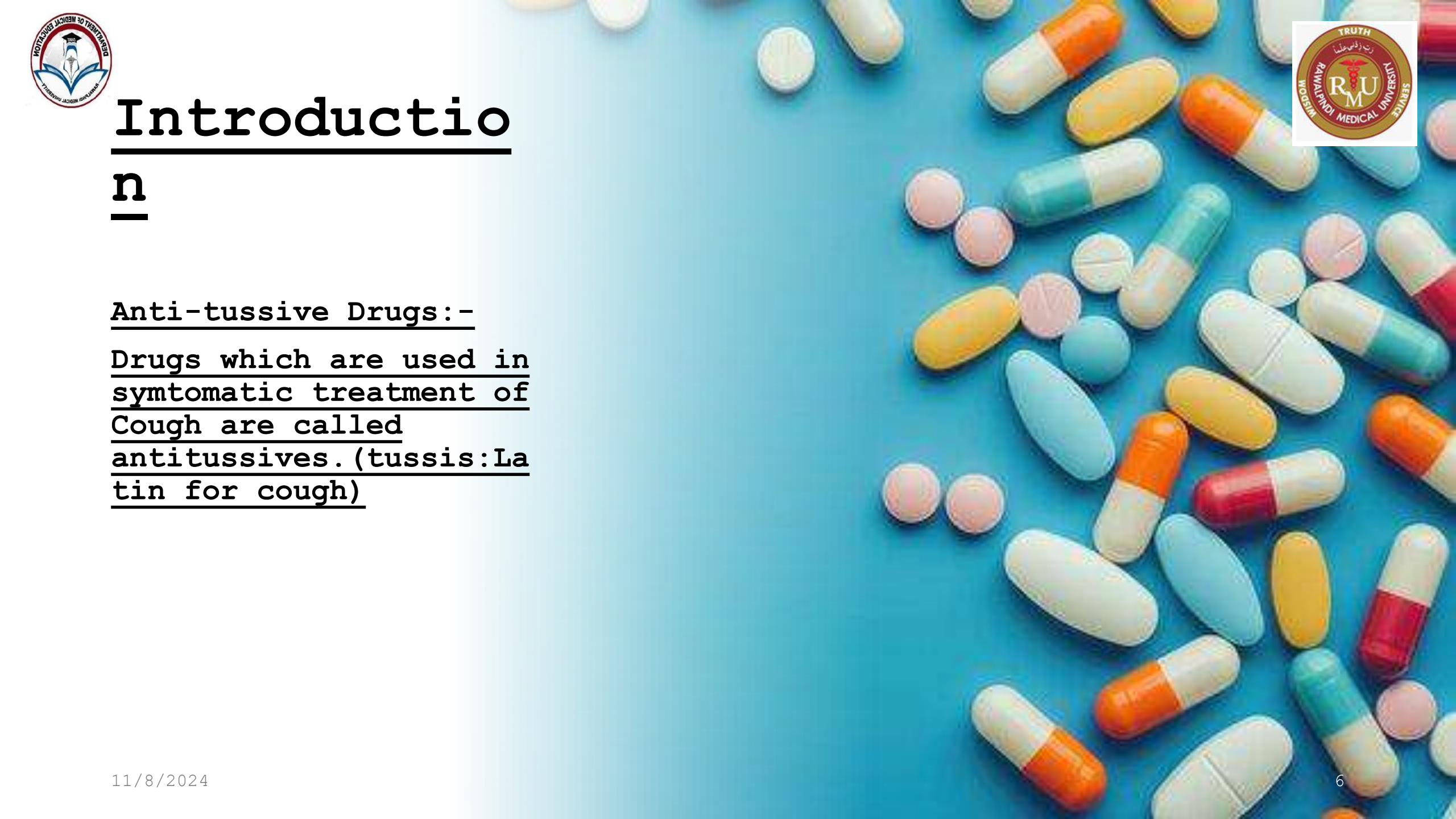
03

Describe Pharmacodynamics of these drugs

Introduction

Anti-tussive Drugs:-

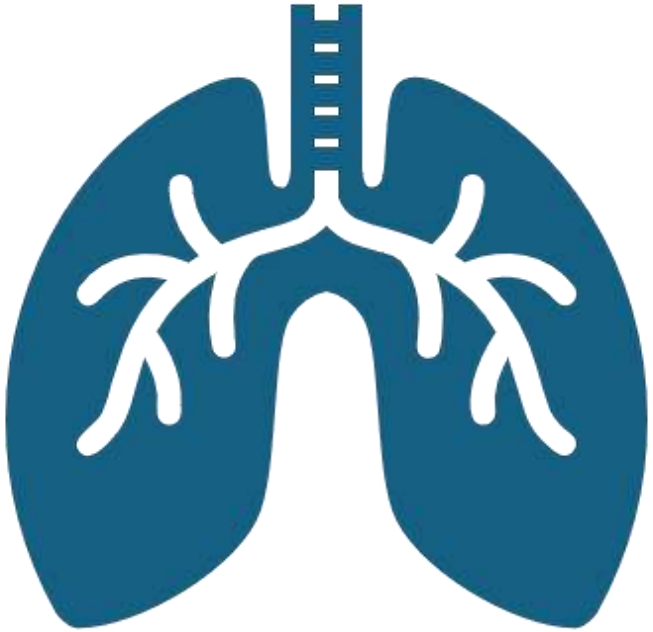
Drugs which are used in symtomatic treatment of Cough are called antitussives.(tussis:Latin for cough)



INTRODUCTION

- **COUGH**

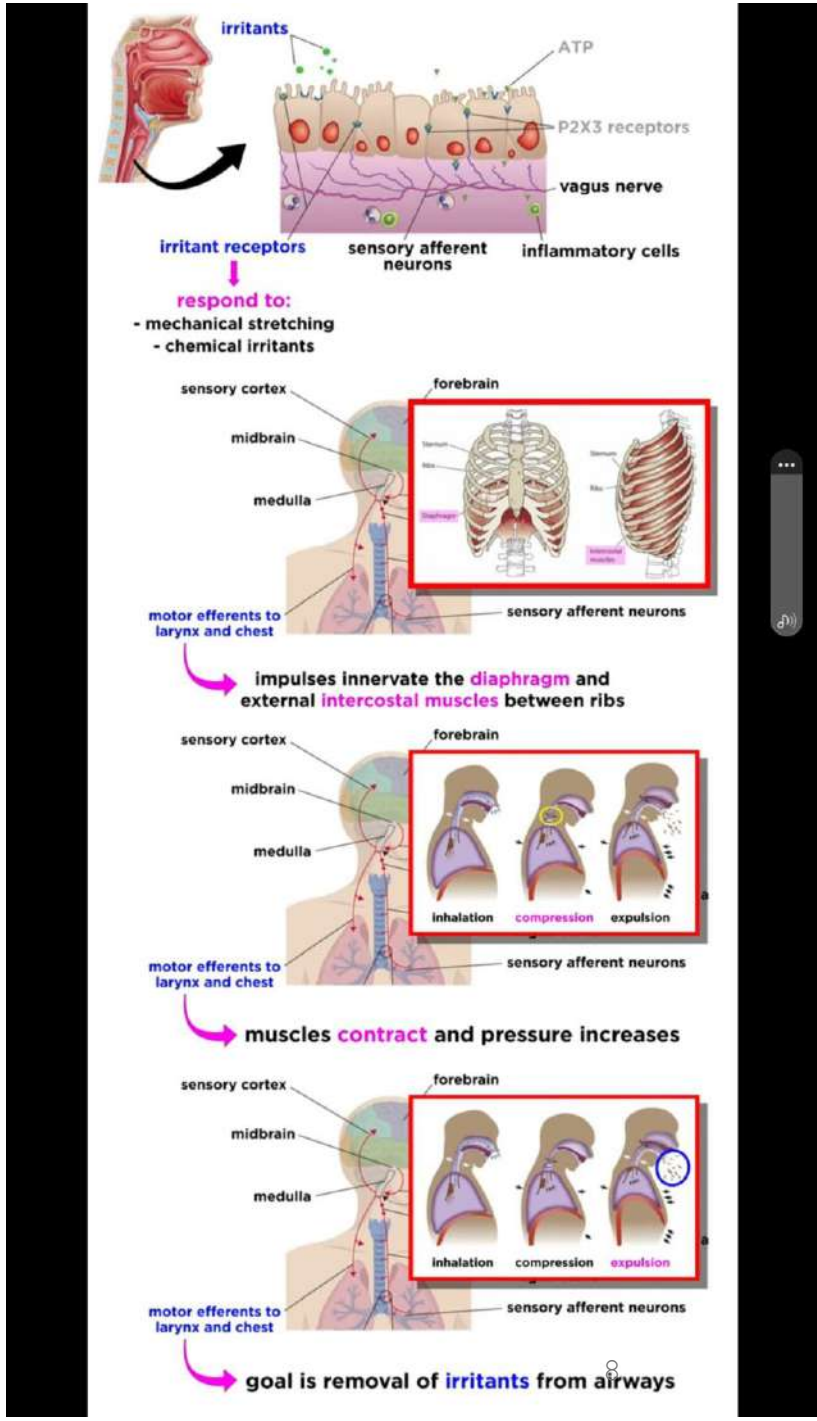
It is a protective mechanism by which the body gets rid of foreign particles present in the bronchus and bronchioles of the lungs.



COUGH REFLEX

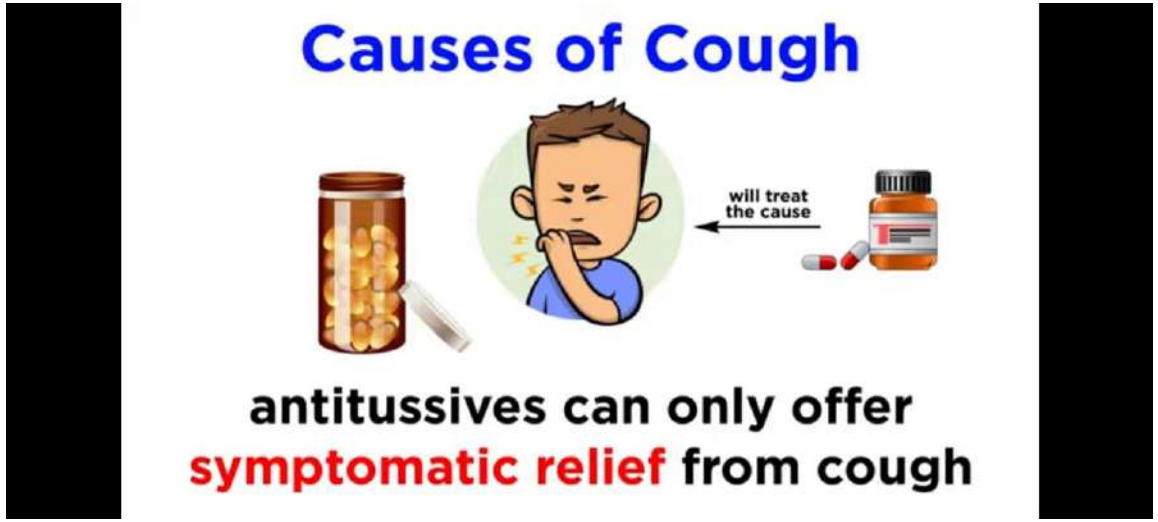
- **Mechanoceptors** and **Chemoceptors** are present in larynx , trachea , bronchi.
- And **Stretch Receptos** in lungs.

- Any triggering agent can initiate impulses from these receptors (**afferent vagal** impulses) and send the signal to the cough centre in the brain stem.
- **Efferent**s towards diaphragm , abdominal muscles



Causes of Cough

1. Respiratory infections
2. Chronic obstructive pulmonary diseases
3. Lung cancer



Classification of the drugs for the treatment of cough

CENTRAL ANTITUSSIVES (COUGH CENTRE SUPRESSANTS)

OPIOIDS
- Codeine
- Pholcodeine
- Dihydrocodeine

NON-OPIOIDS
- dextromethorphan
- Noscapine
- Chlophedianol
- levopropoxyphene

PERIPHERAL ANTITUSSIVES

1 Demulcents
- Liquorice (lozenges , cough drops , syrups)

2 Steam Inhalation
- Tincture Benz compounds
- Menthol

3 Local anesthetics
- Benzonatate

EXPECTORANTS (MUCOKINETICS)

Expectorents are drugs which induces bronchial secretions and facilitate removal of respiratory secretions by coughing

DIRECTLY ACTING or STIMULANT EXPECTORANTS

- Guaiacol
- Guaiphenesin
- Sodium and potassium citrate
- sodium and potassium acetate
- Potassium iodide

- **REFLEXLY ACTING EXPECTORANTS**

- Saline Expectorants

ammonium bicarbonate

ammonium chloride

potassium iodide

potassium citrate

- Nauseant Expectorants

Tincture

❖ MUCOLYTICS

- Acetylcysteine
- Carbocysteine
- Bromhexine
- Ambroxol

ANTI-HISTAMINES

- Chlorpheniramine
- Diphenhydramine
- promethazine

•INDICATIONS FOR USE OF ANTI-TUSSIVES

1) For dry , hacking , unproductive cough.
2) If cough is unduly tiring.
3) Disturbs sleep
4) Is hazardous

(hernia, piles, occular or any abdominal surgery)

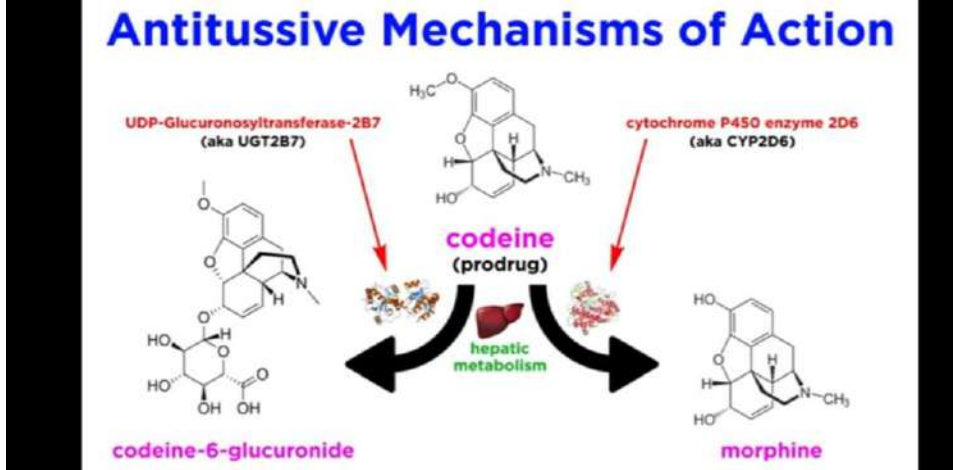
•Mechanism of Action CENTRAL ANTI-TUSSIVES

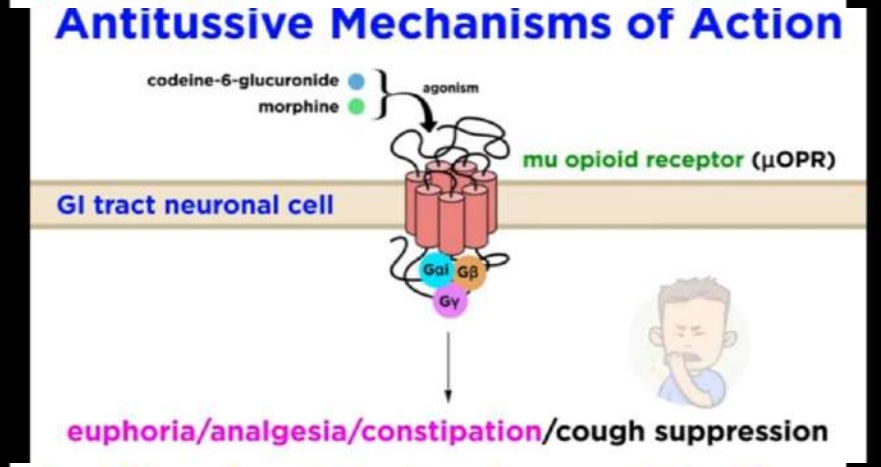
- **OPIOIDS**
- THEY ACT ON OPIOID RECEPTORS.
- **They directly suppress the cough by**

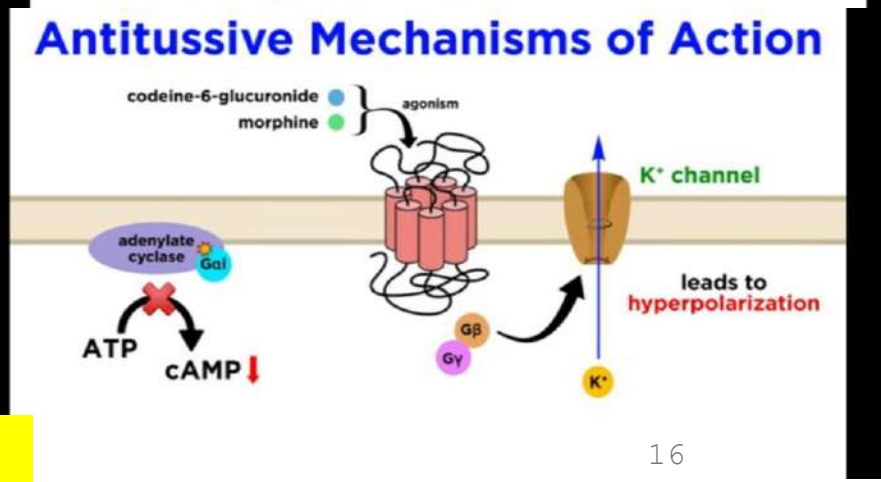
1) **Depression of medullary centre or associated higher centers.**
2) **Increasing threshold of the cough centre.**
3) **Interruption of afferent impulses peripherally in the respiratory tract.**
4) **Inhibition of conduction along the motor pathways.**

CODEINE

- It is an opium alkaloid , similar to but less potent than morphine.
- So it produces less CNS, respiratory depression.
- Abuse liability is also low
- It suppresses the cough centre in medulla.
- Its anti-tussive action is reversed by naloxone.
- Duration of action - 6 hours.
- Constipation - chief drawback
- At higher doses - respiratory depression , drowsiness







PHOLCODEINE

- Similar in efficacy as antitussive to codeine
- but has longer duration of action (12 hours)
- No analgesic or addicting property.

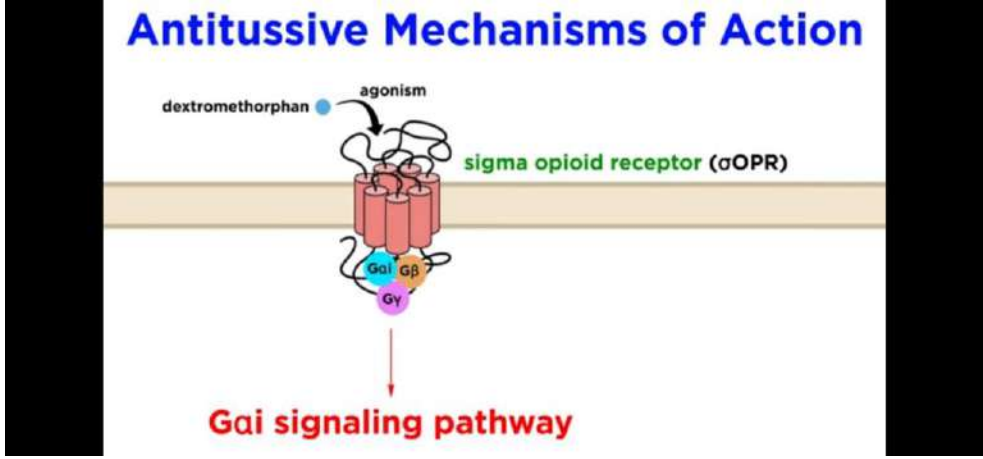
NON-OPIOIDS

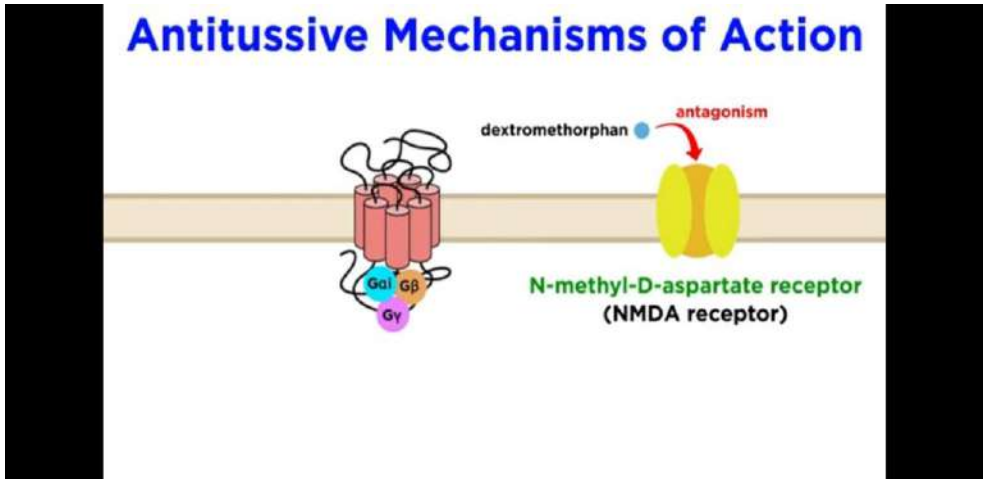
DEXTROMETHORPHAN

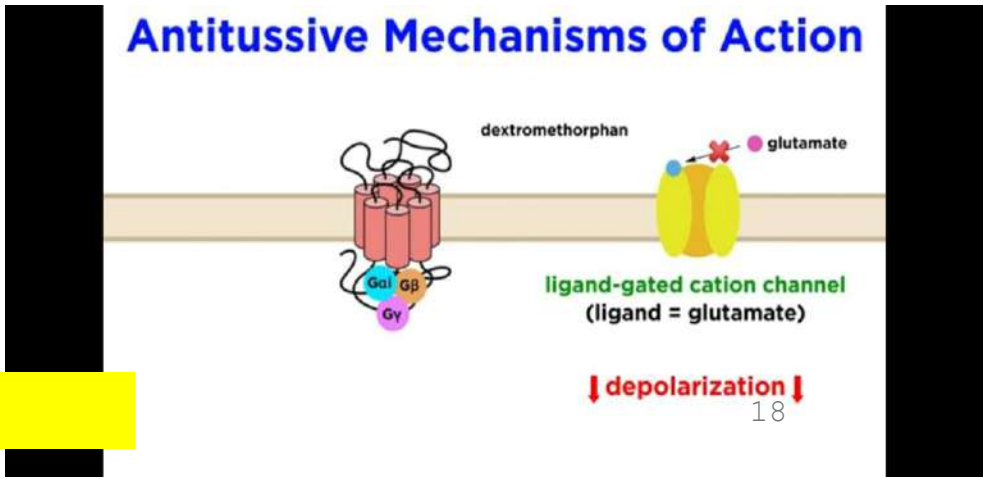
- it is a synthetic compound as effective as codeine.
- Its anti-tussive action not blocked by naloxone.

ADVANTAGES

- ✓ No respiratory depressing effect
- ✓ No CNS depression
- ✓ No addiction potential
- ✓ Does not depress mucociliary action







Core subject

NOSCAPINE (narcotine)

Non-opioid

- Nearly equipotent anti-tussive as codeine.
- Especially useful in spasmodic cough.
- No analgesic properties.
- No addiction property

- ADVERSE EFFECTS

  headache

  nausea

ADVERSE EFFECTS of Central Anti-tussive

- Dizziness
- Lightheadedness
- Headache
- Drowsiness
- Mood changes
- Nausea , vomiting
- Stomach pain
- Constipation
- Difficulty urinating

SIGNS OF ANTI-TUSSIVE (opioids)OVERDOSAGE

- Difficulty breathing (respiratory depression)
- Excessive drowziness
- Loss of consciousness
- Loss of muscle tone
- Cold , clammy skin
- Slow heart rate

❖DRUG INTERACTIONS

✓Opioids can interact with the following drugs

- CNS depressants
- Alcohol
- MAO inhibitors
- Sedatives

✓Opioids should be cautiously used in following conditions:

- head injury patient
- Pre-mature infants
- Hypersensitive individuals
- cough with increased secretions

PERIPHERAL ANTI-TUSSIVES

MECHANISM OF ACTION-

- Demulcents;

- They sooth the throat (directly or by promoting salivation)
- Reduce the afferent impulses from inflammed pharyngeal mucosa

- Steam inhalation with tinc . Benzoin compounds and menthol;

- It promotes secretion of a diluted mucus that gives a protective coating to the inflammed mucosa

- **Local Anesthetics**

✓ used topically in the airways to block the mucosal cough receptors directly.

✓depress the pulmonary stretch receptors.

ADVERSE EFFECTS of PERIPHERAL ANTI-TUSSIVES

- headache
- dizziness
- pruritis
- burning of eyes
- tightness of chest

❖Expectorants

- ✓ These are the drugs that increase the production of cough
- ○ by increasing the volume of bronchial secretions or reducing its viscosity. (loosen the cough)
- ○ Thus facilitating the removal of respiratory secretions by coughing.
- ➢ Also known as Mucokinetics.

Directly acting expectorants

- Sodium And Potassium Citrate Or Acetate
- Potassium iodide
  - they directly irritate the bronchial glands and thus increase the bronchial secretions

  - Guaiacol
  - Guaiphenesin
  - increases bronchial secretion
  - Increases mucociliary action
  - GUAIPHENESIN Is The Only FDA Approved Expectorant .

Uses: (directly acting expectorants)

For symptomatic relief of dry, non productive cough in the presence of mucus in respiratory tract.

- **Adverse effects** (directly acting expectorants)

  - POTASSIUM IODIDE - goiter , hypothyroidism
  - GUAIACOL AND GUAIPHENESIN - gastric irritation , rash
  - SODIUM SALTS may be contraindicated in some patients.

REFLEXLY ACTING EXPECTORANTS

- **MECHANISM OF ACTION**

They are mainly gastric irritants and reflexly enhance the bronchial secretions.

✓ Some are saline and some are nauseants but used in subemetic doses.

- Potassium iodide is both directly and reflexly acting.

- Tincture ipecacuanha stimulates sensory nerve endings in the stomach and duodenum- this causes reflex copious bronchial secretions.

- **Adverse effects:**

Nausea
Vomiting
Gastric irritation

❖MUCOLYTICS

- These are the drugs that makes the sputum thin , loose and less viscid so that it can be easily expectorated out by directly acting on the mucus.

INDICATIONS (Mucolytics)

- Acute bronchopulmonary disease (pneumonia, bronchitis, tracheobronchitis)
- Tracheostomy care
- Pulmonary complications of cystic fibrosis
- Pulmonary complications associated with surgery and during anesthesia
- Posttraumatic chest conditions
- Atelectasis due to mucous obstructiono

Mucolytics

- ACETYLCYSTEINE
- CARBOCYSTEINE

MECHANISM OF ACTION:

They open the disulphide bonds in the mucoproteins present in the sputum making it less viscid but has to be administered directly into the respiratory tract.

Adverse effects:

1. irritation
2. rash

- **BROMHEXINE (potent mucolytic)**
- **AMBROXOL**

MECHANISM OF ACTION:

they depolymerizes the mucopolysaccharides directly or indirectly by liberating the lysozomal enzymes.

ADVERSE EFFECTS:

- **Rhinorrhea**
- **Lacrimation**
- **gastric irritation**
- **hypersensitivity reaction**

Beneficence

Vertical integration

The principle of beneficence is th obligation of physician to act for th **benefit of the patient** and supports a number of moral rules to protect and defend the right of others, prevent harm, remove conditions that will cause harm, help persons with disabilities, and rescue persons in danger. It is worth emphasizing that, the language here is one of positive requirements. The principle calls for not just avoiding harm, but also to benefit patients and to promote th welfare.

TAKE HOME MESSAGE

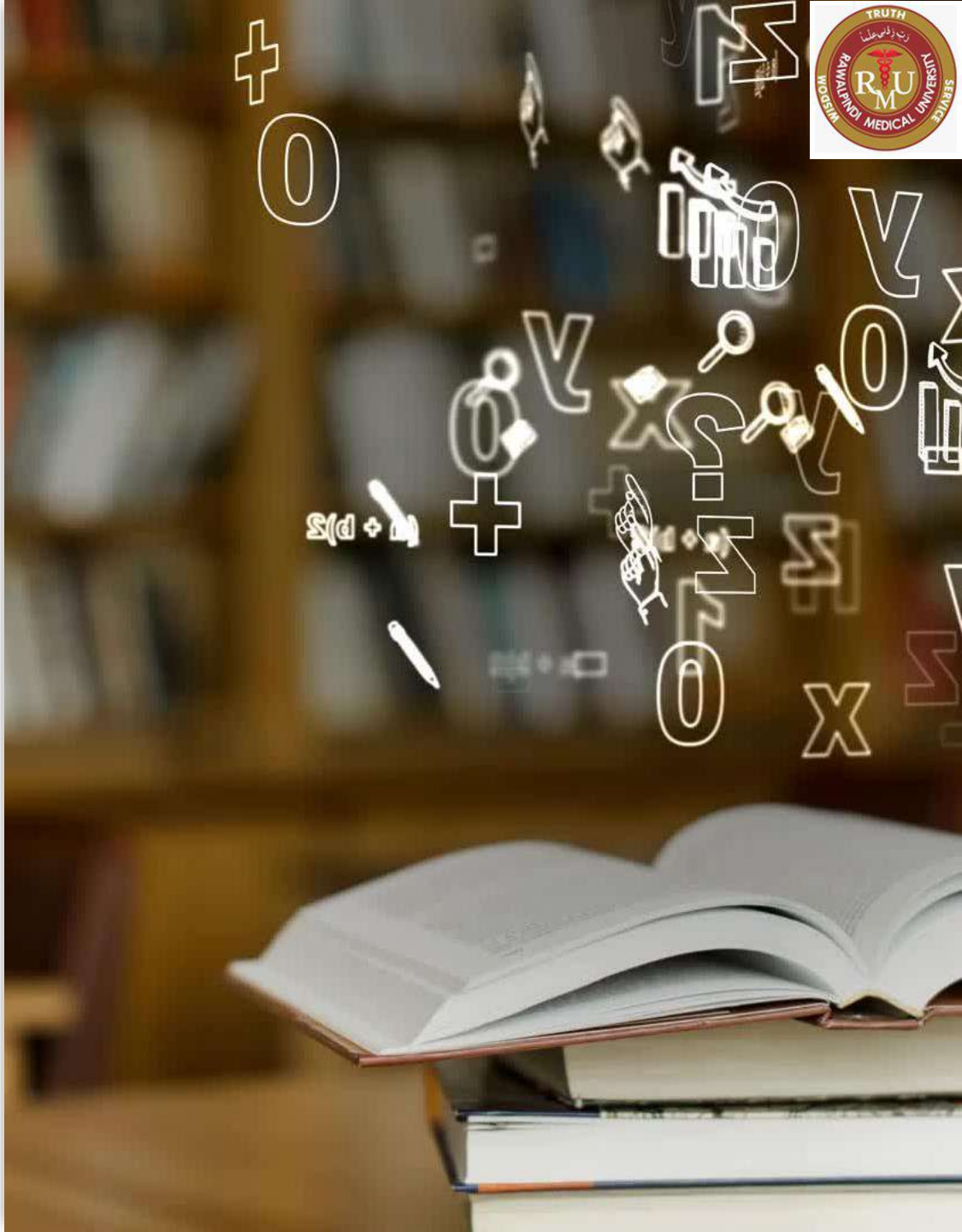
Research

- Use of antitussive medications in acute cough in young children
- J Am Coll Emerg Physicians Open. 2021 Jun; 2(3): e12467.
- Published online 2021 Jun 18. doi: 10.1002/emp2.12467
- Samuel H. F. Lam, MD, MPH,corresponding author 1 James Homme, MD, 2 Jahn Avarello, MD,, 3 Alan Heins, MD, MPH, 4 Denis Pauze, MD, 5 Sharon Mace,

How To Access Digital Library

- **Steps to Access HEC Digital Library**

1. Go to the website of HEC National Digital Library.
2. On Home Page, click on the INSTITUTES.
3. A page will appear showing the universities from Public and Private Sector and other Institutes which have access to HEC National Digital Library HNDL.
4. Select your desired Institute.
5. A page will appear showing the resources of the institution
6. Journals and Researches will appear
7. You can find a Journal by clicking on JOURNALS AND DATABASE and enter a keyword to search for your desired journal.



Assessment –MCQs

- **Q1. A 32-year old man with a history of addiction presents with cough due to viral upper respiratory tract infection. Which is appropriate symptomatic treatment for cough in this patient?**
- Guaifenesin/Dextromethorphan
- Guaifenesin/Codeine
- **Benzonatate**
- Montelukast
- Zafirlukast

contd

- **Q2. Which of the following is an opioid antitussive**
- Noscapine
- Dextromethorphan
- **Codeine**
- Bromhexine
- Ambroxol


Thank
you