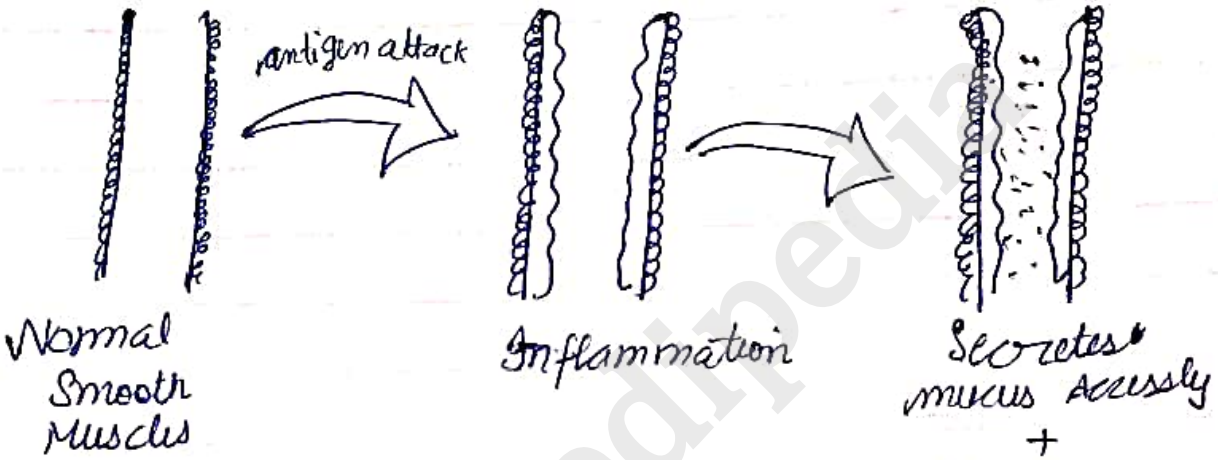
ANTI-ASTHMATIC DRUGS

Introduction :-

Asthma - It is a condition in which the Respiratory Smooth muscles get inflammated and secretes mucous accessly and cause Blockage of Smooth muscles.

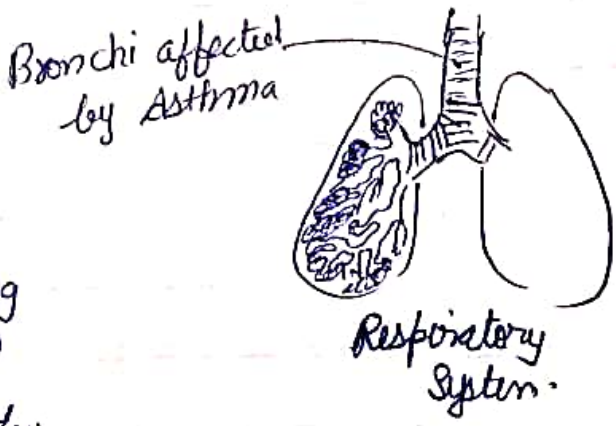


Symptoms :-

→ Dyspnea (Difficulty in Breathing)

→ Whoozing Cough (whistling Sound)

→ Limitation (Dec) in Activity.



Causes :-

→ Pollution

→ Cold air → Constrict Bronchi

→ Infection → By Inhalation
→ By Food etc

→ Allergen / Irritant (Pollen grain etc)

Types of Asthma

Intrinsic	Extrinsic
→ occurs at middle age in Peoples (22, 24 yrs)	→ In early age it develops. (genetic)
→ Chronic (More Serious)	→ Episodic.
→ No history of allergy	→ have allergic history.

Mechanism of Asthma

Foreign Particle or Allergen or Etiologic factor Enters to lungs

↓

Allergen Binds to the Mast Cells with IGE Bodies

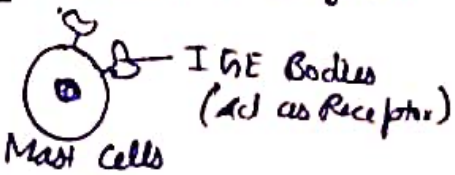
↓

Binding can Result in formation of Ag-Ab complex

↓

Inflammatory Mediators Release from Mast Cells

* Mast cell - Present in lungs etc.



* Ag-Ab - Antigen - Antibody

↓

Inflammatory Mediators Release

- Histamine
- Prostaglandins (PG)
- Leucotrienes (LT)
- Protease Enzymes
- Interleukins

} Responsible for Inflammation

↓

Start Inflammation in Bronchial Smooth Muscles

↓

Constriction + Mucous Secretion in Bronchi

↓

Start Blockage

Classification of Anti-asthmatic Drugs

Bronchodilators

- **β_2 - Sympathomimetics**
  - Salbutamol
  - Bambuterol
  - Terbutaline
- **Methyl Xanthine**
  - Theophylline
  - Aminophylline
  - Caffiene
- **Anticholinergic**
  - Ipratropium Bromide
  - Tiotropium Bromide

Leukotriene Antagonist

- Montelukast
- Zofrilukast

Mast Cell Stabilizer

- Sodium chromoglycotate
- Ketotifen

Anti-IgE Antibody

- Omalizumab

Corticosteroids

- **Systemic**
  - Hydrocortisone
  - Prednisolone
- **Inhalation**
  - Fluticasone
  - Budesonide
  - Beclomethasone

Mechanism of Action

★ Bronchodilators :-

↳ **β - Agonist :** These drugs Binds to β-Receptors Present in Bronchioles smooth muscles

↓

Stimulate Adrenergic Receptors

↓

Bronchodilation

Example : Salbutamol, Bambuterol etc

↳ **Anticholinergic :** These drugs Blocks Binding of Acetylcholine that is Responsible for Bronchoconstriction

↓

Blockage Cause Bronchodilation.

Example : Ipratropium Bromide, Tiotropium Bromide

↳ **Methyl Xanthines :** These drugs decreases Phosphodiesterase Enzyme which can cause constriction

↓

Cause Bronchoconstriction

Example - Theophylline, Aminophylline etc

Methylxanthines use

↓

Inhibit Phosphodiesterase Enzyme

↓

cAMP not convert into CGMP

↓

Bronchodilation

[cAMP - Dilation / Relaxation cause
cGMP - Constriction cause]

☆ Leucotriene Antagonist

Leucotrienes Binds to IgE Receptor of mast cells and Cause Inflammation

↓

Leucotriene Antagonists can Block the Binding of Leucotrienes to Receptors.

↓

Reduce Inflammation — example - Montelukast, Zafirlukast etc

↓

Bronchodilation

→ used in mild Asthma or moderate Asthma.

→ Blocks Phospholipase Enzyme to form Arachidonic Acid/Enzyme

→ Blocks Cox Enzyme to form leukotrienes.

☆ Cortiosteroids :

→ Inhibits Phospholipase A2

↓

Reduce Bronchial hyper-reactivity to Stimuli

↓

Reduce Bronchial inflammation

→ Effective in allergic, Exercise, antigen and irritant-induced asthma

☆ Mast Cell Stabilizers

→ Use Mast cell granulation (Release of Inflammatory Mediators)

↓

Inhibition of Inflammation + mucus Secretion.

→ Effective in Asthmatic Attack.

example - Sodium chromoglycate, Ketotifen etc

ADR - Sedation, dry mouth
- Throat Irritation
→ Bronchospasm
→ Dizziness, nausea etc

☆ Anti - IgE Antibody

Use Binding ability of IGE antibodies/Receptors to allergen

↓

Prevent Binding and Inhibit Mediators Release

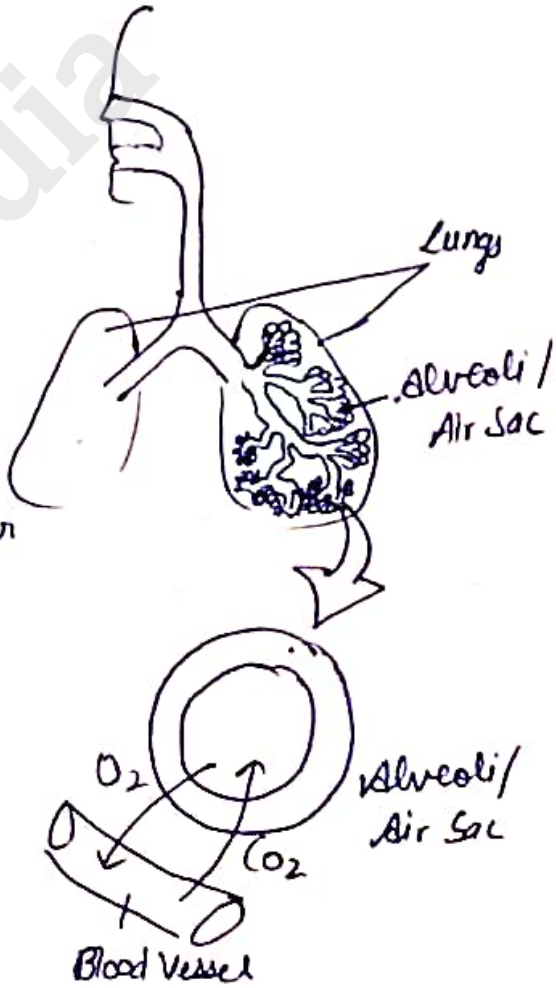
example - omalizumab etc

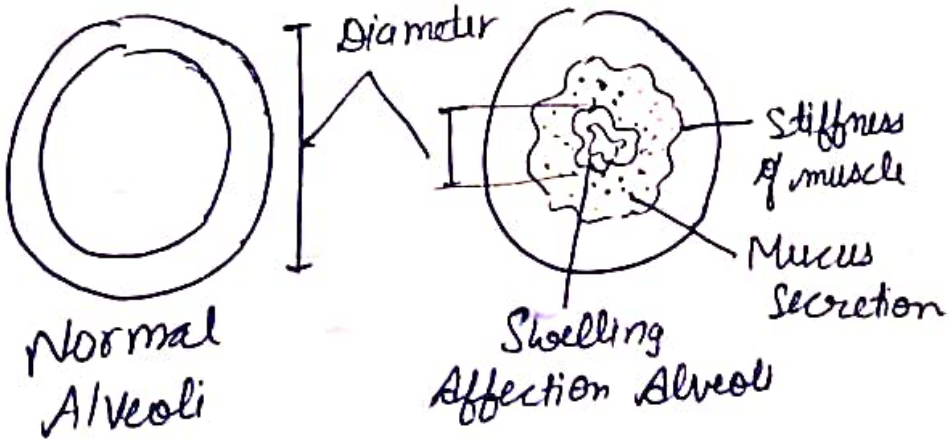
COPD- Coronary Obstructive Pulmonary Disorder

The condition in which the diameter of Alveoli decreases result in decrease in oxygen supply by Inhalation and cause disturbance in alveoli and whole Respiratory System.

Pathogenesis

Hardness of muscles
↓
Release of Muscles
↓
Inflammation + Swelling + Mucous Secretion.
↓
Continuous decrease in diameter of Alveoli





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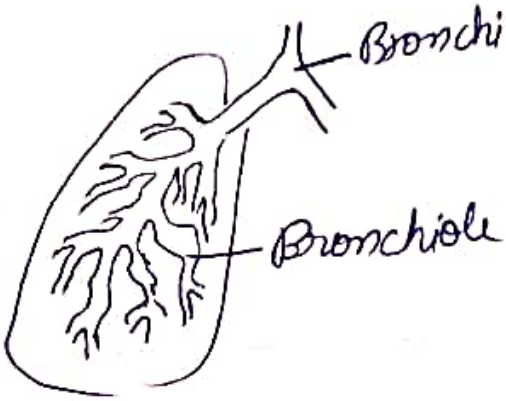


→ Air flow Resistance
→ Chronic Bronchitis
→ Bronchalitis
→ Emphysema (Alveoli Blockage)
→ Breathing difficulty

Symptoms

→ Impaired Nutrition (↓ ATP)
→ weight loss
→ Skeletal muscle dysfuntion (Ribs etc)
→ obstruction of air way
→ May be Irreversible

Risk factors

→ Tobacco Smoking
→ Fuel free Smoking
→ Air Pollution
→ Industrial Exhaust Fumes
→ working in coal mines
→ Respiratory infection
→ Exposure of Cadmium

Pathological Condition

→ Loss of elastic tissue surrounding airway
→ Enlargement of mucous secretion cell (↑se in No.)
→ ↑se. in number of goblet cells (mucous secretion)
→ Inflammation and Fibrosis (↓se Elasticity) in airway wall

Drugs Used in COPD

- Inhaled Bronchodilators
  - β_2 - Sympathomimetics
    - Salbutamol, Bambuterol etc
  - Anticholinergic
    - Thioatropium Bromide,
    - Ipratropium Bromide
    - etc.
- Inhaled glycocorticoids
  - Eluticoxone
  - Budesonide
  - Beclomethasone
- Prophylactic Antibiotics
  - Azithromycin
  - Doxicycline
  - Levofloxacin
- Anti Ig E Antibodies
  - Omalizumab

☆ Prophylactic Antibiotics

↳ Bactericidal Antibiotics - Kill Bacteria by interfering with cell wall Synthesis of Antigens.

↳ Bacteristatic antibiotics - Prevent Reproduction in Bacterias by Inhibiting their multiplication proces. and Protein Synthesis.

Expectorants & Antitussive

Cough :- Protective Reflux of Respiratory System

Expectorants :- The agents that Expell mucous from throat By Coughing.

Antitussive :- The agents that Suppress Cough Centre in CNS for Relieving Cough.

Cough due to Stimulation of

- Mechano/Chemo Receptor throat
  (Receptors that Block antigen Entry + Lung & Secretes mucous)
- Respiratory Tract
- Stretch receptors in Lungs

Types of Cough

According to duration

- Acute Cough :- Cold, cough, Infection, Pneumoniaeh. for about 2-3 week.
- Chronic Cough :- Infection takes more than 3week
  → due to Smoking, Laryngitis, TBE, ACE Inhibitors intake.

On Basis of Function :-

- Productive - Production of Mucus with Cough.
- Non-Productive - Dry Cough.

Treatment of Cough : → By Expectorants
→ By Antitussive

Classification of Cough Relievants

- Pharyngeal dimulscent
  - Lozenges
  - Syrup
  - Liquerise
  - glycerine
- Expectorant
  - Secretion Enhancers
    - KI
    - K-Citrate
    - Tolubalsam
    - Vasaka
    - NH_4Cl
  - Mucolytics
    - Bromohexin
    - Ambroxol
    - Acetylcystine
    - Carbocystine
- Antitussive
  - opioids
    - Codiene
    - ethyl-morphine
    - Pholcodine
  - Non-opioids
    - Nascapine
    - Dextro-methorphan
  - Anti-histaminic
    - Promethazine
    - Chlorpheniramine (CPM)
    - Diphenhydramine
- Bronchodilator
  - Salbutamol
  - Terbutaline

MoA :-

★ Pharyngeal dimulscent : These can Provide smoothness to throat.

↓

Provide Ease to Expell Mucus

* Expectorants

→ Secretion Enhancers

↓

these can increase secretion of water

↓

Dilute mucous

↓

Decrease Viscosity

→ Mucolytics

↓

hydrolysis of Mucin (Mucin is a Protein in mucus)

↓

decrease Viscosity

↓

Easy in Expell. out

* Antitussives :-

↓

Control Cough Centre in CNS (Responsible for Cough)

↓

Stops Mucus Secretion and Release

→ Codiene - → opium Alkaloid (obtained from Poppy Plant)

→ Most Effective

- More Selective to Cough Centre

Antidot - Naloxone

ADR - Use dose cause Respiratory Depression

- Drowsiness
- Impaired driving

Contraindication - → Asthma Patient
→ Childrens

→ Non-opioid - drug have not Sedative or hypnotic Effect (Sleepiness)

* Bronchodilators (Adjuent Antitussive)

↓

dilation/Relaxation of Bronchial Muscles

→ Treat spasms in Bronchi

NASAL DECONGESTANT

The medicine that Provides Short term relief for Stuffy or Blocked Nose.

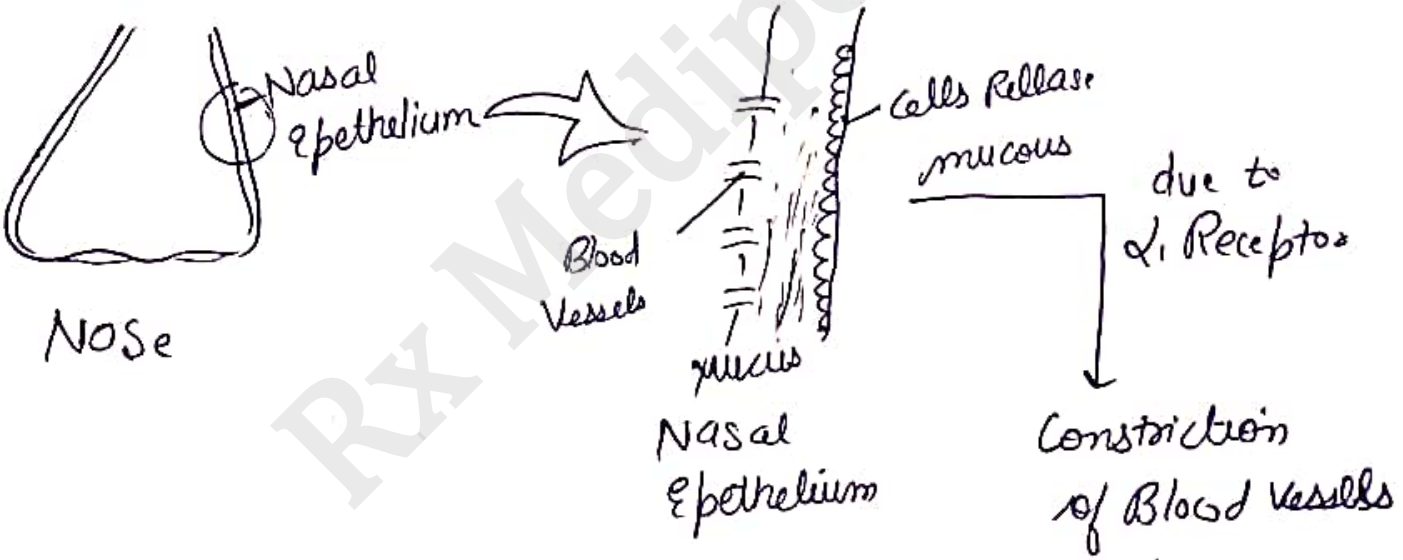
★ In Nasal Epetheliom

↓

α_1 Agonist / Receptors are Present which cause Vasoconstriction (Blood Vessels)

↓

Decrease in Running Nose due to Vasoconstriction.



Constriction of Blood vessels and mucosal Cells

↓

Reduce Nasal discharge

↓

Nasal Decongestion

Nasal Decongestants

- **Oral Decongestant**
  - Ephedrine
  - Pseudoephedrine
  - Phenylephrine
- **Nasal Spray**
  - Oxymetazoline
  - Xylometazoline
  - Naphazoline

Nasal Spray

→ Naphazoline, Oxymetazoline and Xylometazoline also used in rhinorrhoea.

★ Rhinorrhoea - mucus running out of Nose

→ Drugs Binds to α_1 agonistic Receptors Present in Nasal Epithelium

↓

decrease in mucus Secretion and Release

↓

Reduction in Congestion

→ Oxymetazoline may also show Some α_2 agonistic action.

Oral Decongestant

→ Pseudoephedrine and Phenylpropanolamine are used in Common Cold oral formulation for relief in Nasal Congestion

ADR - Insomnia, Treatment, Nasal Irritation

By Long Use - Atrophy Nasal mucosa

(Atrophy - Decrease in Size of tissue, organ etc)

- Desensitisation of Receptors
- Loss of Smell
- ~~Insomnia~~ Anosmia - temporary loss of Smell due to Blockage of Nose.

Respiratory Stimulants (Analeptics)

The drugs used in loss of Breathing for increase Lung capacity or Tidal Capacity

→ Drugs can act on Brain Stem and Spinal Cord to Stimulate respiratory or Vasomotor Centres.

Respiratory Stimulants (Drugs)

- Diazepam
- Nicettamide
- Theophylline
- Caffiene

} other Categories

- Doxopram (Mainly Used drug in this Category)

Doxopram - Act on Brain and Spinal Cord

↓

Activate Respiratory and Vasomotor Centre in CNS and PNS

↓

Increase Respiratory Volume

(Ability to Respiration in Lung enhanced)

Mechanism of Action :-

It increase chemoreceptors in CNS

↓

Increase in CNS (Central Nervous System) Transmittors or Neuronal Activity due to increase in chemoreceptors.

↓

increase in heard Rate and Relax Bronchi

↓

Stimulation in Respiration (Activation)

→ Doxapram is a short acting drug with higher Safety.

→ Increase Rate of Respiration.

Uses

→ In COPD

→ In Hypoxaemic and Hypercapnic Respiratory Failure

(* Hypoxaemic - Reduce Oxygen in Blood
* Hypercapnic - Increase CO_2 in Blood)

ADRs :

→ May cause Respiratory failure

→ Nausea, cough

→ Restlessness

→ Hypertension

→ Tachycardia (increase in heart Beat)

→ Dorhythmia (Abnormal ♡ Beats)

Contraindications

→ In Hypoxaemic Respiratory failure

→ Asthma

→ Respiratory failure due to Epilepsy (Acute)

★ high dose may cause Convulsions, Confusions.

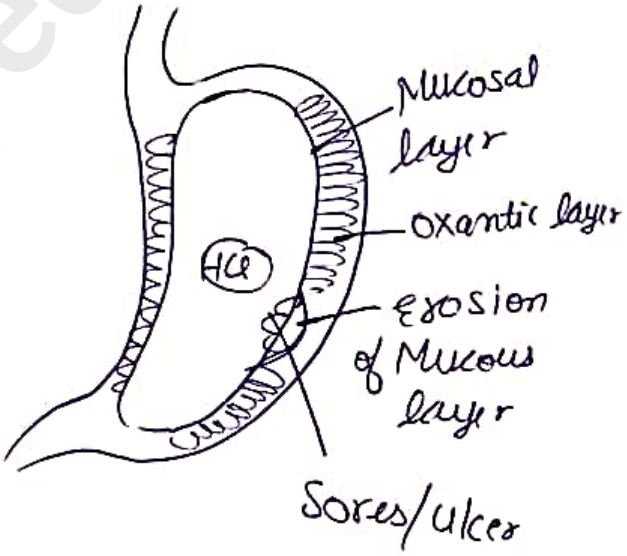
Preparation - Doxapram: 4mg/ml Injection.
(Caropram)

Drug Acting On GIT

GIT - Gastro Intestinal Tract

Anti - Ulcer Drugs

Peptic Ulcer :- Ulcers or Sores produced in the lining of Stomach due access acid Production that Effect Stomach lining.



☆ Oxantic layer in Stomach Produces HCl

↓

To digest the food and its Breakdown

↓

Mucosal layer can Protect other Stomach layers from HCl.

↓

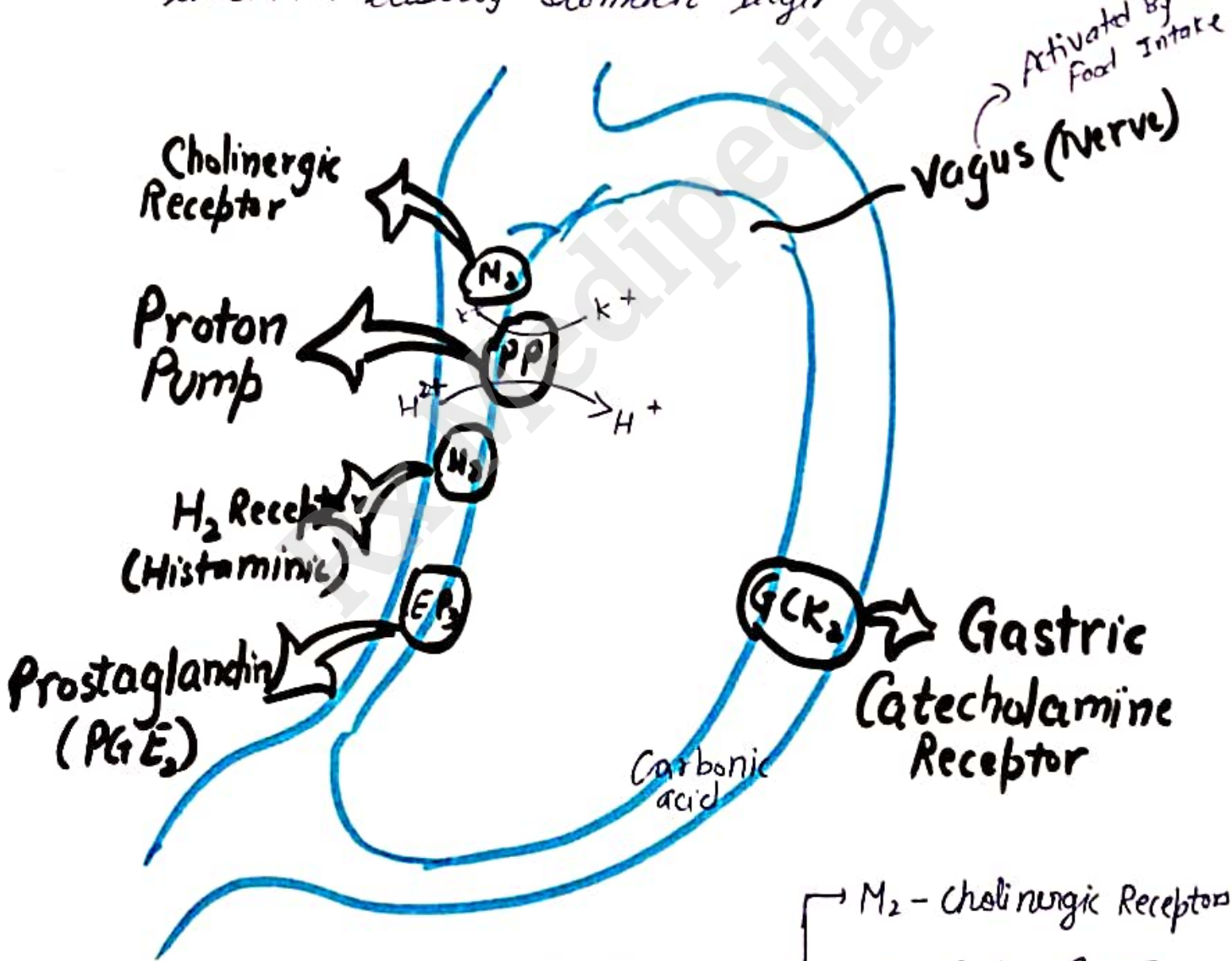
due to factors, HCl can Destroy the Mucosal layer and due to Interaction of acid with Stomach linnings

↓

Sores or Ulcers Produced in Stomach with Severe Pain

Causes of Peptic Ulcer

- Imbalance in mucus factor and HCl
  - due to Stress condition
  - Fast food etc.
- H Pylori (Helicobacter Pylorii)
  - Bacteria eats mucus layer in stomach and HCl distroy stomach layer



Stomach wall consist of 5 Receptors
- M_2 - Cholinergic Receptors
- PP - Proton Pump
- H_2 - Histaminic Receptors
- PGE_2 - Prostaglandins
- GCK_2 - gastric catecholamine Receptor

* When we See, eat or think about food, the Vagus nerve activates the different Receptors

Example -

* When we Imagine food
  ↓
  Gastrin Release from Body
  ↓
  Binds to GCK_2 Receptors
  ↓
  it Activates Proton Pump
  ↓
  HCl Release

* Activation of Vagus Nerve due to
  - → Release Acetyl Choline by Cholinergic Neuron
    ↓
    Acetyl Choline Binds to M_3 → Activates PP
  - → If wrong food Intakes
    ↓
    Histamine Release from Mast cells
    ↓
    Binds to H_2 Receptor in Stomach
    ↓
    Increase cAMP and Proton Pump
    ↓
    Release HCl
  - → In Inflammatory Condition
    ↓
    Prostaglandins Release and Binds to EP_3
    ↓
    Inhibit Prostaglandins

☆ An Enzyme carbonic Anhydrase forms carbonic acid from water and carbondioxide

↓

Carbonic acid Breaks into H^+ or HCO_3^-

↓

H^+ can help in HCl formation

CLASSIFICATION OF ANTI ULCER DRUGS

- Gastric Acid Secretion Inhibitors
  - H_2 - Antihistaminics
    - Cimetidine
    - Ranitidine
    - Fometidine
  - Proton Pump Inhibitor
    - Omeprazole
    - Esmoprazole
    - Pantoprazole
  - Anti-cholinergic
    - Piperazipine
    - Propanthlene
  - PG Analogue
    - Misoprostol
- Gastric Acid Neutralizers
  - Systemic
    - Sodium Bicarbonate
    - Sodium citrate
  - Non Systemic
    - $Mg(OH)_2$
    - $Al(OH)_2$
    - $CaCO_3$
- Ulcer Protective
  - Sucralfate
  - Colloidal Bismuth Subcitrate
- Anti-biotics
  - Amoxicillin
  - Tetracycline
  - Clarithromycin

Mechanism of Action

Gastric Acid Secretion Inbitors

Histamine can Activate H_2 Receptor, Acetyl Choline Activates M_2 Receptor, Prostaglandin Activates PG Receptors

↓

The Activates Directly to the Proton Pump(PP)

↓

PP can Secretes acid (Reduced)

GA Neutralizer

↓

Basic Drugs can neutralize the HCl acid

↓

Reduce Acidity

Ulcer Protective

↓

These can make a Protective Covering on ulcers

Antibiotics

↓

These can Kill H. Pylorii Bactorias

↓

Reduction in Breakdown of mucus layer

Drugs Used For Diarrhoea & Constipation

☆ Introduction

Some amount of water can Reabsorbs in Large Intestine from Stools or Faeces (about 75%)

When 75% and more water Reabsorbed in Intestine from Stool → Stool Become hard due to low water content → Cause Constipation

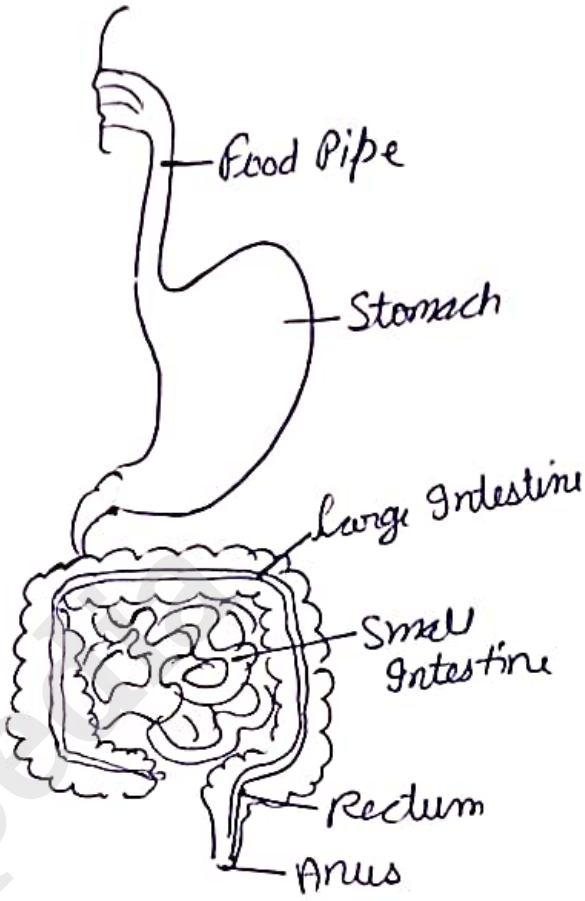
When water absorbs Less than usual (75%) → Stool Become watery → Cause Diarrhoea

Constipations

When Reabsorption become more than usually in Large Intestine and hardness of feacal material leads to painful and Regulation of Elimination of matter is known as constipation.

Causes :-

→ Drug Induced
→ Pregnancy
→ Travelling
→ Fibreless diet
→ Loss of Physical Activity
→ dehydration
→ Metabolic disorder



- Laxative - Medicine used to treat Constipation
- Purgative & Cathartics - Laxatives in high Concentration

Classification of Constipation Relieved Drugs

- Bulk Forming / Dietary Fibre
  - Plantago
  - Bran
  - Methocellulose
- Stool Softner
  - Docusates
  - liq. Paraffin
  - Almond oil
  - Peanut oil
  - Castor oil
- Stimulant Purgative
  - Anthraquinones
    - Senna
    - Cascarat
    - Aloe
  - 5HT Antagonist
    - Prucalopride
  - Fixed oil
    - Castor oil
  - Sodium Picosulfate
- Osmotic Purgative
  - Mg. Salt
  - Sulfate
  - OH & Na Salt
  - Milk of Magnesia

Bulk Forming / Dietary Fibres

↓

Bulk Formings help in absorption of water

↓

Make Bulk and Softens due to H_2O Absorption

↓

help in Easy Passage of Fecal Mater & Eliminate

Stool Softner

These are Basically oily in Nature

↓

Comes across stool along wall

↓

Cause Soften the hard Stool

↓

help in elimination easy

Stimulant Purgative :

↓

Stimulate colon & ceacum layer of Large Intestine

↓

↓se absorption Rate of H_2O

↓

Stool decrease to harden

↓

Easy Elimination

Osmotic Purgative

↓

Increase osmotic Bressure

↓

Increase water absorption higher Concentration to lower Intestinal Concentration

↓

Softens the hard Stools

↓

help to Easy Passage

Diarrheal DRUGS

The frequent Passage of Stool to most watery mixtured form due to low water Reabsorption in Intestine

Causes

→ Increase Secretion by Intestinal Mucosa.

→ Inflammation of mucosa.

→ decrease electrolyte and water absorption

→ Microbial Infection.

→ low water Reabsorption

Classification of Anticiaorrheal Drugs

- **Antimicrobial Agents**
  - Norfloxacin
  - Ciprofloxacin
  - Ofloxacin
  - Mitrorendazole etc
- **Probiotics**
  - Lactobacillus
  - Enterococcus
  - Bacillus etc
- **For - Inflammation Bowel Disease**
  - 5-Amino Salicylic Acid
    - sulfoSalazine
    - Osalazine
    - Mesalazine
  - Glucocorticolds
    - Prednisolone
    - Hydrocortison
  - Immuno Suppressants
    - Azithropine
- **Non-Specific Anti-diarrheal Agent**
  - Adsorbent
    - Methyl cellulose
    - Isobgul
  - Anti-Secretory
    - Bisubsalicylate
    - Anticholinergics
  - Anti-Motility
    - codiene
    - Loperamide

MoA :-

Probiotics :

→ Probiotics are a type of good Bacteria that balance the body irregulation.

→ used in good Bacteria Deficiency.

Inflammatory Bowel disease :

In Intestine, due to Inflammation

↓

Increase Secretion and cause Diarrhoea

Appetizer & Anarexiants (Appetite Stimulants & Suppressants)

Appetizers ☆ The agents used to encrease Appetite (hunger) or treats loss of appetit

(Anorexia - No hunger)

Appetizers

- Bitters
  - → Quassia
  - → chirata
- Alcohol
- Miscellenous Compounds
  - Inulin
  - Histamine
- Digestant
  - Enzymes
    - → Pepsin
    - → Rennin
    - → Pancreatin
  - Choleretics
    - → Bile salt
    - → Bile acid

Mechanism of Action :

Bitters :-

quassia, chirata can enhance or Activate the Taste Buds

↓

Produce Reflex Secretion of gastric Juice

Alcohol :

These Induce the gastric Secretion by Reflex or direct Stimulation of taste Buds

↓

Stimulation in taste Buds can increase the Hunger

Miscellaneous Compounds

☆ Inulin → Increase gastric Secretion By Producing hypoglycemia

↓

gastric Secretions can enhances the Appetite

☆ Histamine → Stimulate gastric glands

→ May have no therapeutic Application.

Digestants - Increase digestion Process

↓

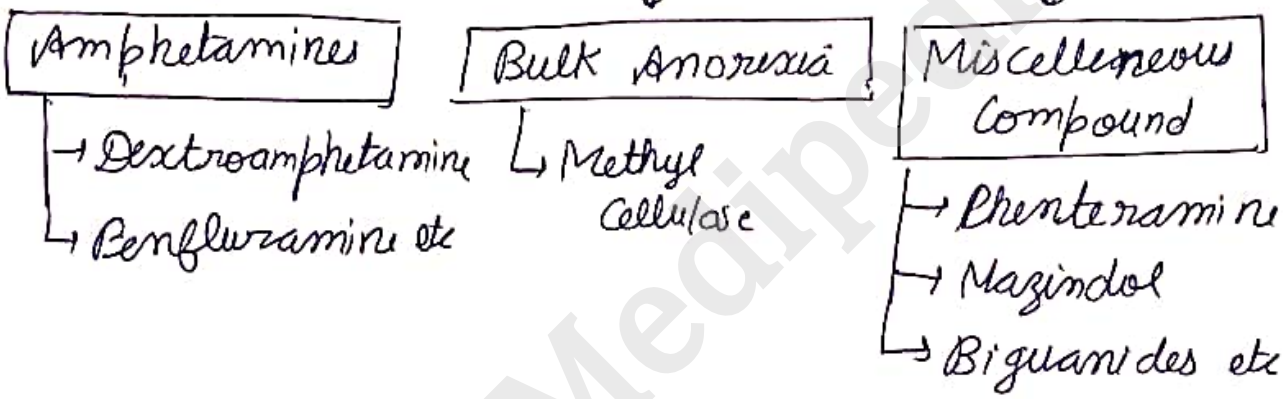
Increase in Elimination and also hunger

Anorexiants : These are the agents that used to suppress the Appetite or hunger.

→ Decrease hunger

→ Mostly used in obesity.

Classification of Anorexiants



Mechanisms of Action

Amphetamine :→ It Stimulates hypothalamus in CNS

↓

Produce CNS Stimulation and Tolerance

↓

decrease in Appetite

Bulk Anorexiants :

Bulk Anorexiants are the Non digestible materials (Resin)

↓

These absorbs water from Stomach and Swell up

↓

Produce feeling of Fullfillness.

Sialogogues :- These can increase Salivary Secretion in Mouth

↓

More mixing and digestion of Food

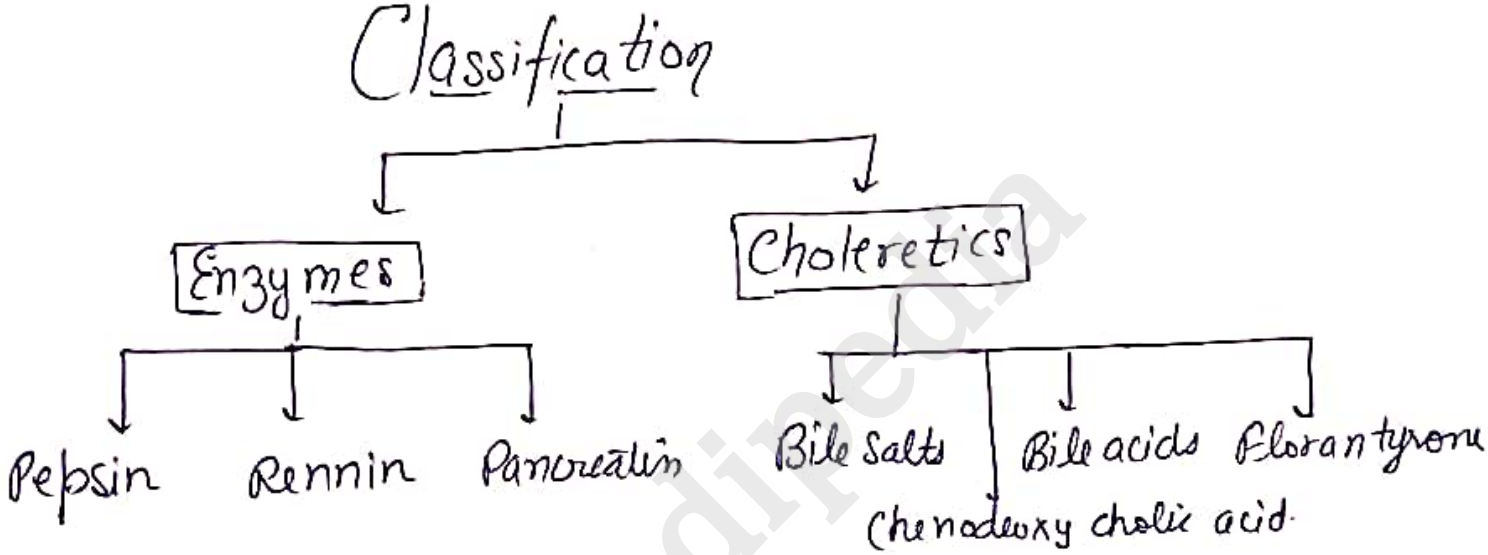
→ used in Dry Mouth.

Drugs
- Anticholinergic – Atropine
- Local Astringents – Alum and Tannic acid
- Anti-histaminic - Bromethazine etc
- ganglionic Blocker – Hexamethonium and Pentolinium

Digestants and Carminatives

Digestant - These are the agents can increase the Process of digestion.

→ Also used in Acidity, Indigestion.



★ Enzymes :- There are some Several Enzymes that can Enhances the digestive Activity.

→ Pepsin :- It is a Proteolytic Enzyme that helps in Breakdown of Protein. Secreted by Stomach.

- ★ Effective in case of defective Secretion of Pepsin.

→ Rennin :- It is a milk curdling Enzyme

- obtained from glandular layer of calf stomach

→ Rennin have similar use as Pepsin.
→ used in preparation of cheese

→ Pancreatin :

- Pancreatin contains 3 Enzymes → Amylase, Trypsin, Lipase

- It is not useful in GI disorders unrelated to Pancreatic Enzyme deficiency.

- Administered orally in form of Enteric Coated capsules to prevent gastric disorders.

- used for Replacement of Pancreatin deficiency.

☆ Choleretics

Choleretics can increase the output of Bile by liver.

→ Bile :- About 1 litre of bile secreted by liver.

Bile Contents → Bile acids, Cholesterol, Bilirubin

- Bile is important in Breakdown of fats in Intestine.

→ Cholecystokinin (CCK) is polypeptide can mainly Responsible for biliary secretion

→ Chenodeoxy cholic acid (CDCA) or Chenodiol :-

- constituent of Bile.
- Intaken orally, useful in dissolving gall stones.
- It help in Reduce Biliary cholesterol
- Increases bile acid secretions in some Patients.

Carminatives

The agents used to Release Excess gas from the Body.

Or

The drugs used to Expel gas from Stomach or Intestine.

→ Most drugs are aromatic Volatile oils.

→ The Produces feeling of warmth in Stomach.

→ Carminatives offer Relief and audible Satisfaction.

Classification

- **Condiments and Spices**
  - Cardomom
  - Coriander
  - ginger
  - Asafoetida (Hing)
  - etc
- **Tinctures of volatile oils**
  - Zingiberis Tinctura
  - Cardomom Tinctures
- **Dimethylpolysiloxane (Dimol)**
  - Other Example
    - Sodium Bicarbonate

MoA - These Aromatic Volatile oils cause irritation in gastric Stomach

↓

Increase in Peristaltic movement

↓

Flatulence and gas Release

Dimol - It eliminates Mucus embedded Bubbles

↓

Act as defoaming agents, allow gas to escape from GIT and Provides comfort to Patient.

→ Available in 40mg Tablets.

- Dimol is used in combination with antacids, antispasmodics and Digestants.

Useful Meanings-

- Condiments - Substances used to give flavour to food example - Spices.
- Tincture - Substance used or dissolved in alcohol used as mediam
- Gingiberis - Ginger (Adrak, अदरक)
- Cardamon - Elaichi इलायची
- Flatulence - gas filled in Stomach (पेट फूँलना)
- Calf - Baby of Cow बछड़ा
- Bile - पित्त, Yellowish / Greenish Digestive, viscous liquid that Breaks Fatty acids. produced By liver

- Bicarbonate (Sodium) Na_2CO_3

Combine with HCl and Co_2 forms.

$Na_2CO_3 + HCl \longrightarrow Co_2$ (Expulse out from Body)

Emetics & Anti-Emetics

Introductions :- When the Vomiting Centre of CNS Activated, then the Gastric material Expulsed/Expell in opposite direction.

→ Vomiting Centre Present in medulla CNS.

Types of Vomiting - (1) Motion Sickness
(2) Morning Sickness
(3) Gastric Sickness

(1) Morning Sickness :- Vomiting in Pregnancy Condition

(2) Motion Sickness :- Vomiting during Travelling

(3) Gastric Sickness :- Vomiting during wrong food Intake

Physiology : In Brain, Cerebullum Part consist of Chemo-Techtic Trigger (CTZ) Zone activetes.

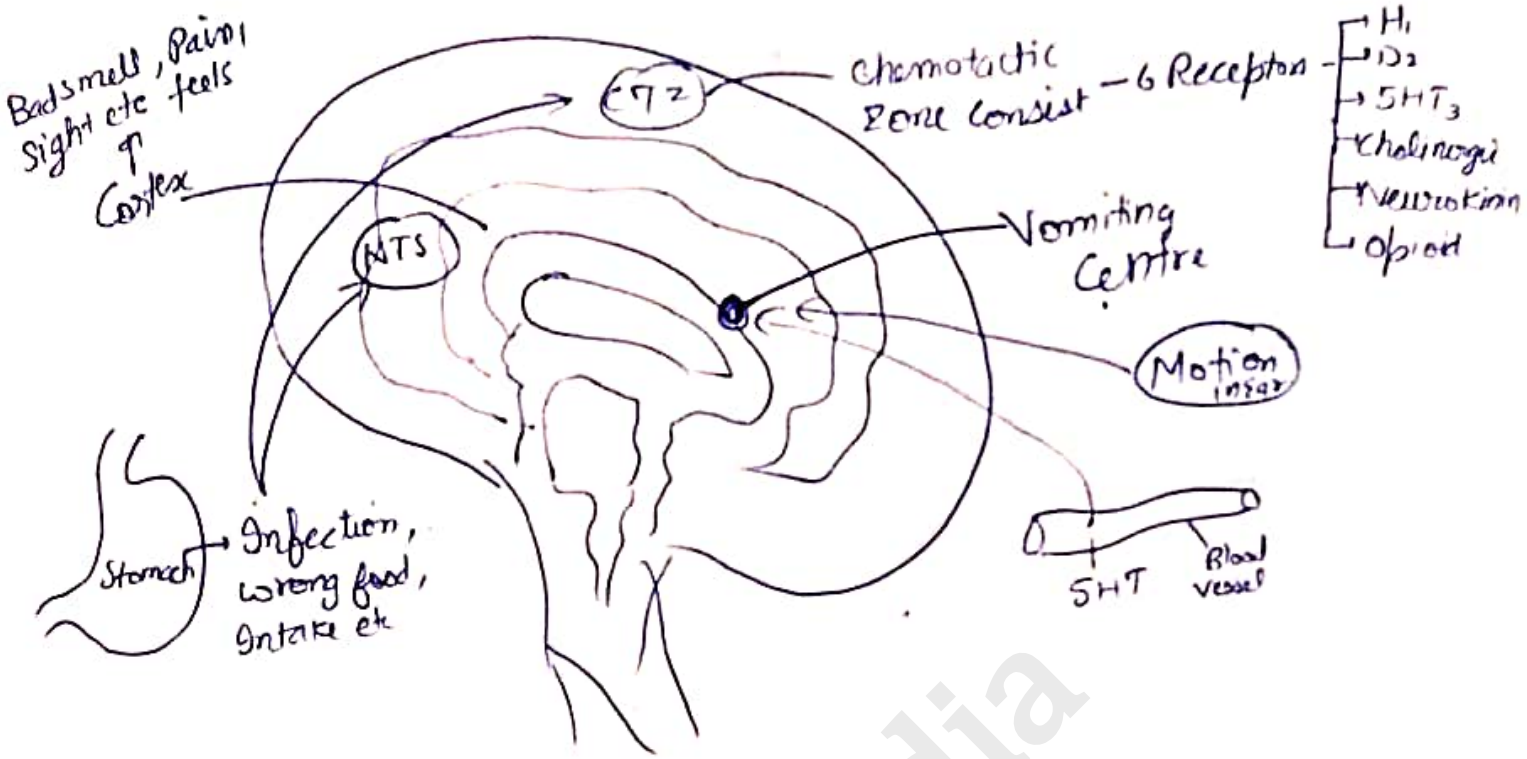
↓

It activates Vomiting Centre.

☆ In Cerebullum, Nucleus Tractus Sollitorius (NTS) activates

↓

Activates and stimulates Vomiting Centre



★ CTZ Part Consist of 6 Receptors, when the Receptors Binds to any drug, then Vomiting Centre ACTivates.

Receptors - H_1 – histaminic
D_2 – Dopaminic
$5HT_3$ – ~~b~~
Cholinergic
Neurokin Receptor
Opioid Receptor

★ During Motion or Travelling
↓
Ear consist Ear oscillus
↓
when internal Ear produces Vibrations due to motion
↓
Activates ~~Cell~~ Cerebellum that consist NTS and CTZ Zone
↓
Vomiting centre Activates

★ During Thinking, Smell, Pain, Sight of any worse thing, then cortex part of Brain activate Vomiting Centre

★ In our Intestine / Stomach, 5HT and PG Receptors found

↓

due to wrong food, medication, drink Intake, Infection

↓

Irritation and Inflammation due to Histamine and Prostaglandin Release.

↓

Activates and Binds to NTS and CT2

↓

Activates Vomiting Centre

↓

Vomiting

★ In Blood Vessels, RBC and Platelet consist of 5HT Receptor

↓

When any Cytotoxic drug, morphine, Ergot etc drug intaked and Binds

↓

Binds to Receptors of Blood Vessel

↓

Cause Activation of Vomiting Centre

↓

Vomiting

Classifications of Anti-Emetics

- Anticholinergic - Example - Hyosine, Dicyclomine etc.
- H_1 Anti-histaminics - Example - Promethazine, Doxylamine, Diphenhydramine, Dimenhydrinate, Meclozine etc.
- Neuroleptics - Chlorpromazine, triflupromazine, Prochlorpromazine etc
- Prokinetic Drug - Metachlopromide, Domperidone, Cisapride, Mesopride, Itopride etc
- $5HT_3$ Antagonists - Ondasetron, Granisetron, Ramosetron etc
- NK_1 Receptor Antagonists - Aprepitant, Fasprepitant (On Cancer cases)
- Adjuent Anti-emetics - Benzodiazepine (BZD), Nasolone.

Emetics - drugs used to induce Vomiting.

Vomiting occurs due to stimulation of Emetic centre located at Medulla oblongata (CTZ)

☆ Causes

- Drug Treatment Induced - Cancer chemotherapy, cardiac glycosides, Quinine, Toxic agent etc
- Natural (Pregnancy) - Physicological changes
- Infectious Cancer - GIT Inflammation, Viral Fever.
- Pathological conditions - Malignancy
- Post operative - Anesthesia (Before Pain), Analgesia (After Pain)
- CNS Related Causes - Anticipatory Migration.

Classification of Emetics

Centrally Acting
- Apomorphine
- Morphine etc

Peripherally Acting
- Mustard
- Tartar Emetics
- Hypertonic NaCl

Mixed acting (centrally + Peripheral)
- Ipecacuanha Syrup

Centrally Acting - Stimulates CTZ
↓
Cause Vomiting

Peripherally Acting - Act on Other than Brain and Spinal Cords.
↓
Cause Vomiting (irritates gastric Mucosa)

Objectives - widely used to eliminates Poison.

- Apomorphine - Semisynthetic Derivative of morphine
  → Act on/as Dopaminergic Agonist at CTZ
  ↓
  Induce Vomiting
  Onset of Acting - 5-15 Minute.
  Contraindications - Respiratory Depression.
  ↳ May cause CNS Depression.

- Mustard - Irritates gastric mucosa
  ↓
  Reflux Vomiting
  → They form Volatile oil (Reaction with glycosidase Enzyme in Presence of water)

- Hypertonic Solution of HCl - Irritates gastric Mucosa
  ↓
  Prepared By addition of NaCl (Salt) in H_2O

- Ipecacuanha - Contain Emetin Alkaloid (Plant Source)
  - → Irritate gastric mucosa
  - → Also Trigger CTZ

Contraindication
- → Corrosive (Strong Acid & Alkali)
- → CNS increase Stimulation
- → Petroleum Intake.
- → Unconscious.