

DRUGS RELATED TO BALANCE SYSTEM

The overall incidence of dizziness, vertigo, and imbalance is 5-10%

It reaches 40% in patients older than 40 years.

Accounts for 3% of total visits to emergency department

The incidence of falling due to imbalance is 25% in subjects older than 65 years.

1% of falls results in hip fracture

Roughly 50% of fractured hips will not function normally.



The key to life is balance

DRUGS RELATED TO BALANCE SYSTEM

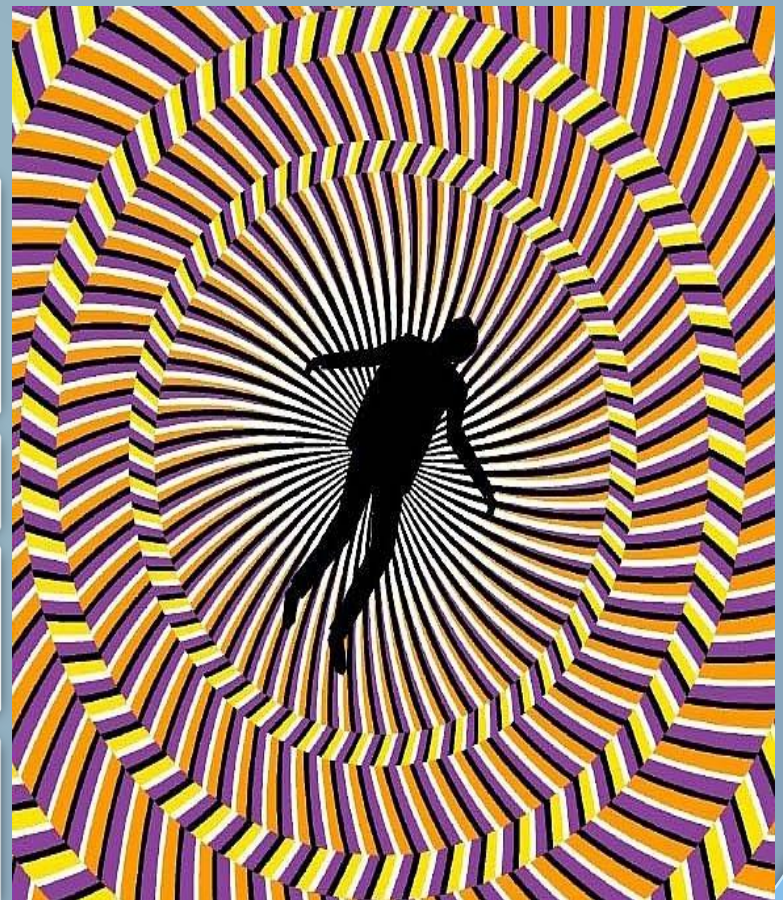
ILOS

To differentiate between classes of drugs used **to control** or to **prevent** vertigo

To hint on some disorders of balance

To detail on some drugs used **to control** or to **prevent** vertigo

To identify drugs that can precipitate vertigo



DRUGS RELATED TO BALANCE SYSTEM

Definition of terms related to balance

Dizziness

Vertigo

Light headedness



SYMPTOMS

Spinning (vertigo)

Confusion or disorientation

Falling or feeling as if one is going to fall

Nausea or vomiting

Sweating

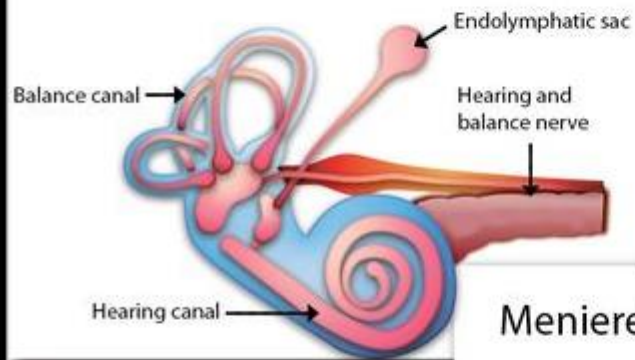
Abnormal eye movement (nystagmus)



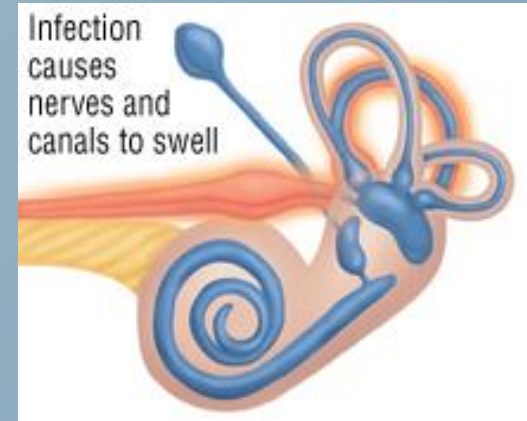
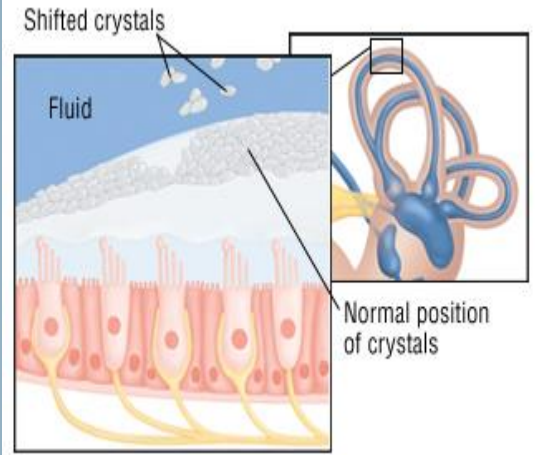
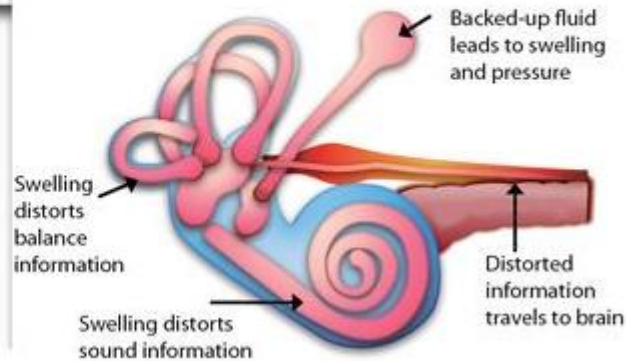
BALANCE DISORDERS

Meniere's disease

Healthy inner ear



Meniere's disease



PHARMACOLOGIC APPROACH

Specific treatment

Symptomatic treatment

Prophylactic treatment



Involves targeting the underlying cause of the

Involves controlling the acute symptoms and autonomic complaints (e.g., vertigo and vomiting)

Aims to

■ Diuretics (but not loop diuretics)

Corticosteroids

■ Ca /K Channel Blockers

■ Cinnarizine, Verapamil

SYMPTOMATIC CONTROL

Vestibular suppressants



Vestibular Antiemetics are drugs that reduce the intensity of vertigo and nystagmus evoked by a vestibular imbalance.

1-Anticholinergics

2-Benzodiazepines

3-Betahistine

1-Anticholinergics

Anticholinergics inhibit firing in vestibular nucleus neurons

Reduce the velocity of vestibular nystagmus

e.g. **hyoscine**, also useful in motion sickness, sedation

ADRs:- dry mouth, blurred vision, sedation

2-Benzodiazepines

In small dosages useful for the management of acute vertigo

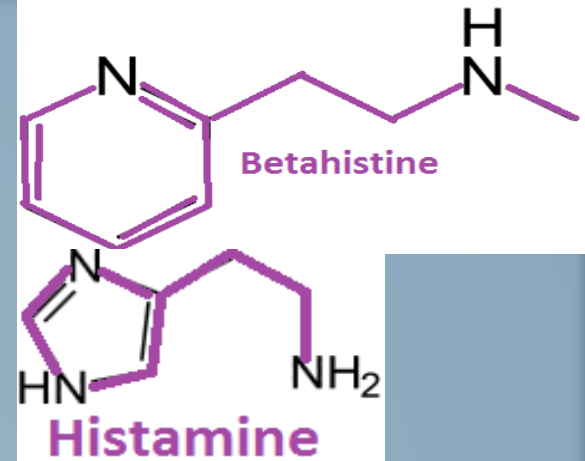
Minimize anxiety and panic associated with vertigo

Lorazepam, Clonazepam, Diazepam

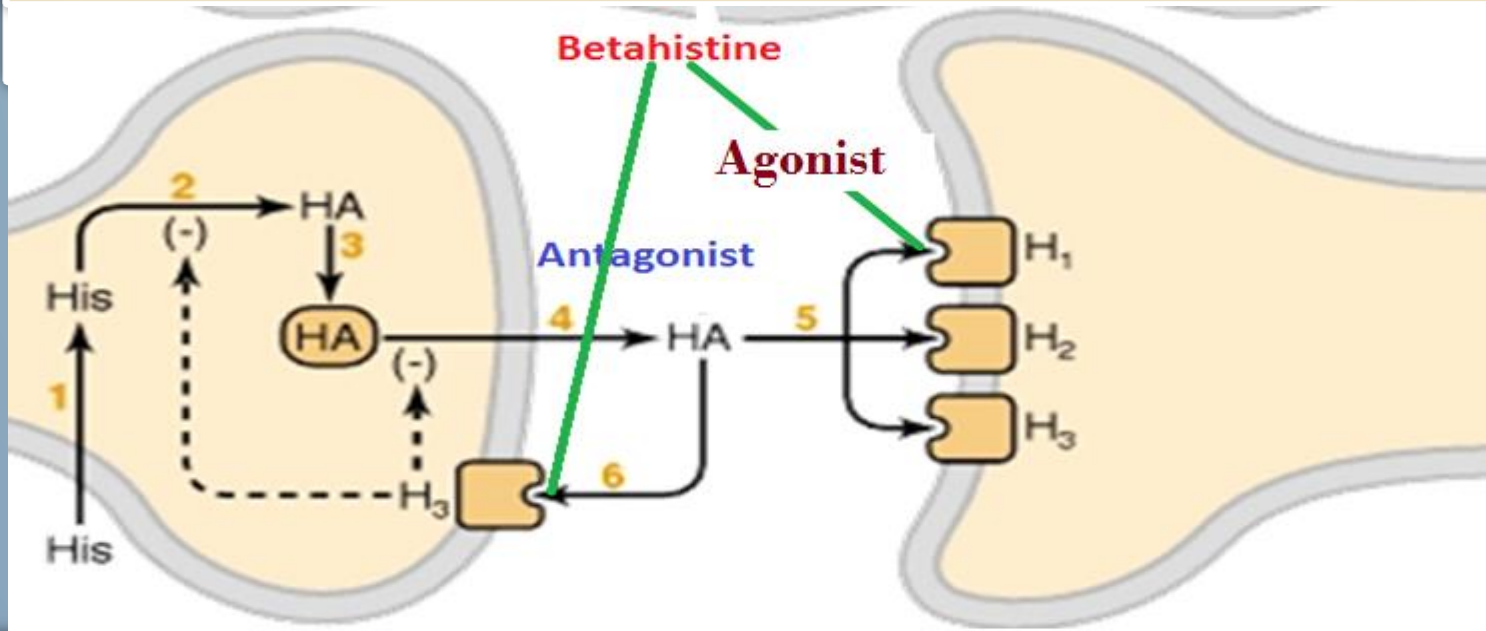
ADRs:- Dependence, impaired memory, increased risk of falling.

3-Betahistine

Mehanism of Action:-



It is a structural analog of histamine with weak histamine H₁ receptor agonist and more potent histamine H₃ receptor antagonist properties



Pharmacokinetics

Contraindications

al solution

Phaeochromocytoma

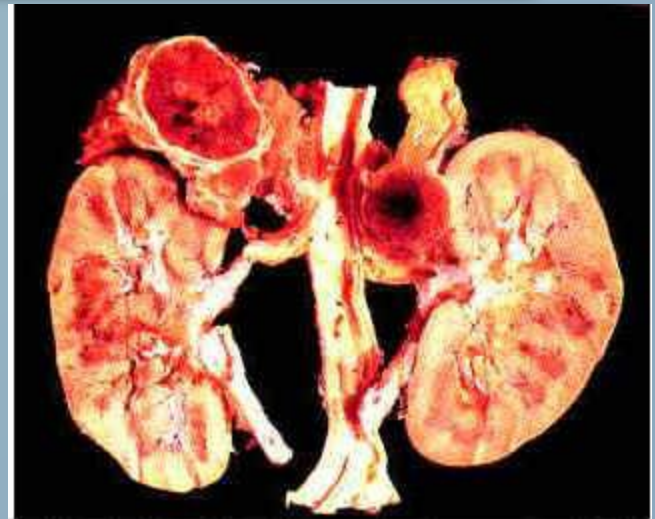
sorbed.

Bronchial asthma

urine within 24 hours

History of peptic ulcer

Hypersensitivity reactions



Betahistine

Clinical indication

Current evidence is limited as to whether betahistine prevents vertigo attacks caused by Meniere's disease, compared with placebo reactions

defining trial (BEMED trial)
BMJ 2016; 352



ANTIEMETICS

Antiemetics are drugs used to control vomiting and nausea

Antihistamines e.g. dimenhydrinate

Phenothiazines e.g. prochlorperazine

Dopamine antagonists e.g.
metoclopramide



DIMINHYDRINATE

Block H₁ receptors in CRTZ

Sedative effects

Weak anticholinergic effects

Anticholinergic side

↓ Excitability in the labyrinth & blocking conduction in vestibular-cerebellar pathways

Indications

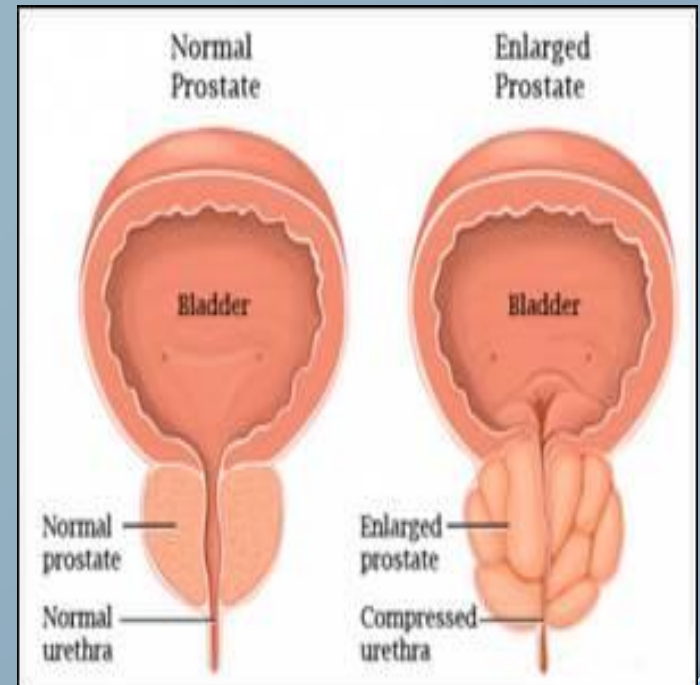
Indications:-

Glaucoma

Prostate enlargement

In vertigo

Motion sickness



PROCHLORPERAZINE

Blocks dopamine receptors at CRTZ

Antipsychotic , some sedation + antiemetic

Indications

**One of the best antiemetics in vertigo,
has some vestibular suppressant action**



METOCLOPRAMIDE

A potent central antiemetic acting on CRTZ

Has some sedative action

Has potent **gastroprokinetic** effect

ADRS:-

Restlessness or drowsiness
Extrapyramidal manifestations
on prolonged use

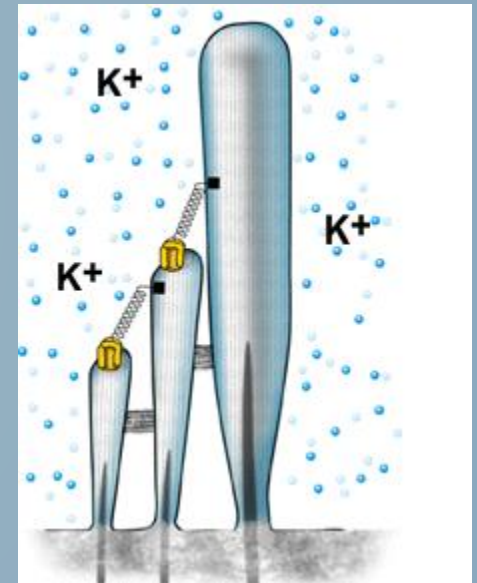


CINNARIZINE

Selective calcium & potassium channels blocker,
antihistamine, antiserotonin, antidopamine

It promotes cerebral blood flow

Cinnarizine inhibits K^+ currents



Inhibition of K^+ currents lessen the vertigo and motion-induced nausea by dampening the over-reactivity of the vestibular hair cells.

PHARMACOKINETICS

Clinical uses:-

Used to treat nausea and vomiting associated with motion sickness, vertigo, Meniere's disease.

Low oral bioavailability due to hepatic first pass

Car drivers

If administered IV in lipid emulsion, it has better

Muscle rigidity and tremor

DRUGS INDUCING VERTIGO

Drugs producing damaging effects on structure or function of labyrinthine hair cells &/ or their neuronal connections

Vesibular toxins

Drugs altering fluid & electrolyte balance

Diuretics

Drugs altering vestibular firing

Anticonvulsants

Antidepressants

Sedative hypnotics

Alcohol

Cocaine

Mixed ototoxins

Alter function

MIXED OTOTOXINS

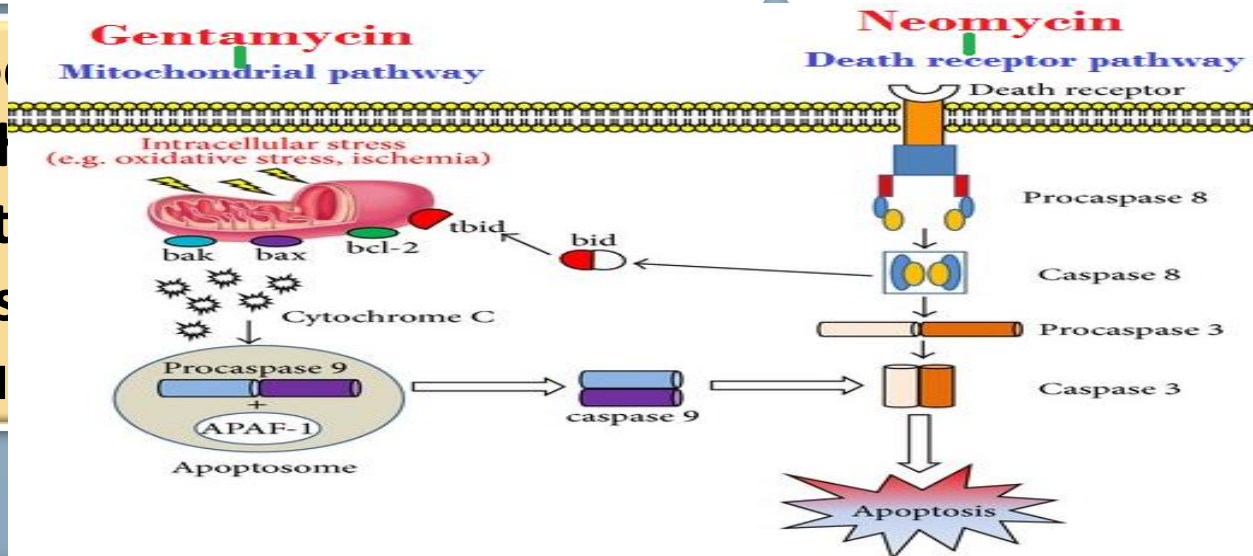
Aminoglycoside antibiotics;
*gentamycin, kanamycin,
neomycin, streptomycin*

⚡ Loop diuretics

Gentamycin → Induce apoptosis
by evoking free radicals →
Mitochondrial Pathway

Neomycin → Induce apoptosis
by activating caspases →
Death Receptor Pathway

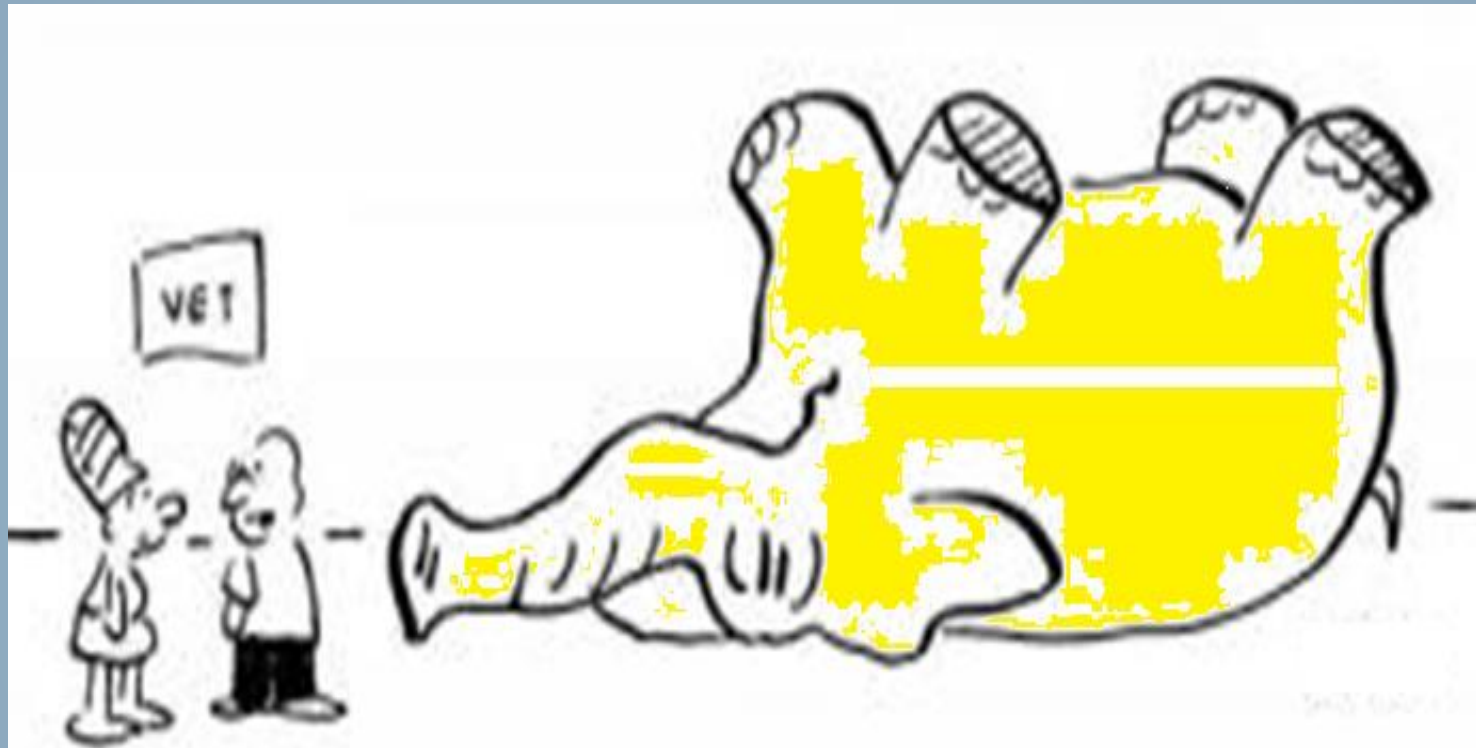
↓ Low
bioelectrical
transmembrane
impulses



Alter

Alter structures

SYNOPSIS



"It may be his inner ear."