SNS COLLEGE OF PHARMACY AND HEALTH SCIENCES

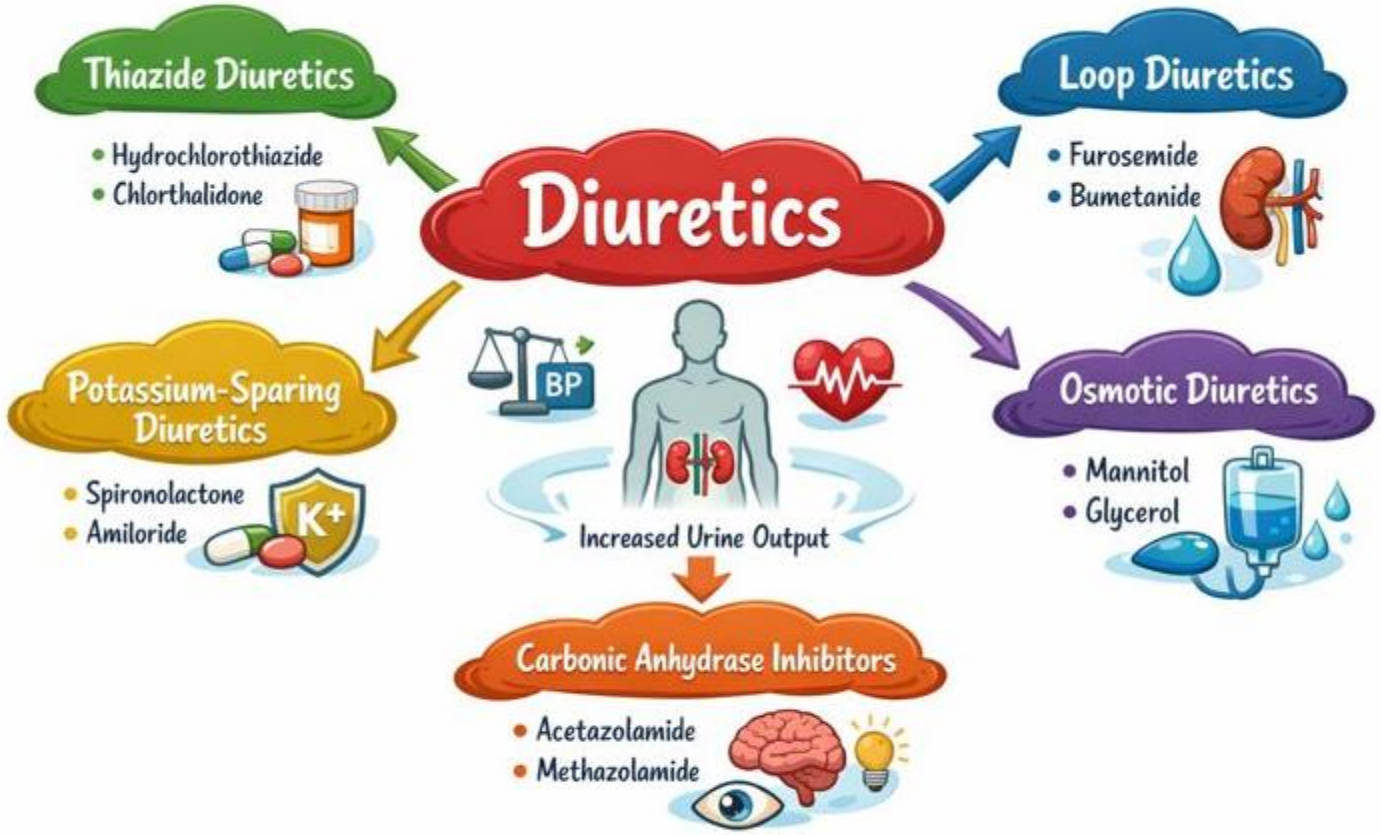
Affiliated To The Tamil Nadu Dr. MGR Medical University, Chennai
Approved by Pharmacy Council of India, New Delhi

Coimbatore-641035

TOPIC : DIURETICS

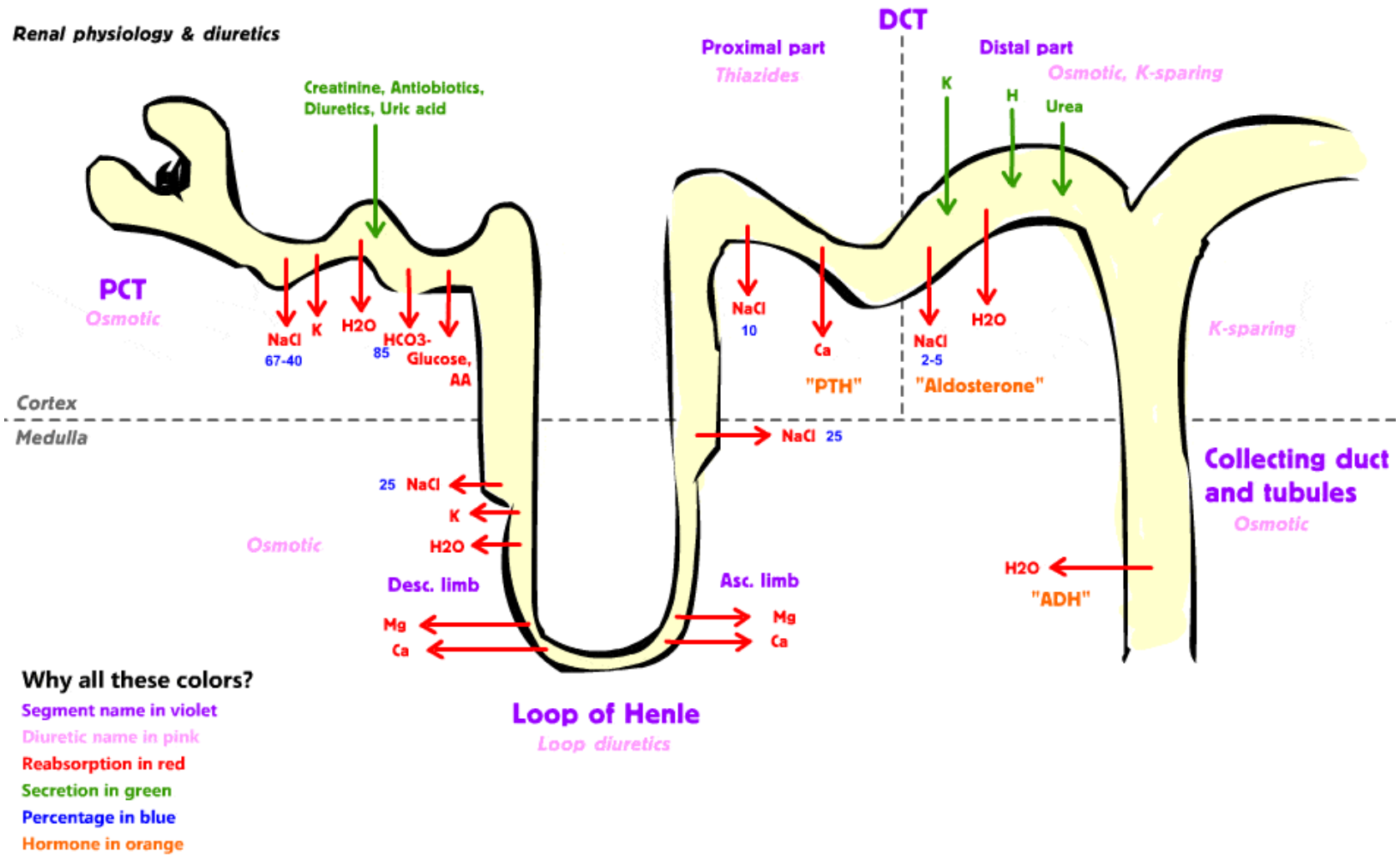
COURSE:PHARMACOLOGY II

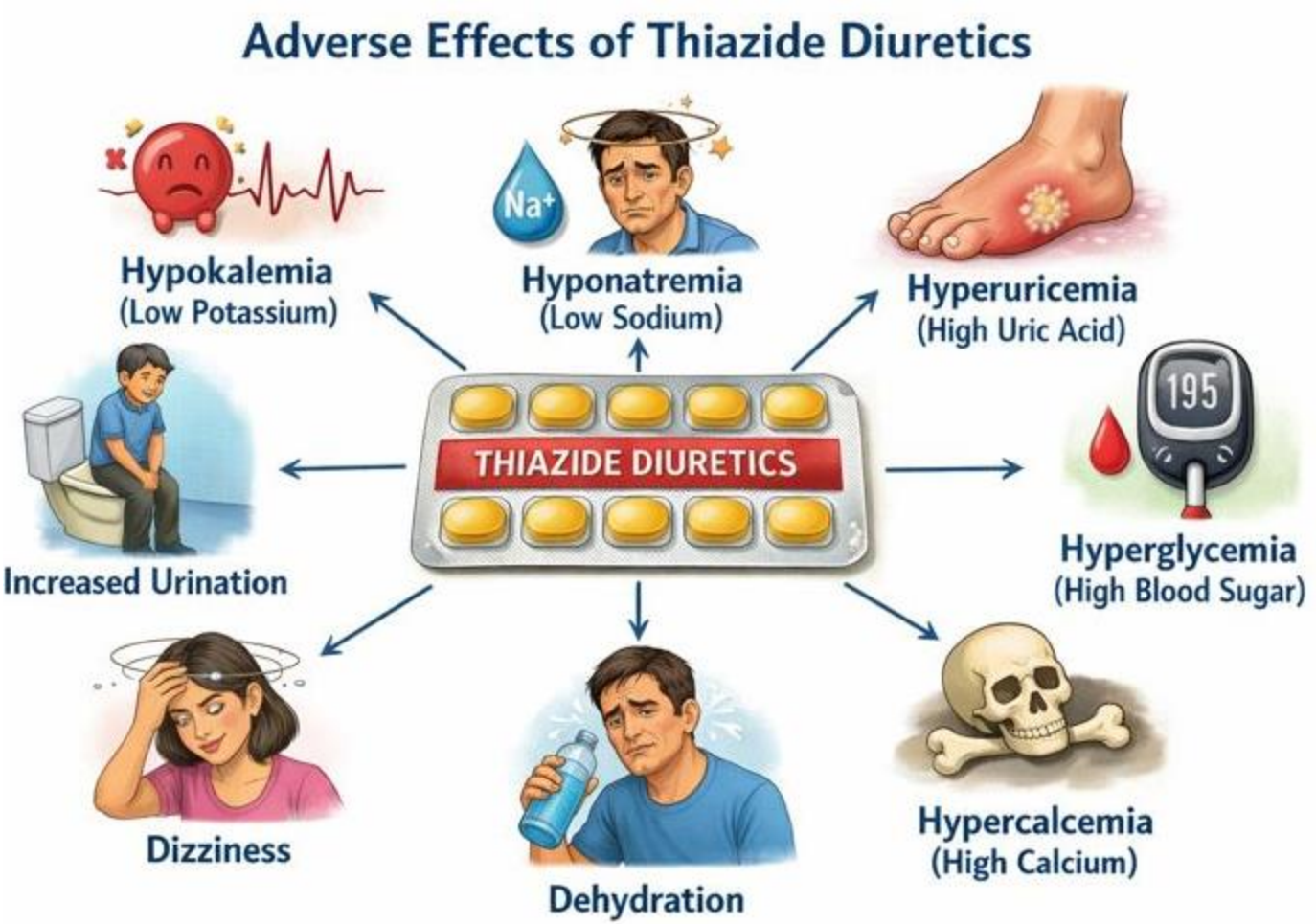
MIND MAP :


Diuretics
Thiazide Diuretics
Hydrochlorothiazide
Chlorthalidone
Loop Diuretics
Furosemide
Bumetanide
Potassium-Sparing Diuretics
Spironolactone
Amiloride
K+
BP
Increased Urine Output
Osmotic Diuretics
Mannitol
Glycerol
Carbonic Anhydrase Inhibitors
Acetazolamide
Methazolamide

Thiazide Diuretics

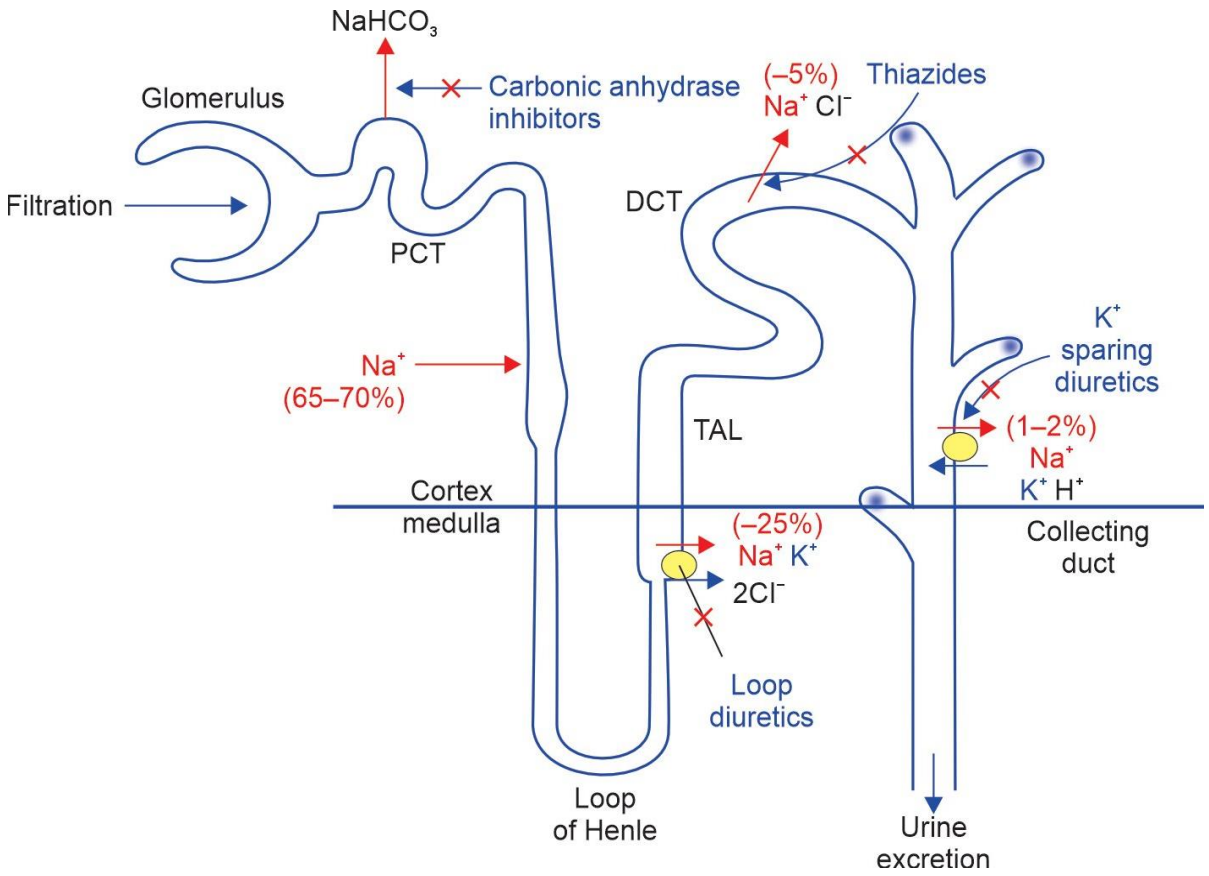
Examples	Chlorothiazide, Hydrochlorothiazide
Indications	Hypertension, CHF
Mechanism of Action	• Act on the distal convoluted tubule to inhibit the sodium-chloride cotransporter • Decrease sodium reabsorption, causing more fluid loss in the urine
Nursing Considerations	Monitor electrolyte levels, monitor BP




Adverse Effects of Thiazide Diuretics
Hypokalemia
(Low Potassium)
Hyponatremia
(Low Sodium)
Hyperuricemia
(High Uric Acid)
Increased Urination
THIAZIDE DIURETICS
195
Hyperglycemia
(High Blood Sugar)
Dizziness
Dehydration
Hypercalcemia
(High Calcium)

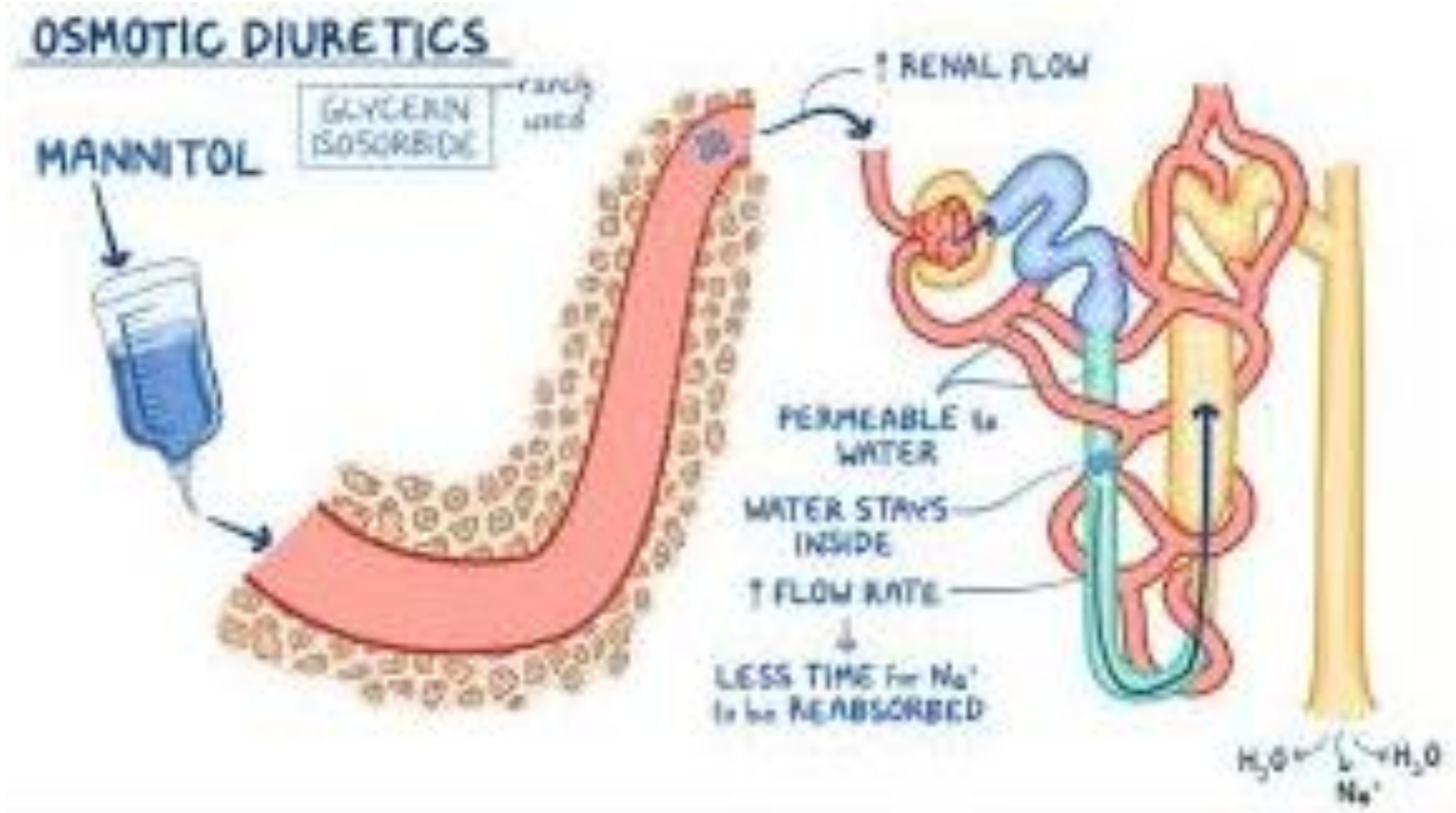
Loop Diuretics

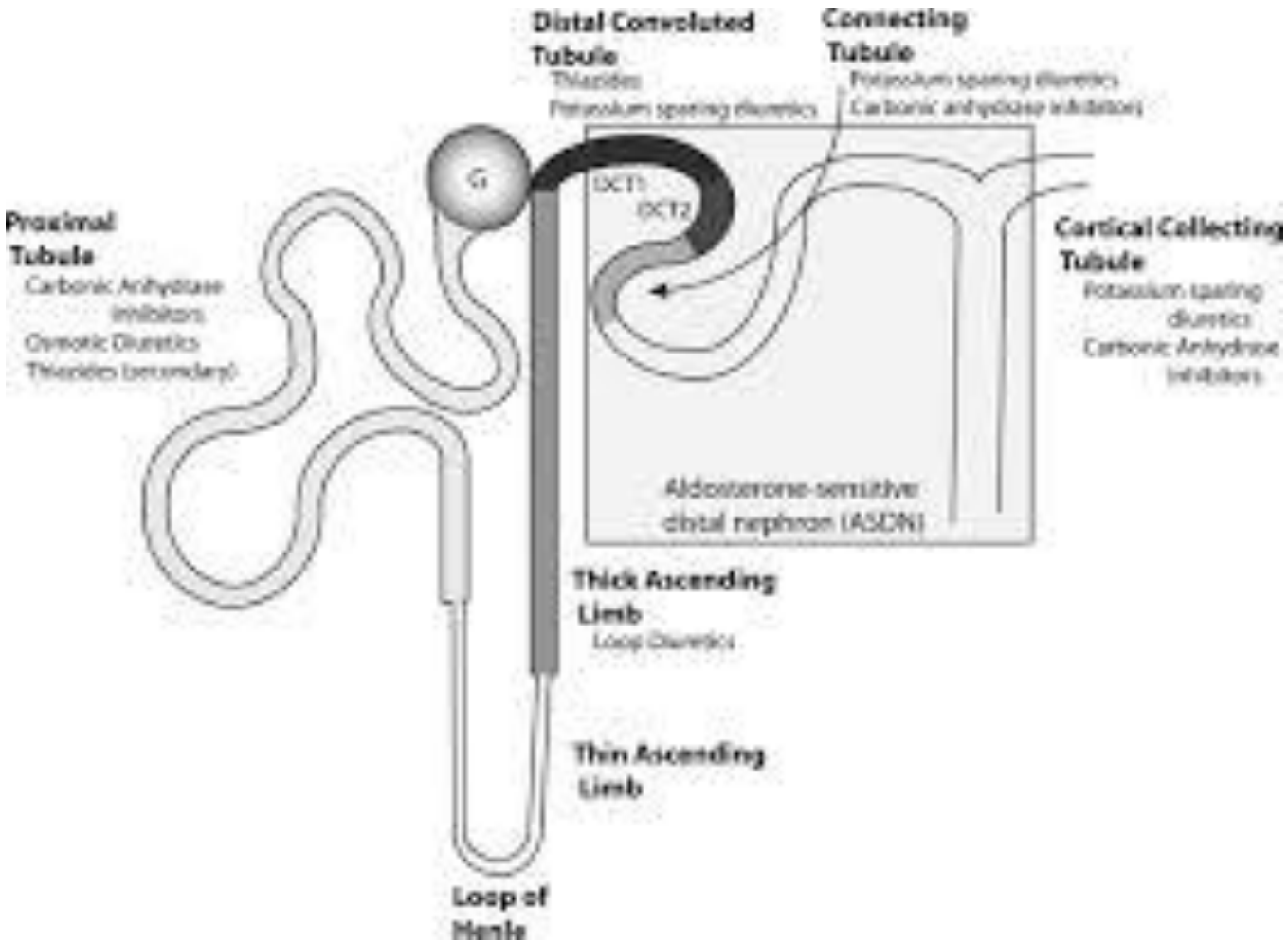
Examples	Bumetanide, Furosemide, Torsemide
Indications	Increase urinary output, edema, CHF, blood pressure management
Mechanism of Action	• Act on loop of Henle to ↑ urine output by affecting sodium reabsorption in nephron • Inhibit sodium potassium chloride cotransporter causing sodium excretion via urine → increases diuresis
Nursing Considerations	Monitor potassium levels Most effective type of diuretic


NaHCO3
Carbonic anhydrase inhibitors
Glomerulus
Filtration
PCT
(–5%)
Na+ Cl–
Thiazides
DCT
K+ sparing diuretics
Na+
(65–70%)
TAL
(1–2%)
Na+
K+ H+
Cortex
medulla
Collecting duct
(–25%)
Na+ K+
2Cl–
Loop diuretics
Loop of Henle
Urine excretion

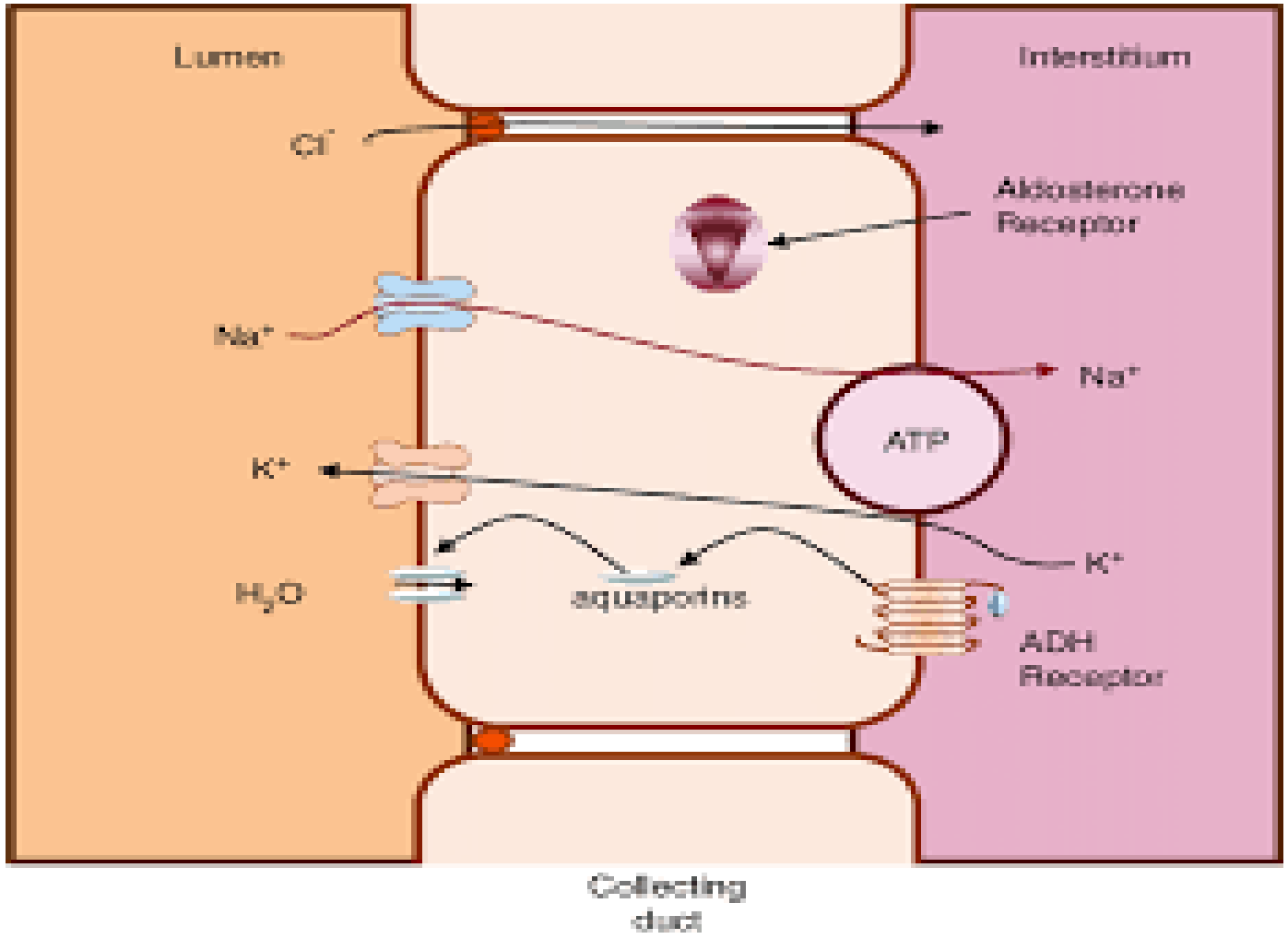
ADVERSE EFFECTS

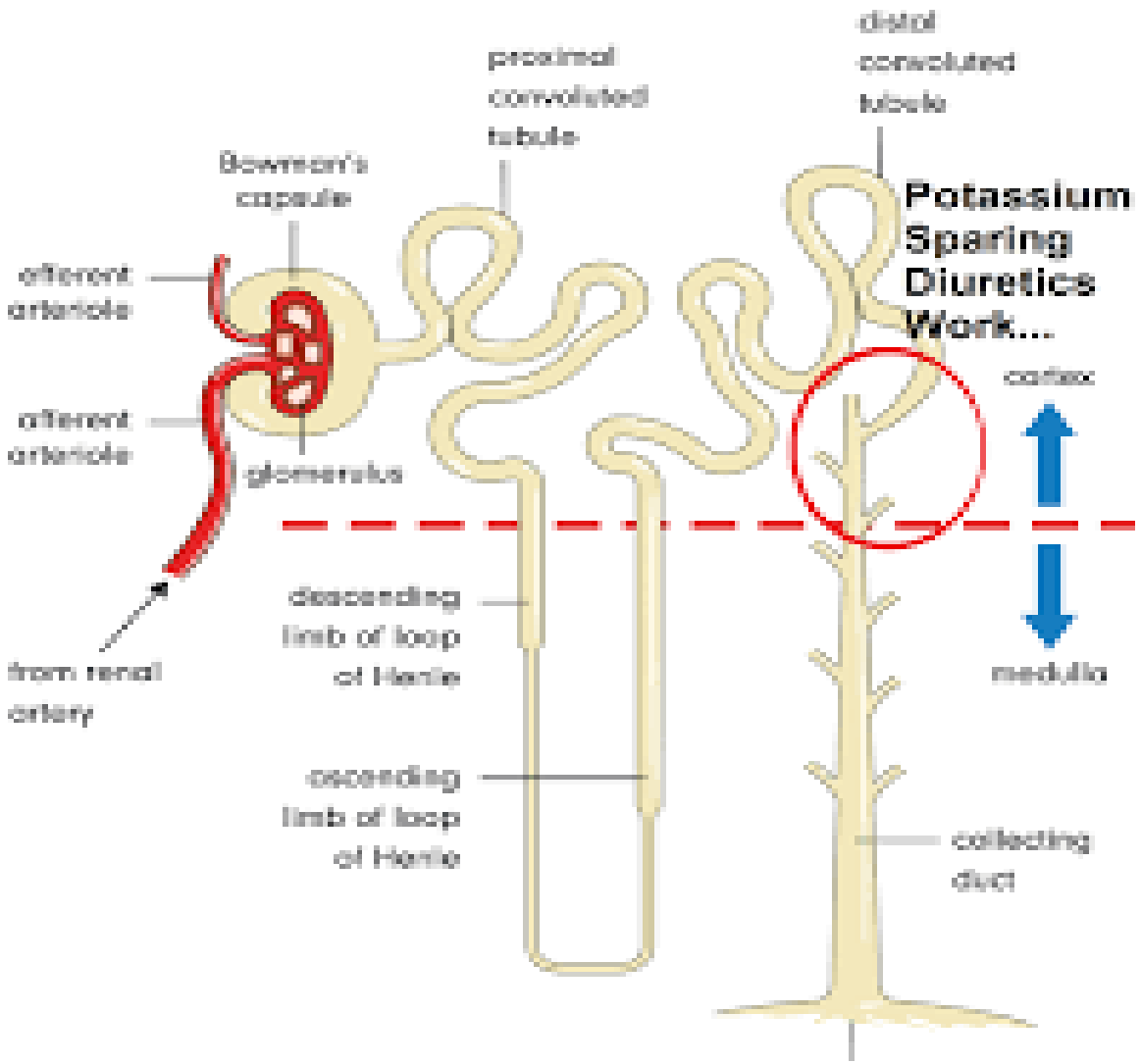
- Loop diuretics can produce a variety of **electrolyte abnormalities, including**
- hypokalemia
- hypocalcemia
- hypomagnesemia
- metabolic alkalosis.
- Also increase blood glucose and uric acid levels in th same manner as the thiazide diuretics.
- use of loop diuretics causes **ototoxicity with manifestations such as tinnitus, ear pain,** vertigo, and hearing deficits. In most cases the hearing loss i reversible.


OSMOTIC DIURETICS
MANNITOL
GLYCERIN
ISOSORBIDE
rarely used
↑ RENAL FLOW
PERMEABLE to WATER
WATER STAYS INSIDE
↑ FLOW RATE
LESS TIME for Na+ to be REABSORBED
H2O
H2O
Na+


Distal Convoluted Tubule
Thiazides
Potassium sparing diuretics
Connecting Tubule
Potassium sparing diuretics
Carbonic anhydrase inhibitors
G
DCT1
DCT2
Proximal Tubule
Carbonic Anhydrase inhibitors
Osmotic Diuretics
Thiazides (secondary)
Cortical Collecting Tubule
Potassium sparing diuretics
Carbonic Anhydrase inhibitors
Aldosterone-sensitive distal nephron (ASDN)
Thick Ascending Limb
Loop Diuretics
Thin Ascending Limb
Loop of Henle

POTASSIUM SPARING DIURETICS:



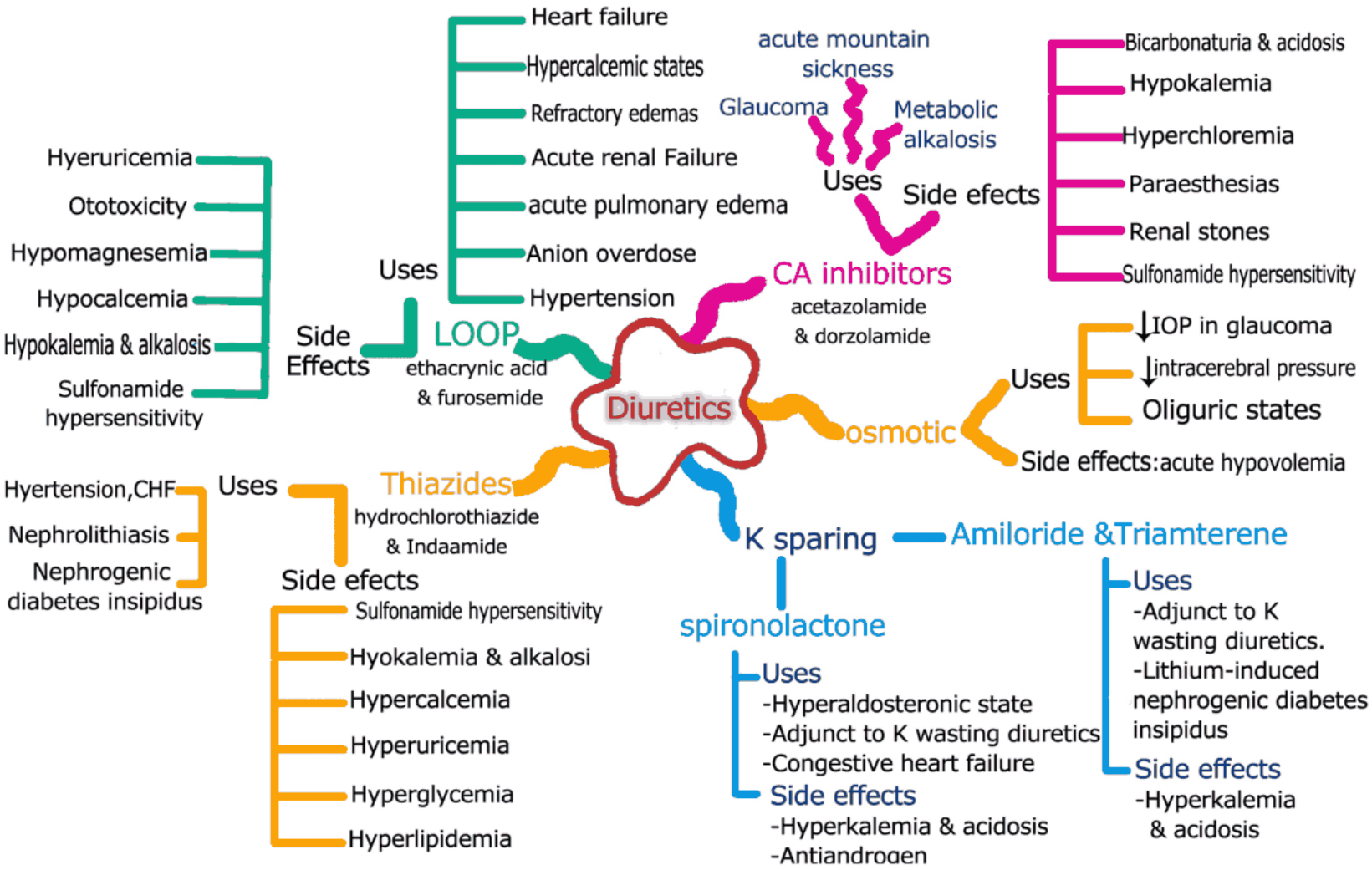

distal
convoluted
tubule
proximal
convoluted
tubule
Bowman's
capsule
Potassium
Sparing
Diuretics
Work....
efferent
arteriole
afferent
arteriole
cortex
glomerulus
descending
limb of loop
of Henle
medulla
from renal
artery
ascending
limb of loop
of Henle
collecting
duct

Pharmacological actions

↑ Excretion of

- Na^+ → Hyponatremia
- Mg^{2+} → Hypomagnesemia
- Ca^{2+} → Hypocalcemia
- H_2O → Hypovolemia

Diuretics - Uses and Side Effects



Multiple Choice Questions (MCQs)

1.Which of the following diuretics acts on the ascending limb of the loop of Henle?
a) Hydrochlorothiazide
b) Spironolactone
c) Furosemide
d) Amiloride

2.Which diuretic is most likely to cause hyperkalemia?
a) Furosemide
b) Hydrochlorothiazide
c) Spironolactone
d) Mannitol

3.A patient with hypertension and osteoporosis might benefit most from which diuretic?
a) Furosemide
b) Hydrochlorothiazide
c) Mannitol
d) Acetazolamide

4.Which diuretic is contraindicated in patients with severe sulfa allergies?
a) Spironolactone
b) Triamterene
c) Furosemide
d) Mannitol

5.Which diuretic is commonly used to treat acute angle-closure glaucoma?

a) Amiloride

b) Acetazolamide

c) Torsemide

d) Chlorthalidone

References:

1. Katzung, B. G. (2021). *Basic & Clinical Pharmacology* (15th ed.). McGraw-Hill Education.
2. Rang, H. P., Dale, M. M., Ritter, J. M., & Flower, R. J. (2020). *Rang and Dale's Pharmacology* (9th ed.). Churchill Livingstone.
3. Goodman & Gilman's: The Pharmacological Basis of Therapeutics. (2018). (13th ed.). McGraw-Hill Education.
4. National Kidney Foundation. (n.d.). *Diuretics*. Retrieved from https://www.kidney.org/atoz/content/diuretics

THANK YOU !