YAKEEN NEET 2.0

2026

8.8.2025

EXCRETORY PRODUCTS AND ITS ELIMINATION

ZOOLOGY | Lecture – 4

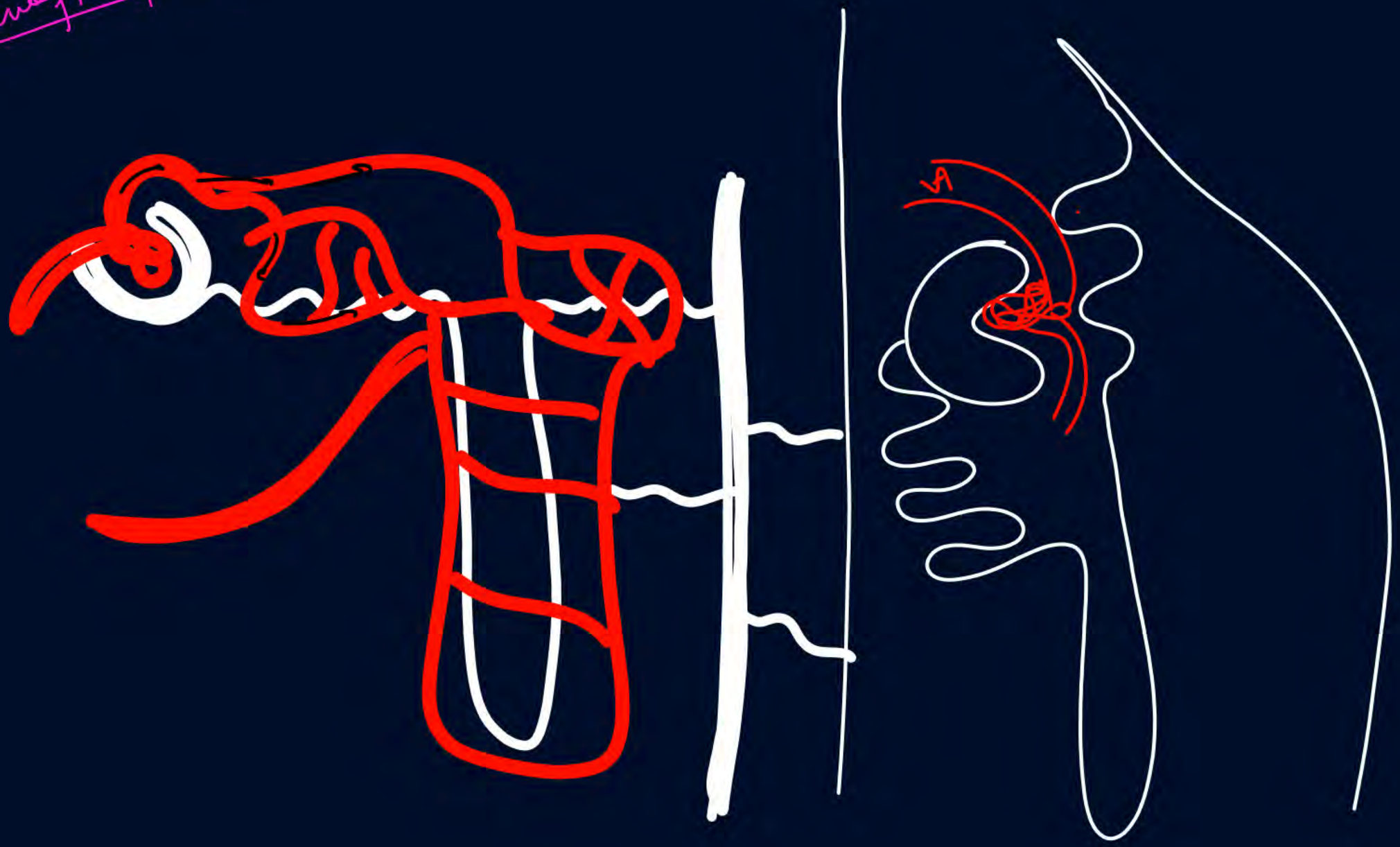
By- SAMAPTI MAM

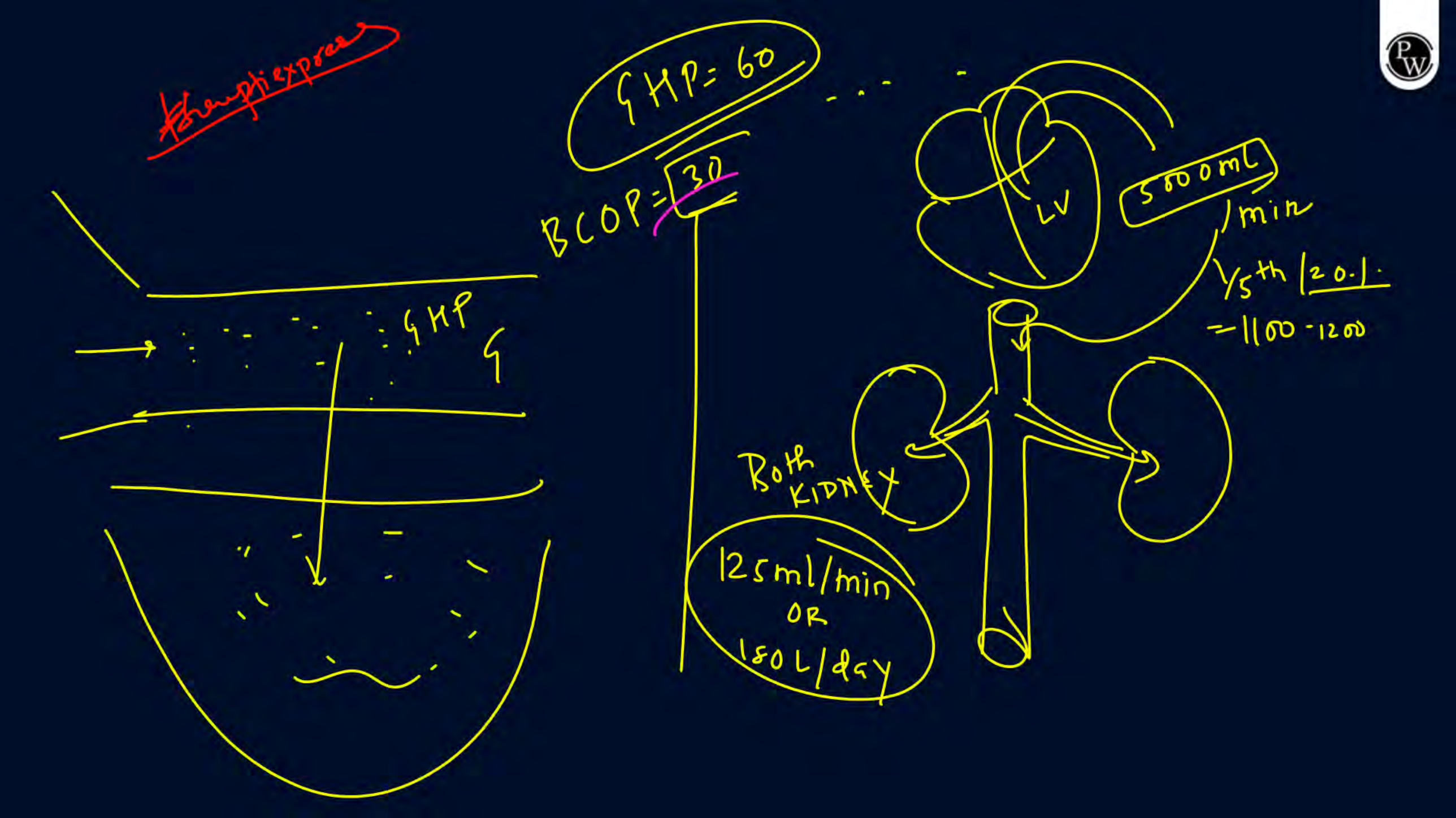
Topics to be covered

1. Urine formation - 2 , Counter-current
2.
3.
4.

MY TELEGRAM

#Dawoptiexpress




GHP = 60
BCOP = 30
GHP
LV
5000 mL/min
1/5th [20.1.
= 1100 - 1200
Both KIDNEY
125 ml/min
OR
180 L/day

(2) Reabsorption / Selective Reabsorption:

1st time absorption already in GI-tract.

Because we select what to be reabsorbed. (Note: Ultrafilteration: Non Selective)

Basics: ↓Osmolarity ∝ $\frac{\text{Solute}}{\text{Solvent}\uparrow}$ (Blood osmolarity = 300 m Osm/L)

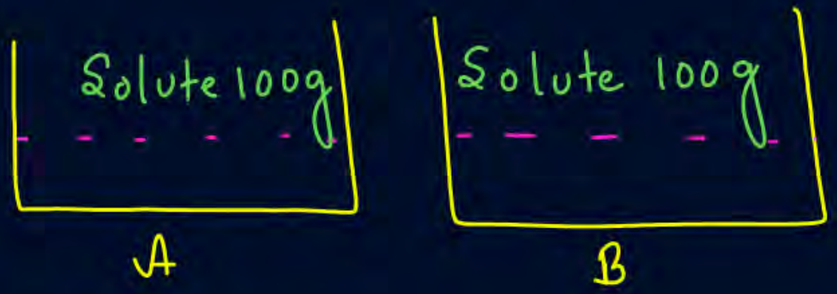
(I)

A: Solvent = 100ml, Solute = 100 g

B: Solvent = 100 ml, Solute = 50 g

Osmolarity: A >> B

(II)



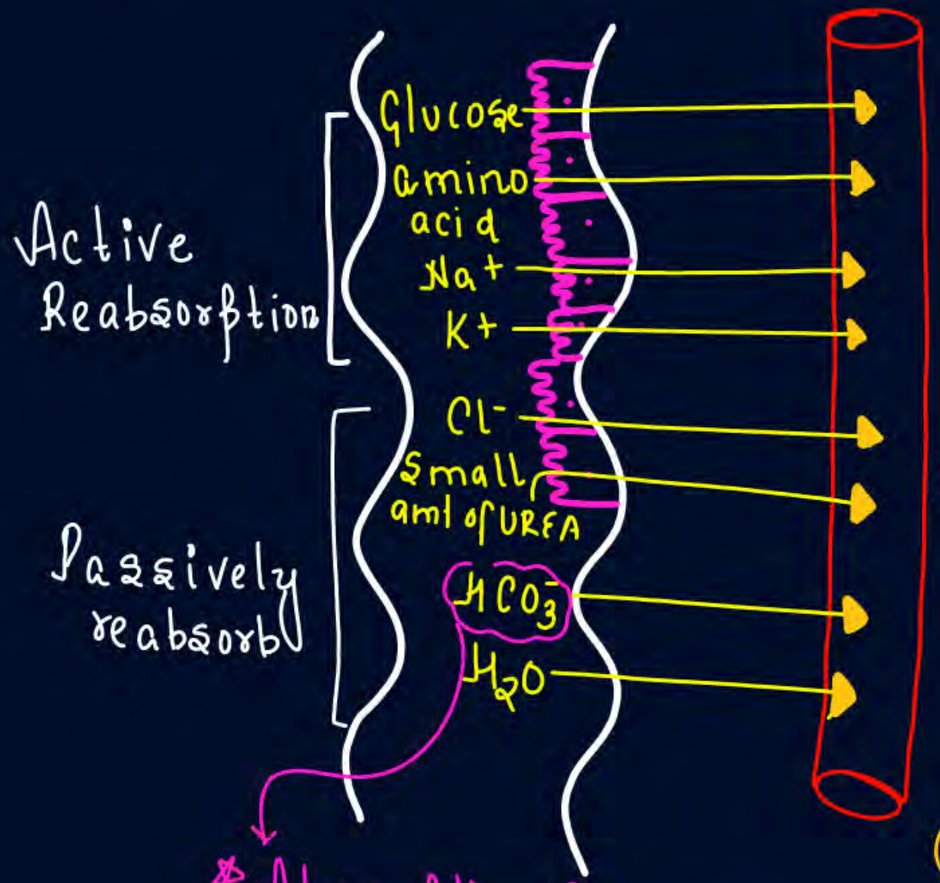
A: Solvent 100ml

B: Solvent 200ml

A > B

1) PCT: Brush Bordered Cuboidal Epithelium (In Bowman's Capsule)

↳ FILTERATE: 300 mOsm/L
↳ reaches 'PCT'



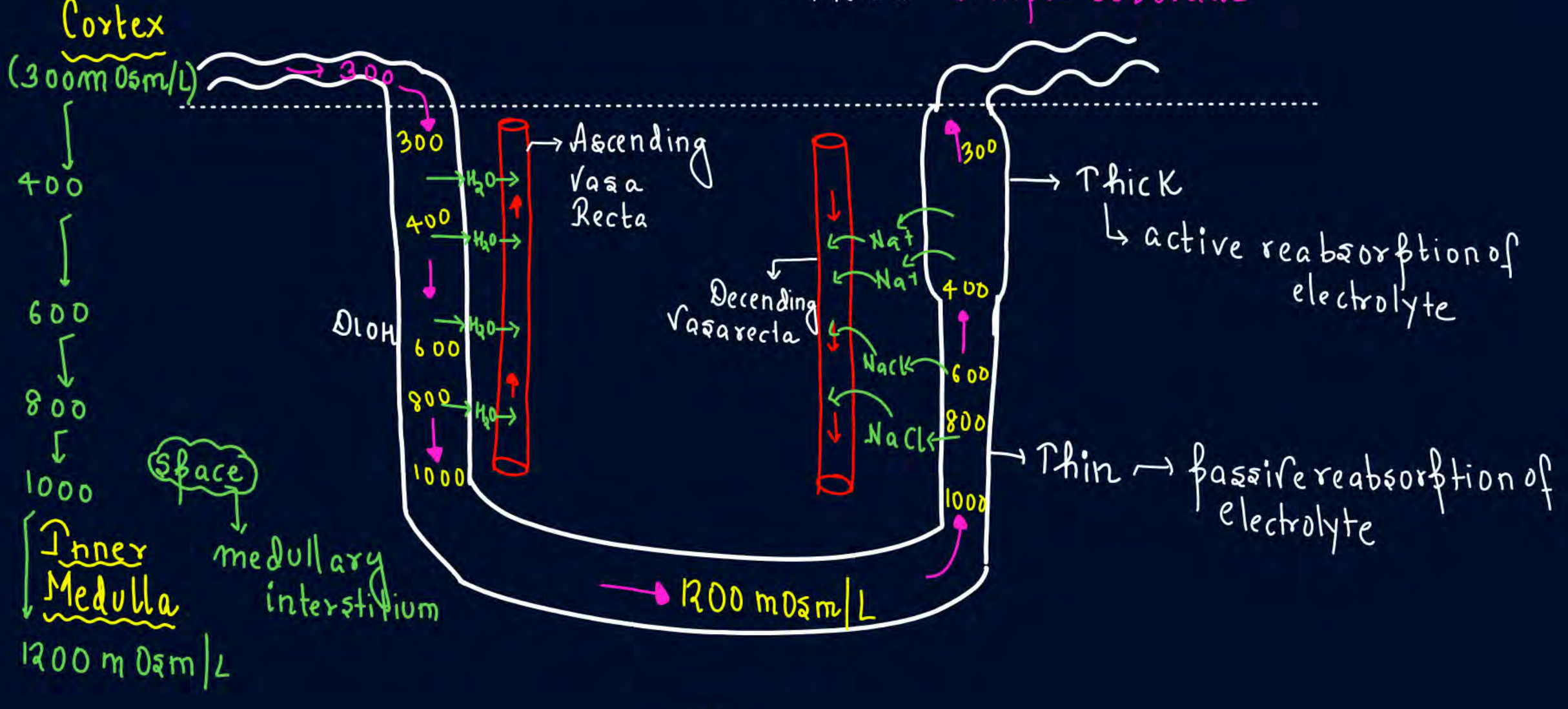
- 100% 'Glu' & 'aa' (amino-acid) reabsorbed from PCT
- 'MAXIMUM-REABSORPTION'
  ↳ 70-80% electrolytes & H_2O
- FILTERATE = 'ISOTONIC' (300 mOsm/l like Blood)

Note: Various substances have different 'THRESHOLD' values in Blood: Max. conc. upto which it can be reabsorbed. (Glucose has High threshold)

* Absorption from PCT, reabsorption from DCT

② Loop of Henle (LOH)

- DLOH : Simple squamous epithelium
- ALOH
  - Thin : Simple squamous
  - Thick : Simple cuboidal



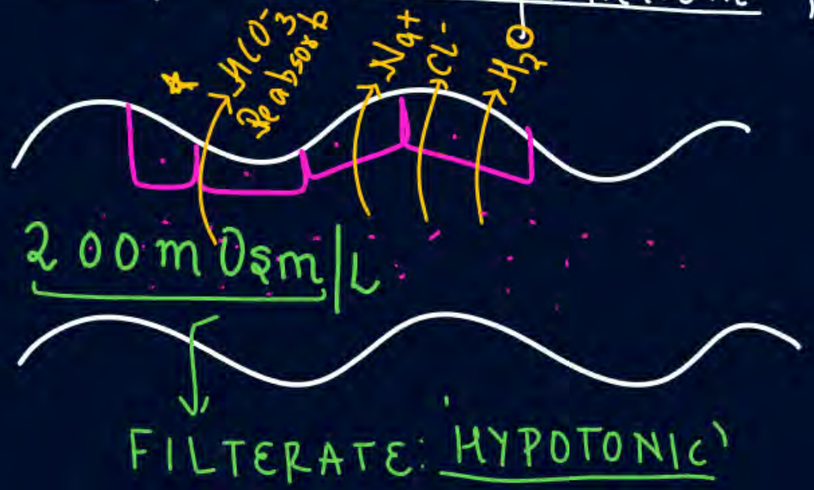
Note LOH → Descending: Permiable for H_2O, nearly impermiable for electrolyte (FILTERATE: HYPERTONIC)

→ Ascending: Permeable only for Electrolyte (FILTERATE: HYPOTONIC)

→ ☆ Minimum reabsorption

• Max. Osmolarity: 200mOsm/L at the base of 'Hairpin' (U)

③ DCT: 'Simple Cuboidal epithelium', '☆☆ CONDITIONAL REABSORPTION'



↓

depending upon the requirement of Body reabsorption occurs under the influence of certain hormone.

2 Hormones (CONDITIONAL REABSORPTION)

i) ADH (Anti-Diuretic-Hormone) / Vasopressin

- Hypothalamic hormone, stored in posterior pituitary
- Acts on 'Latter part of tubules' (DCT & CD)

↓

H_2O reabsorption

↓

Prevent

DIURESIS

(loss of H_2O via Urine)

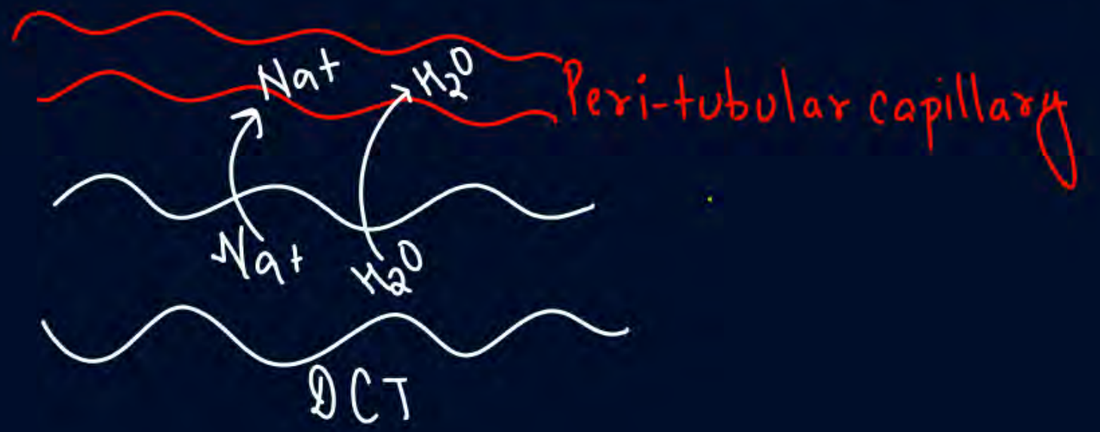
(ii) Aldosterone (mineralocorticoid)

- Hormone of 'Adrenal Cortex'

↓

reabsorption of (Mineral: Na^+)

- Absorbs 'Na^+' & indirectly H_2O
- Acts on 'Distal part of Tubule' (DCT)



Note If ADH deficiency: H_2O ~~reabsorb from DCT~~

↓

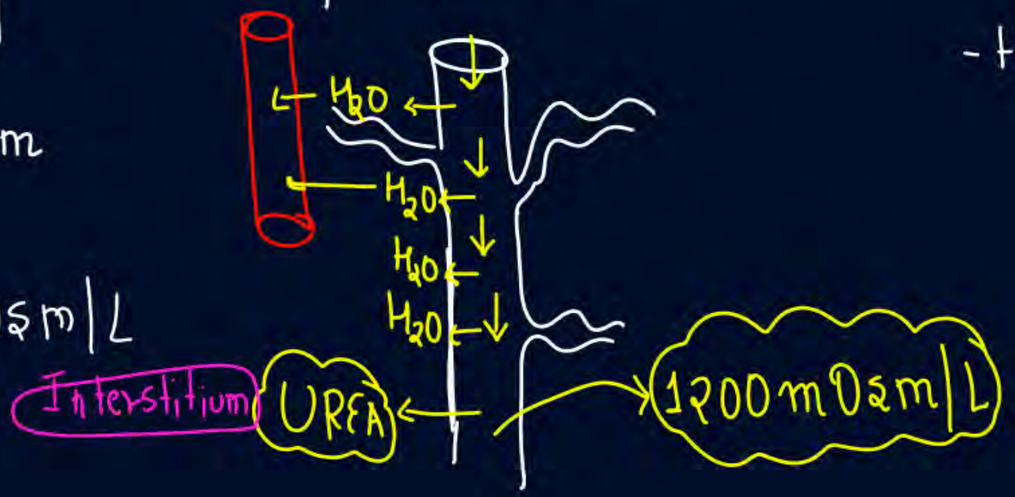
Excess loss of H_2O via URINE (Diuresis)

↓

Diabetes incipidus

④ Collecting Duct: Large amount of H_2O & some of Urea reabsorbed

- Simple cuboidal epithelium
- Initial Filterate = 300 mOsm/L
- Final Urine (Collecting Duct) = 1200 mOsm/L



- Human produces nearly '4 times' concentra -ted Urine

m

The amount of the filtrate formed by the kidneys per minute is called **glomerular filtration rate** (GFR). GFR in a healthy individual is approximately 125 ml/minute, i.e., 180 litres per day !

The kidneys have built-in mechanisms for the regulation of glomerular filtration rate. One such efficient mechanism is carried out by juxta glomerular apparatus (JGA). JGA is a special sensitive region formed by cellular modifications in the distal convoluted tubule and the afferent arteriole at the location of their contact. A fall in GFR can activate the JG cells to release renin which can stimulate the glomerular blood flow and thereby the GFR back to normal.

A comparison of the volume of the filtrate formed per day (180 litres per day) with that of the urine released (1.5 litres), suggest that nearly 99 per cent of the filtrate has to be reabsorbed by the renal tubules. This process is called **reabsorption**. The tubular epithelial cells in different segments of nephron perform this either by active or passive mechanisms. For example, substances like glucose, amino acids, Na^+, etc., in the filtrate are reabsorbed actively whereas the nitrogenous wastes are absorbed by passive transport. Reabsorption of water also occurs passively in the initial segments of the nephron (Figure 16.5).

During urine formation, the tubular cells secrete substances like H^+, K^+ and ammonia into the filtrate. Tubular secretion is also an important step in urine formation as it helps in the maintenance of ionic and acid base balance of body fluids.

16.3 Function of the Tubules

Proximal Convoluted Tubule (PCT): PCT is lined by simple cuboidal brush border epithelium which increases the surface area for reabsorption. Nearly all of the essential nutrients, and 70-80 per cent of electrolytes and water are reabsorbed by this segment. PCT also helps to maintain the pH and ionic balance of the body fluids by selective secretion of hydrogen ions and ammonia into the filtrate and by absorption of HCO_3^- from it.

Henle's Loop: Reabsorption is minimum in its ascending limb. However, this region plays a significant role in the maintenance of high osmolarity of medullary interstitial fluid. The descending limb of loop of Henle is permeable to water but almost impermeable to electrolytes. This concentrates the filtrate as it moves down. The ascending limb is impermeable to water but allows transport of electrolytes actively or passively. Therefore, as the concentrated filtrate pass upward, it gets diluted due to the passage of electrolytes to the medullary fluid.

Distal Convoluted Tubule (DCT): Conditional reabsorption of Na^+ and water takes place in this segment. DCT is also capable of reabsorption of HCO_3^- and selective secretion of hydrogen and potassium ions and NH_3 to maintain the pH and sodium-potassium balance in blood.

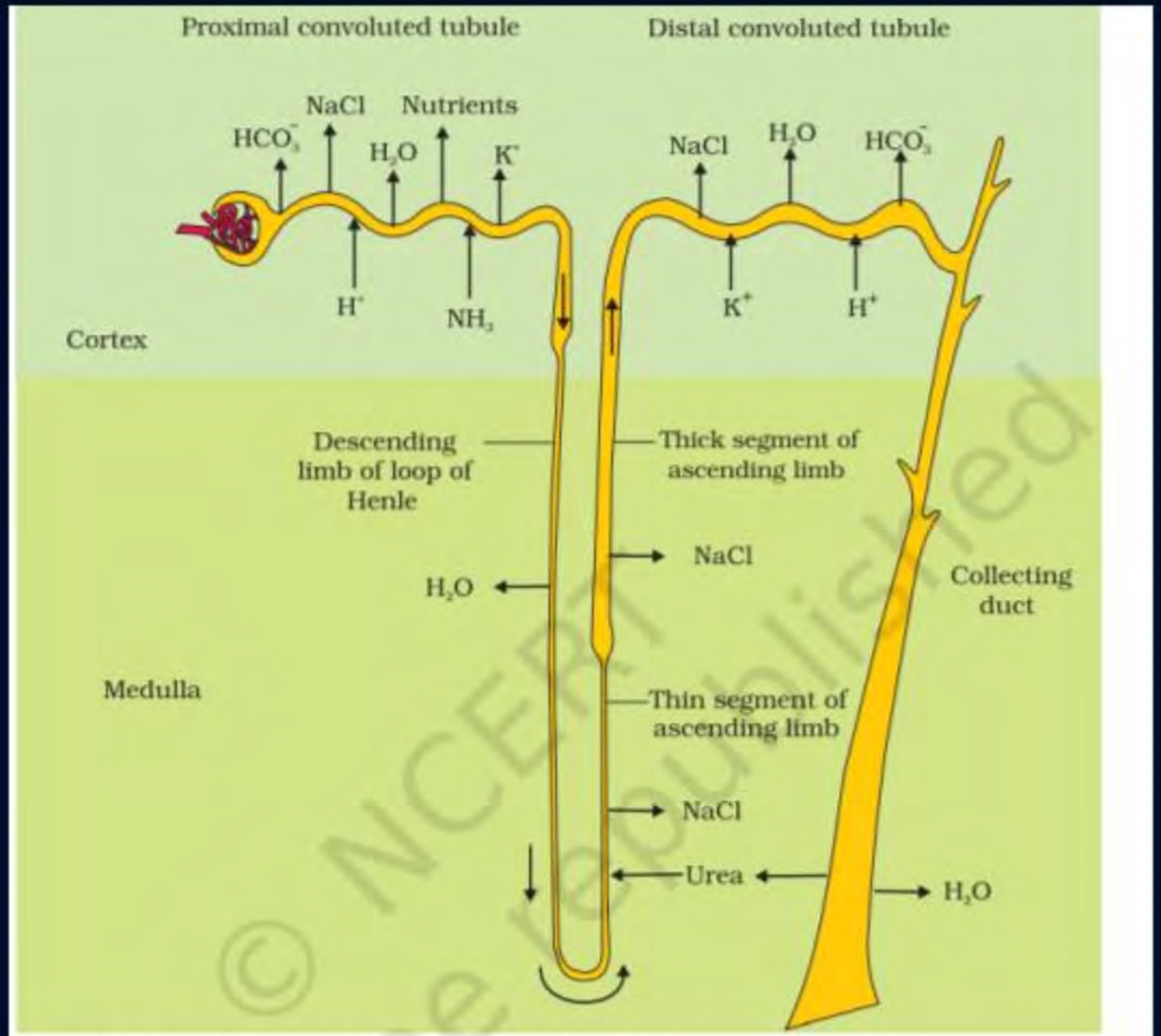


Figure 16.5 Reabsorption and secretion of major substances at different parts of the nephron (Arrows indicate direction of movement of materials.)

Collecting Duct: This long duct extends from the cortex of the kidney to the inner parts of the medulla. Large amounts of water could be reabsorbed from this region to produce a concentrated urine. This segment allows passage of small amounts of urea into the medullary interstitium to keep up the osmolarity. It also plays a role in the maintenance of pH and ionic balance of blood by the selective secretion of H^+ and K^+ ions (Figure 16.5).

Part of Nephron = Not a part of Nephron'

(Many DCTs open in single CD)

Summary: Renal tubule
↳ BC, PCT, LOH, DCT

DCT → CD

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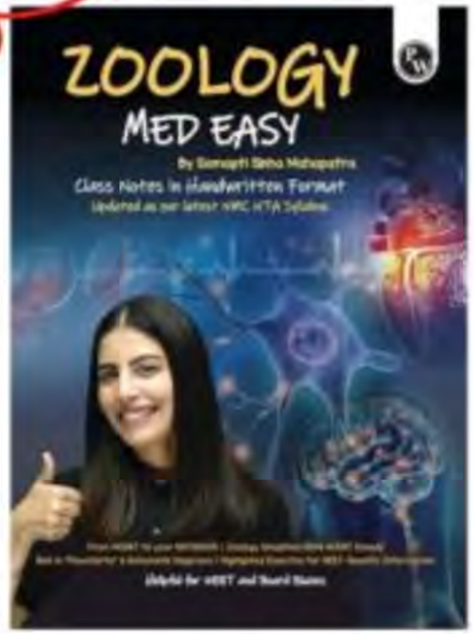

Homework

- REVISE CLAASNOTES / ZOOLOGY MED EASY

THANK YOU