Loop of Henle

Nephron = Glomerulus + Bowman's Capsule + PCT + LOH + DCT

Renal corpuscle

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T.R = Tubular reabsorption
T.S = Tubular secretion

Loop of Henle

- Descending limb
- Ascending limb

↑ Osmolality
⇓
- ↑ Na^+, Cl^- (solutes)
- ↓ H_2O

⇓
hypertonic

* H_2O is pulled due to high Na^+, Cl^- in medullary interstitium

- ↓ Na^+, Cl^- (solutes)
- ↓ H_2O

⇓
hypotonic
⇓
↓ osmolality

DL of LOH ⇒ impermeable to solutes
∴ only movement of water occurs

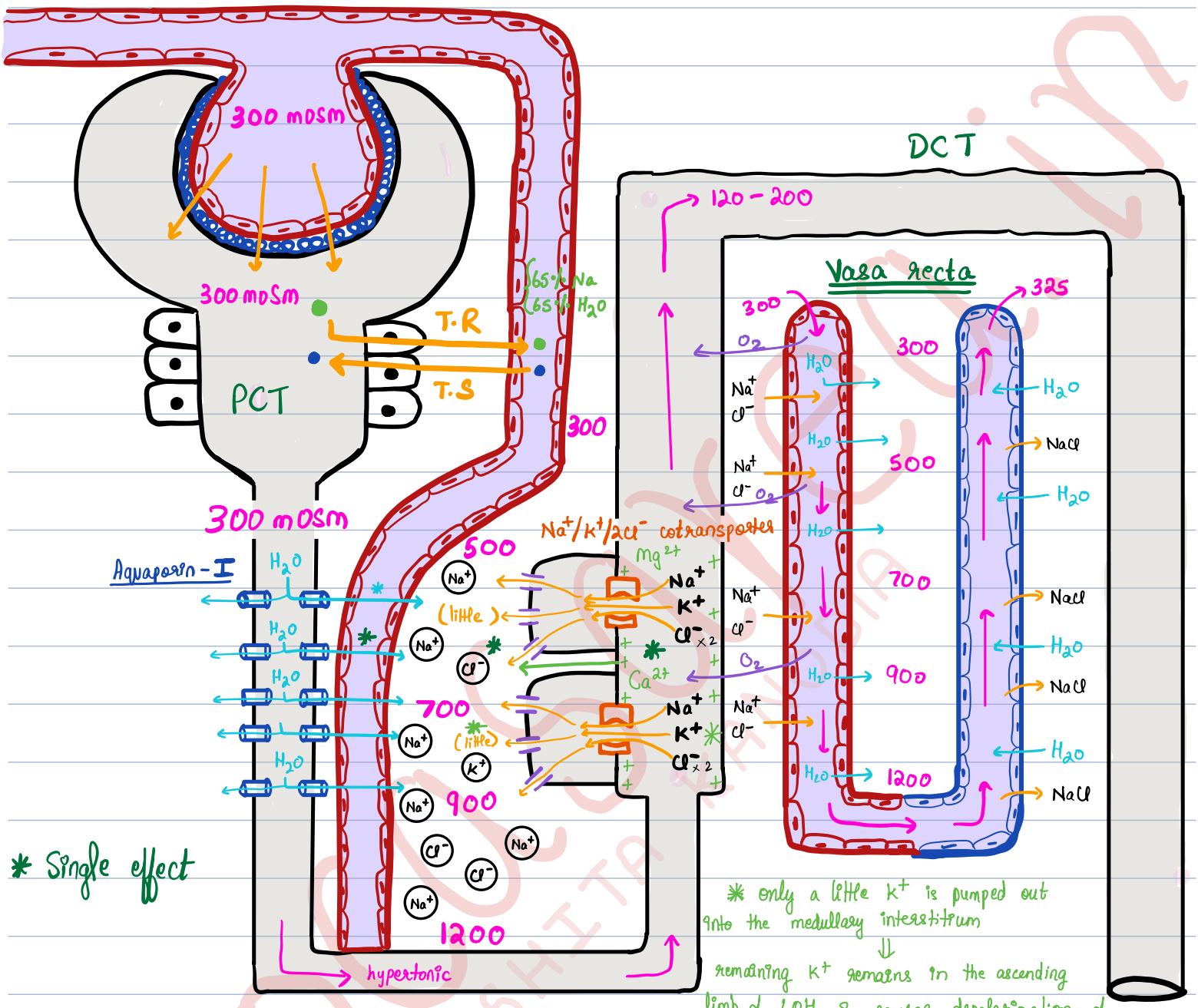
AL of LOH ⇒ impermeable to water
∴ only movement of solutes

- Na^+, Cl^- (solutes) = H_2O

⇓
isotonic

Descend Limb of LOH	Ascending Limb of LOH
• H_2O permeable	• H_2O impermeable
• solute impermeable	• Solute permeable
• Aquaporin - I ⇒ allows water to move out into medullary interstitium	• $Na^+/k^+/2Cl^-$ cotransporter ⇒ pumping Na^+, k^+, $2Cl^-$ out into the medullary interstitium

Countercurrent multiplier



* Single effect

* only a little K^+ is pumped out into the medullary interstitium
⇓
remaining K^+ remains in the ascending limb of LOH & causes depolarization of the membrane (along with Ca^{2+}, Mg^{2+})
⇓
Ca^{2+}, Mg^{2+} is repelled by K^+ depolarization leading to escape of Ca^{2+}, Mg^{2+} via paracellular pathway into the medullary interstitium

Countercurrent multiplier: process of using energy to generate an osmotic gradient which enables to reabsorb water from tubular fluid & produce concentrated urine.
(in LOH)
↓
Absorbed water is returned to circulation via vasa recta
→ ∵ blood flow through capillaries is very slow ∴ any solutes that are reabsorbed into circulation have time to diffuse back into interstitial fluid which maintains the concentration gradient in the medullary interstitium
↳ countercurrent exchange (in vasa recta)

Vasa recta - peritubular capillaries ⇒ branch of efferent arteriole