

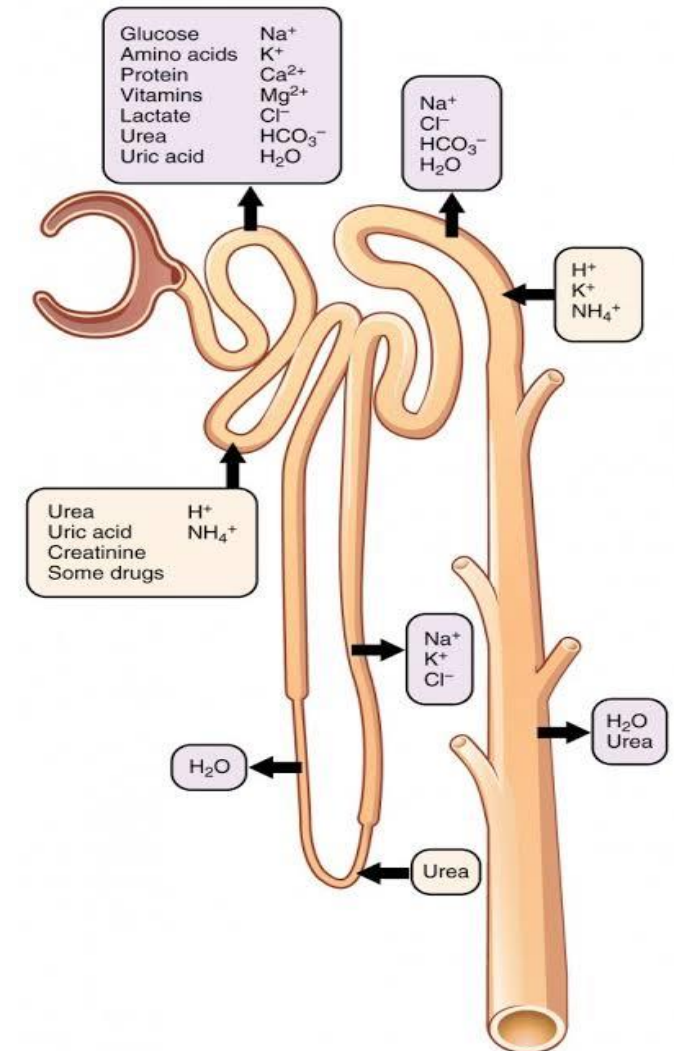
Physiology of Excretion

Tubular Reabsorption

- Filtered fluids contain nutrients, electrolytes etc.
- Glomerular filtration produces greater quantities filtered fluids/day than these materials present in entire body
- Essential materials must be returned back to the body
- Transfer of substances from tubular lumen to peritubular capillaries

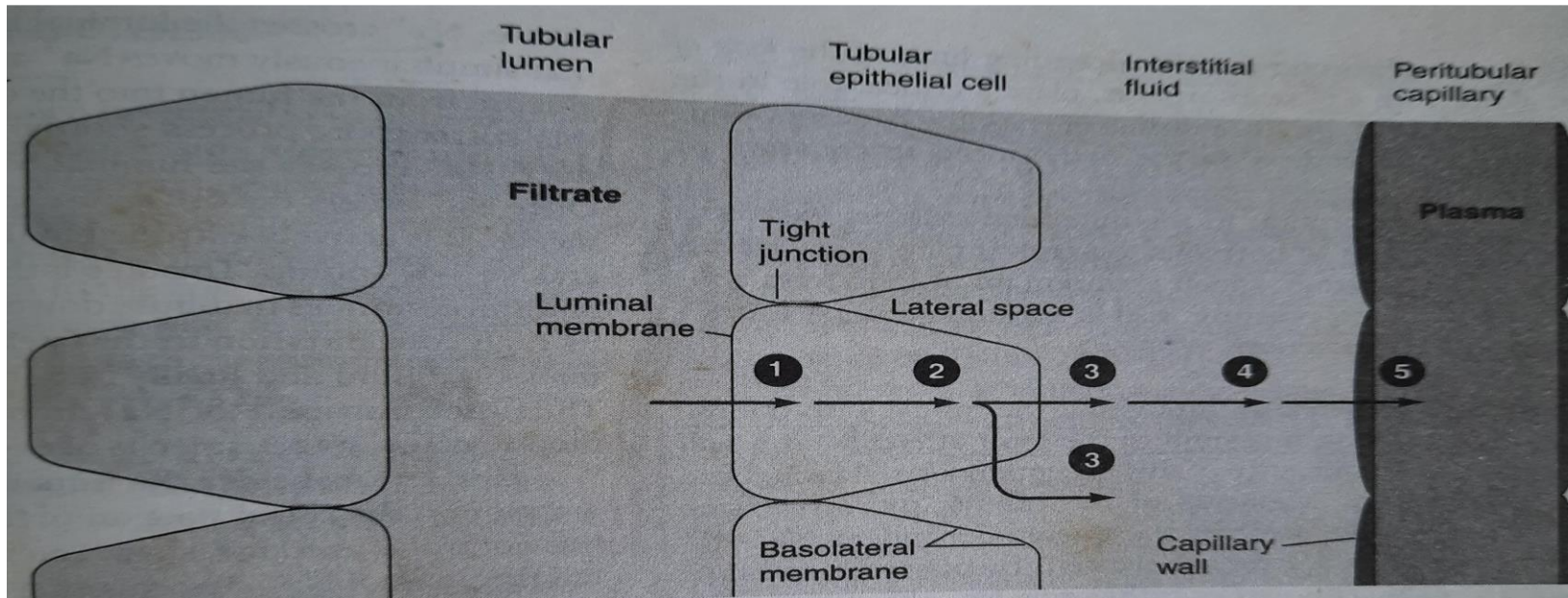
Fate of various substances filtered by the Kidney

SUBSTANCE	AVERAGE PERCENTAGE OF FILTERED SUBSTANCE REABSORBED	AVERAGE PERCENTAGE OF FILTERED SUBSTANCE EXCRETED
Water	99	1
Sodium	99.5	0.5
Glucose	100	0
Urea (a waste product)	50	50
Phenol (a waste product)	0	100



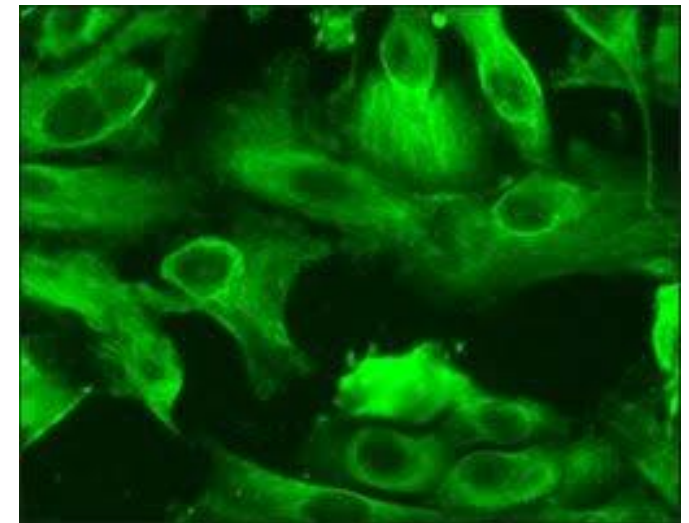
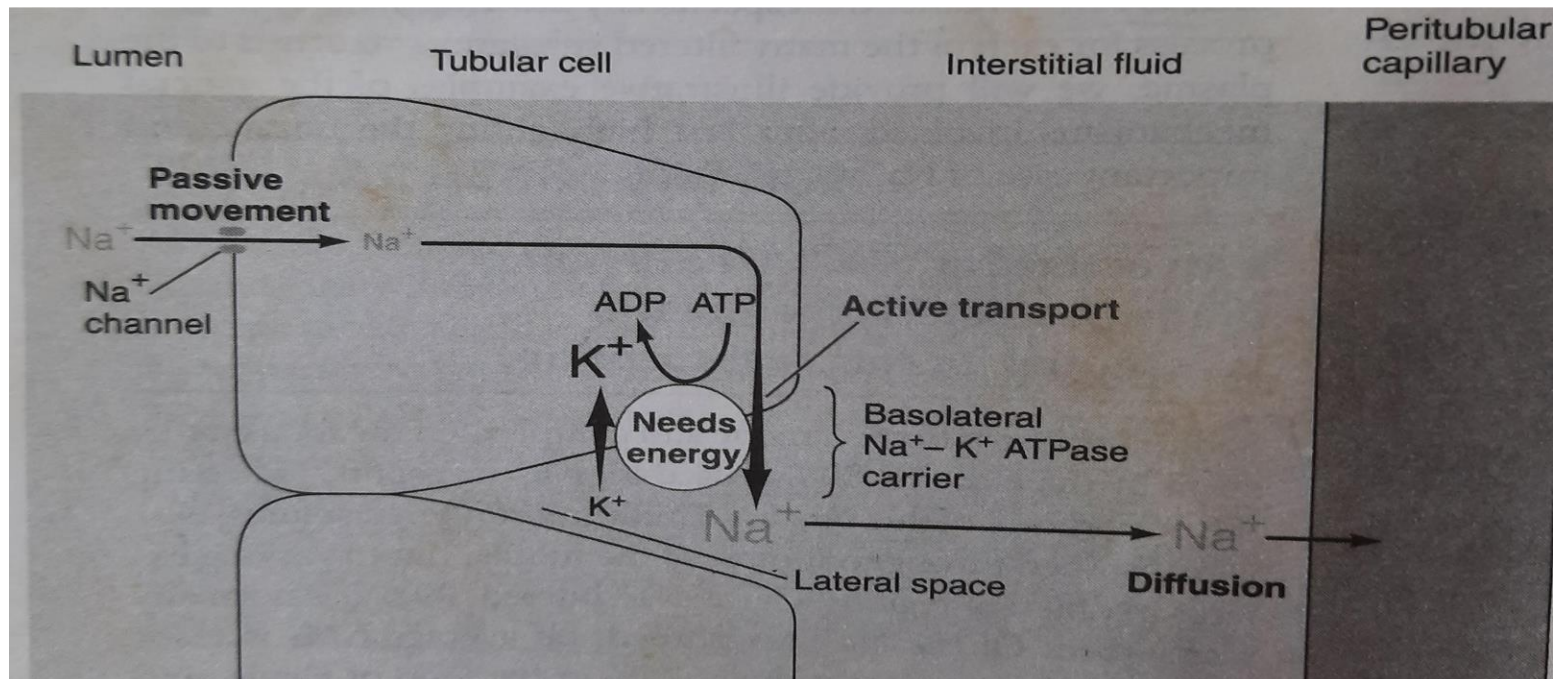
Steps in Transepithelial Transport

- Cross luminal membrane of tubular cells
- Must move one side to other within tubular cells
- Cross basolateral membrane of tubular cells
- Diffuse through interstitial fluids
- Penetrate the capillary wall to enter blood plasma



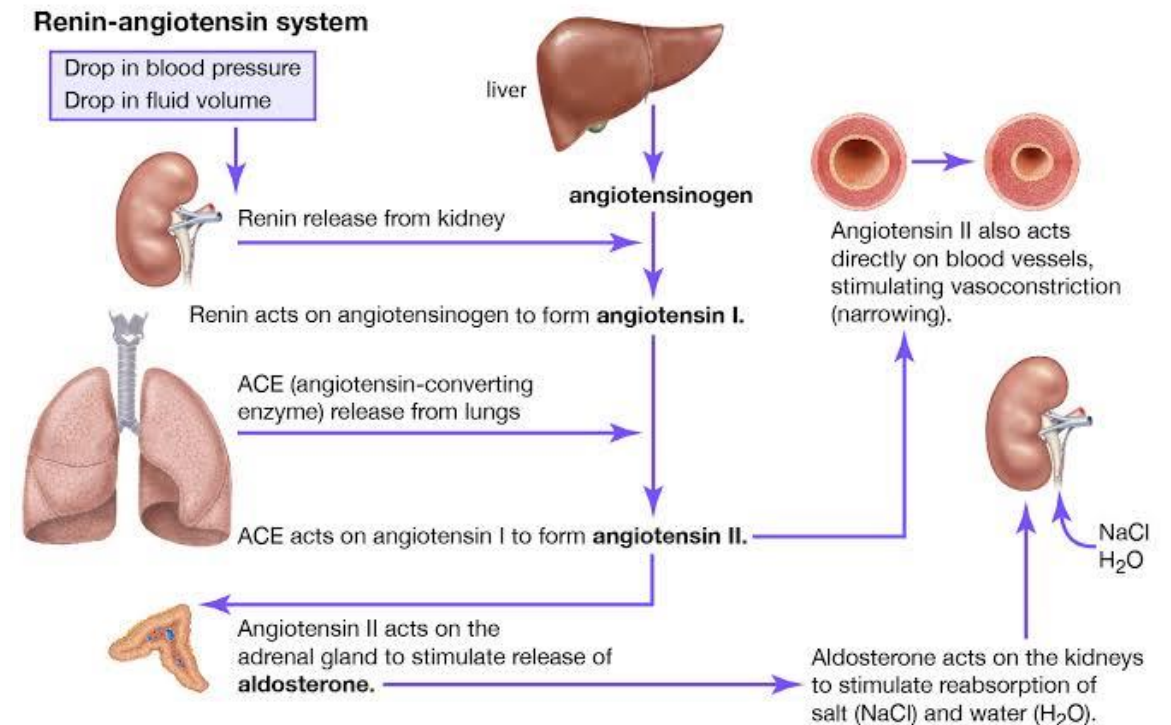
Sodium Reabsorption

- 80% energy spent by kidney
- 67% in Proximal tubule (with glucose, amino acids, water, Cl, urea); 25% in Loop of Henle (with Cl); 8% in distal tubule & collecting duct (hormonal control)
- No reabsorption in descending limb of Loop of Henle

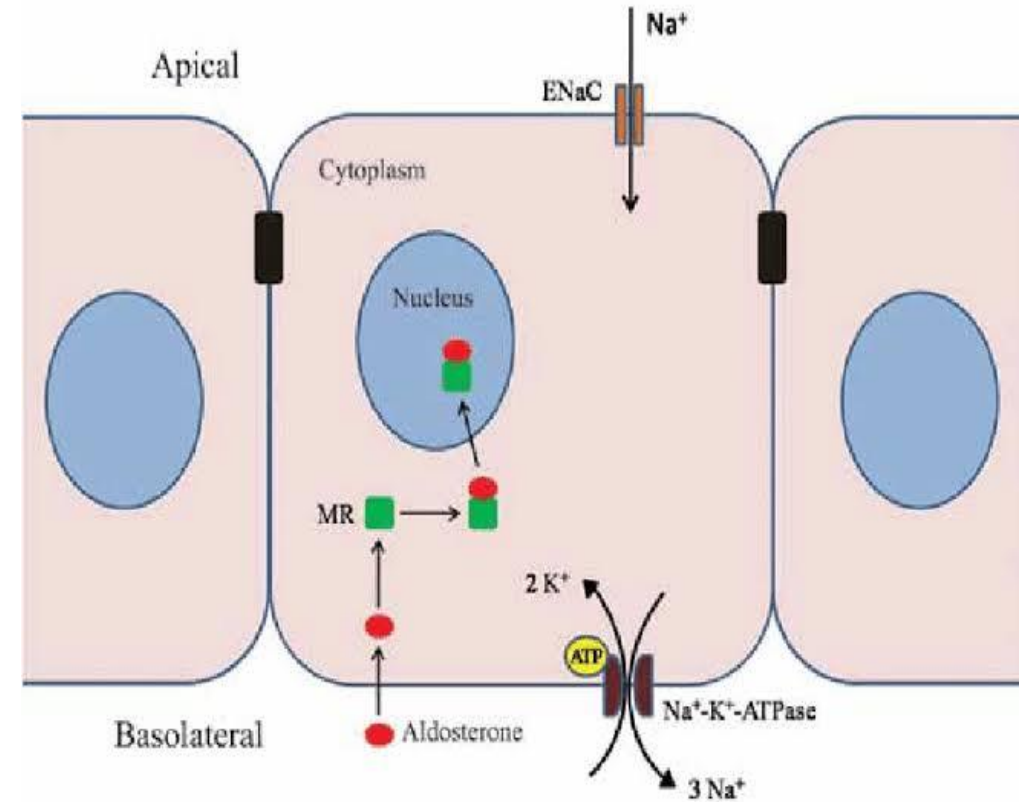
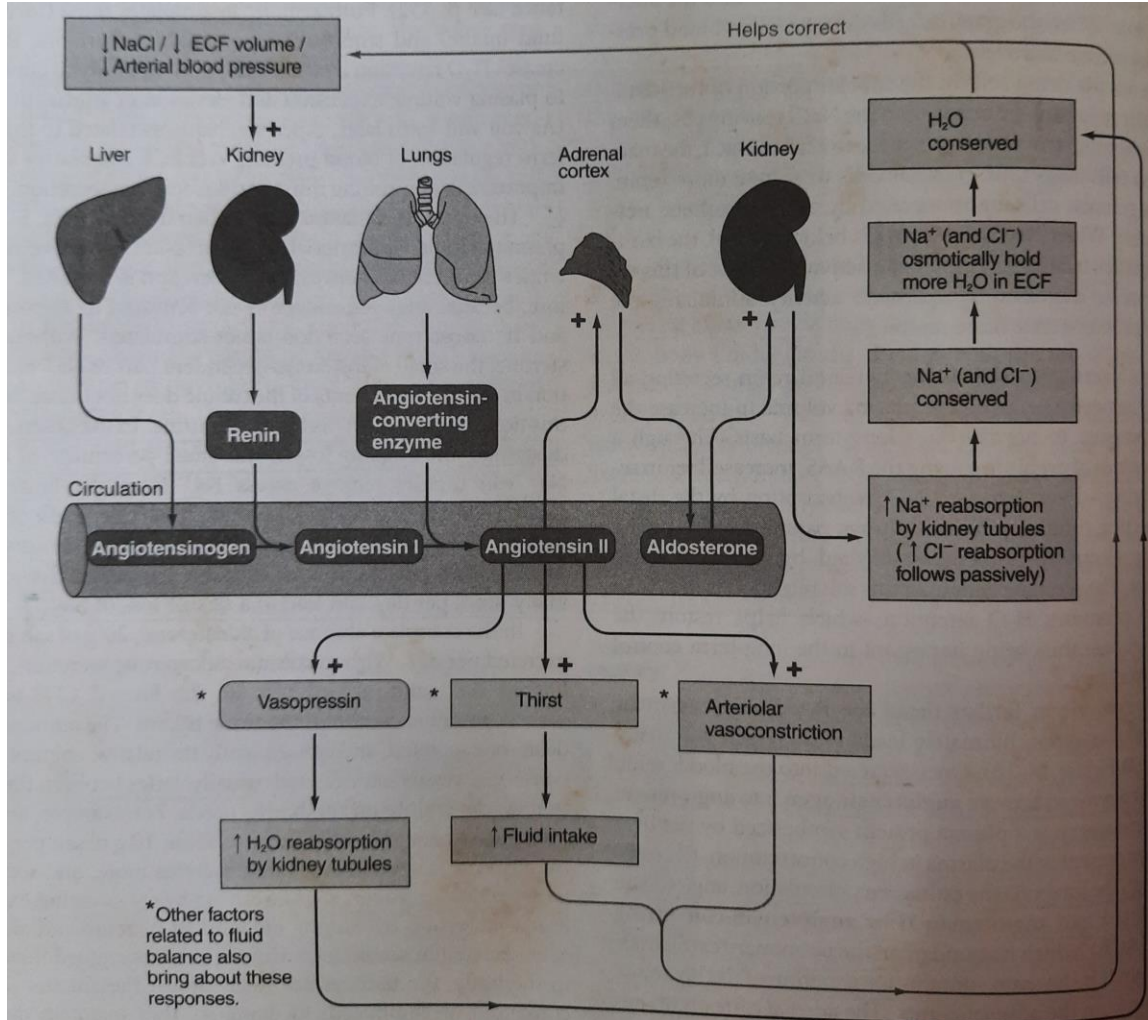


Renin Angiotensin Aldosterone system

- Na load & ECF volume; blood pressure
- Granular cell (internal baroreceptor); Macula densa (sensitive to NaCl); Granular cells are innervated by sympathetic nervous system
- Granular cells secrete Renin

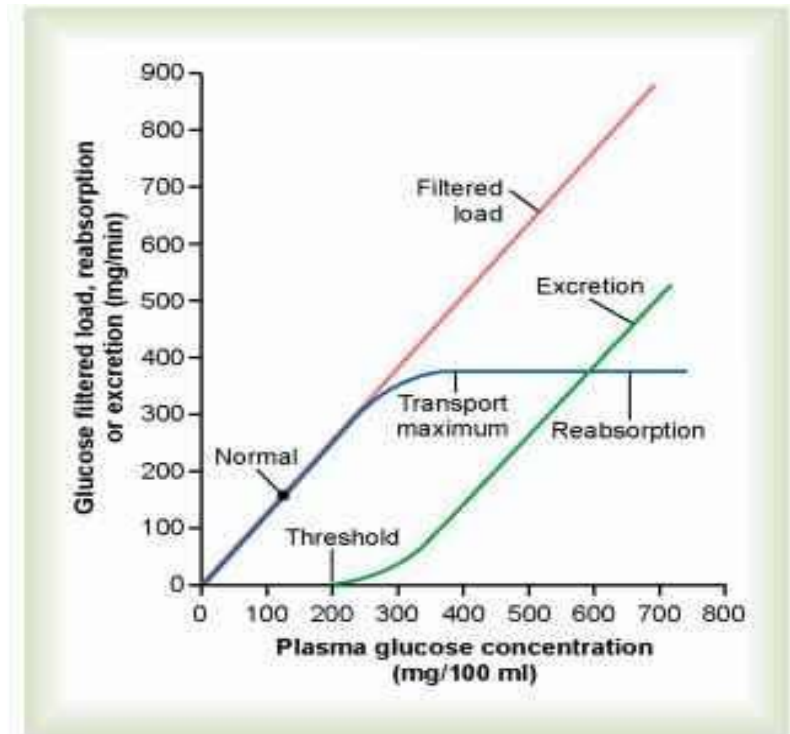


Functions of RAAS



Secondary active transport of Glucose

- Free ride for glucose or amino acids
- Basolateral Na-K pump drives this cotransport system & pulls the organic molecules against concentration gradient
- Tubular maximum or T_m for glucose
- Filtered load of glucose (125mg/min)
- Renal Threshold for glucose

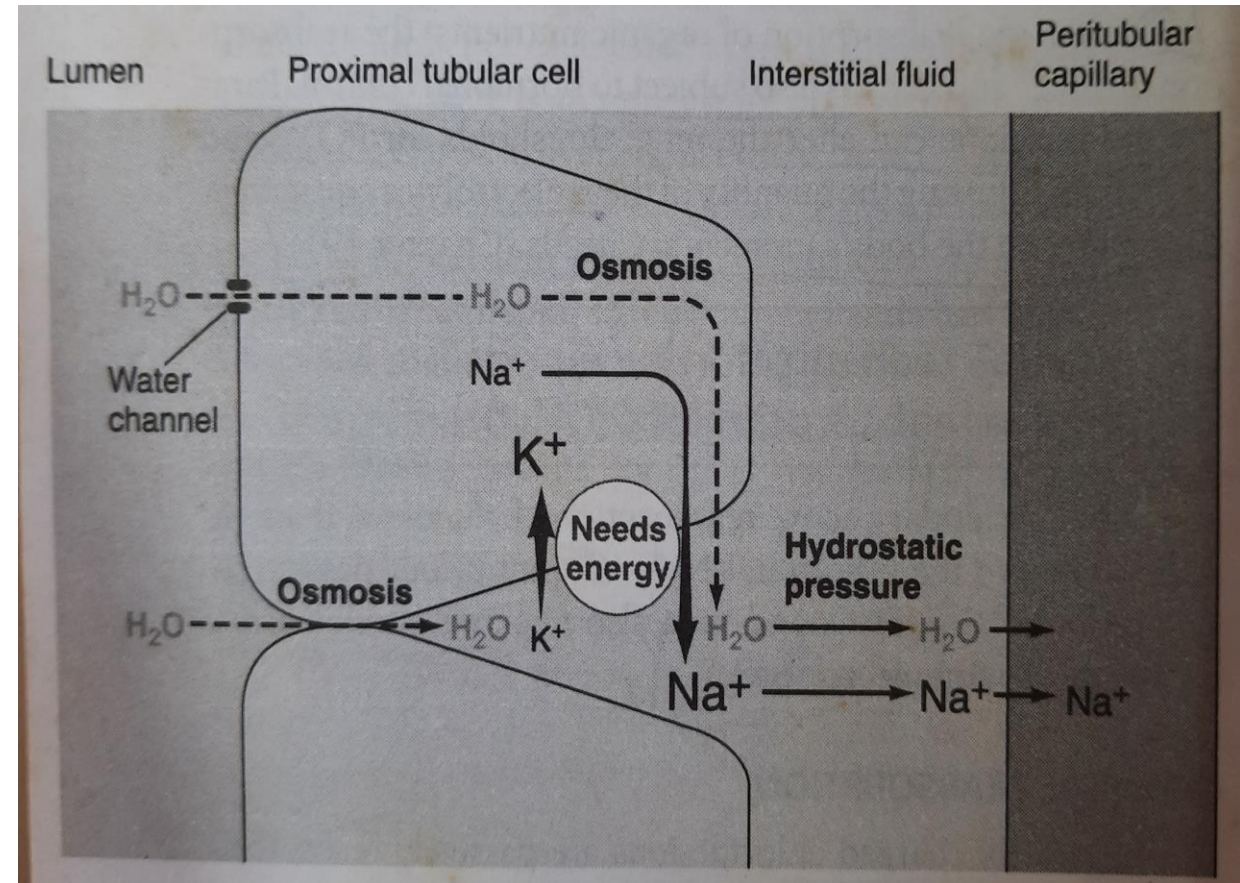
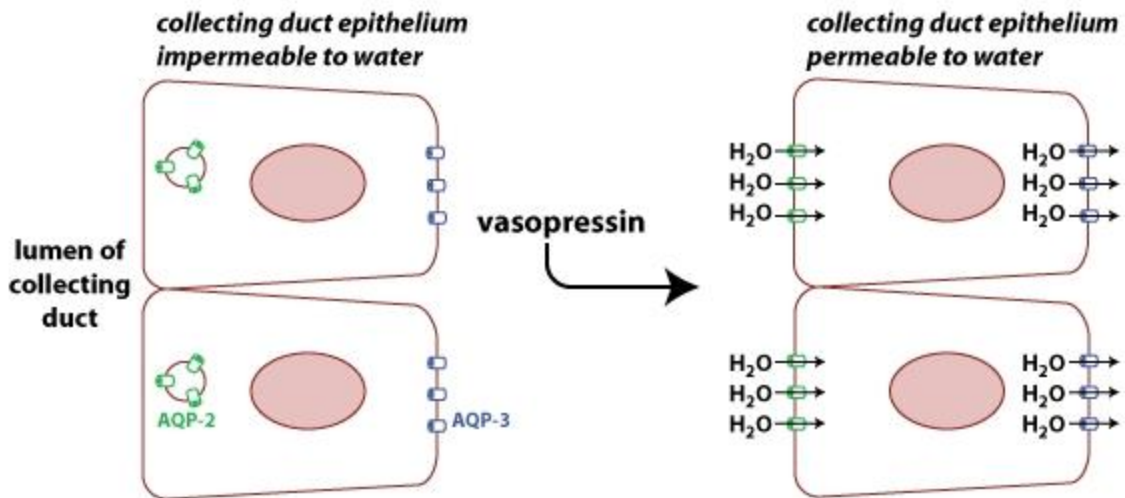


Phosphate, calcium & chloride reabsorption

- Renal Threshold for phosphate & calcium are equal their plasma concentrations
- Transport carriers at proximal tubules
- Parathyroid hormone can alter the thresholds
- Chloride ions passively reabsorbed by active reabsorption process of sodium

Water Reabsorption

- 65% in proximal tubules; 15% in loop of Henle; 20% in distal tubules
- Aquaporins are always open in proximal tubules
- Vasopressin controls in distal part
- Pull & Push concept of reabsorption



Urea Reabsorption

Extensive reabsorption of water in proximal tubules gradually reduces initial 125ml/min of filtrate into 44ml/min of fluid at terminal part of proximal tubule

- Progressive increment of Urea concentration inside tubules lumen
- Concentration gradient forms between lumen and adjacent capillaries
- Passive reabsorption of urea

