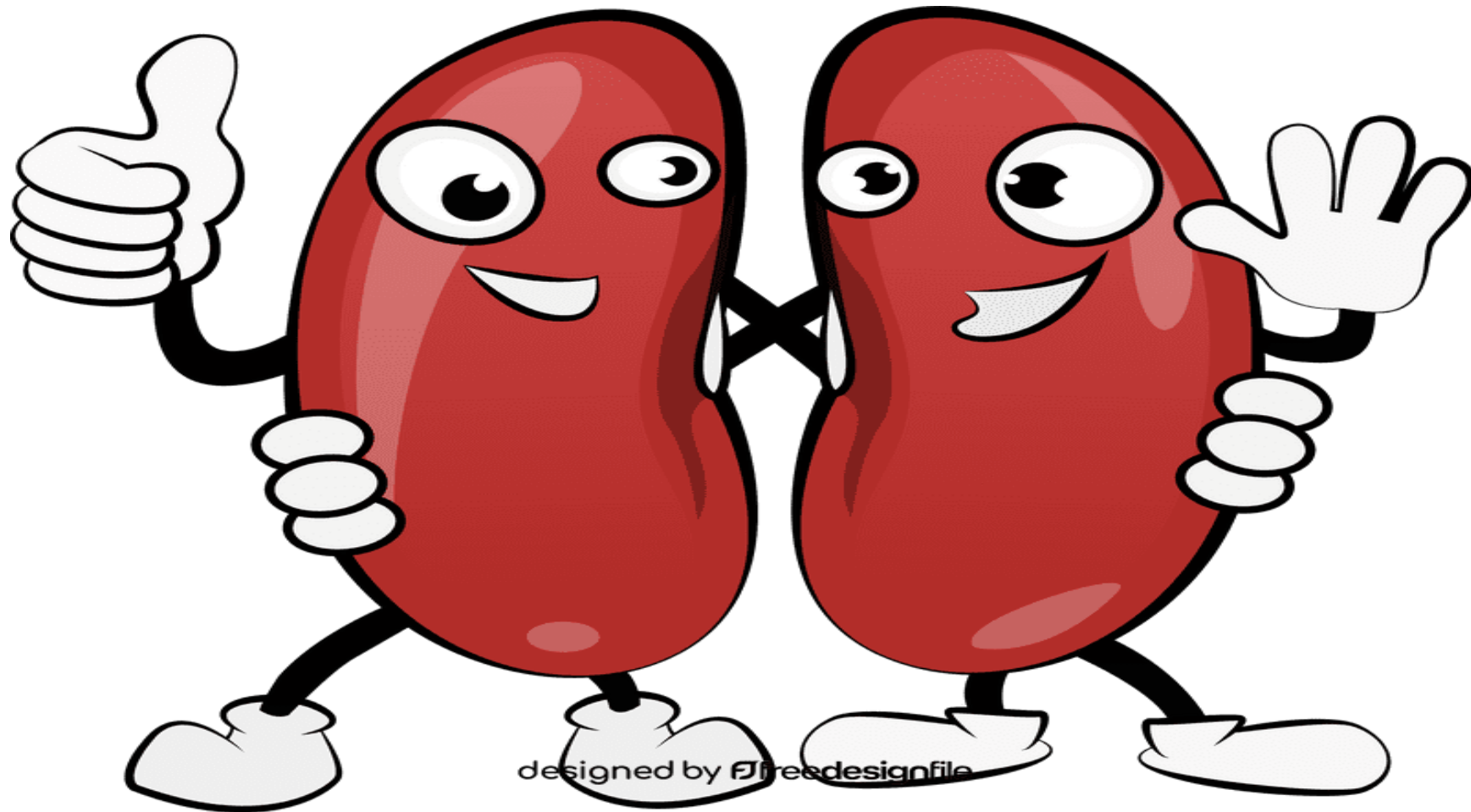
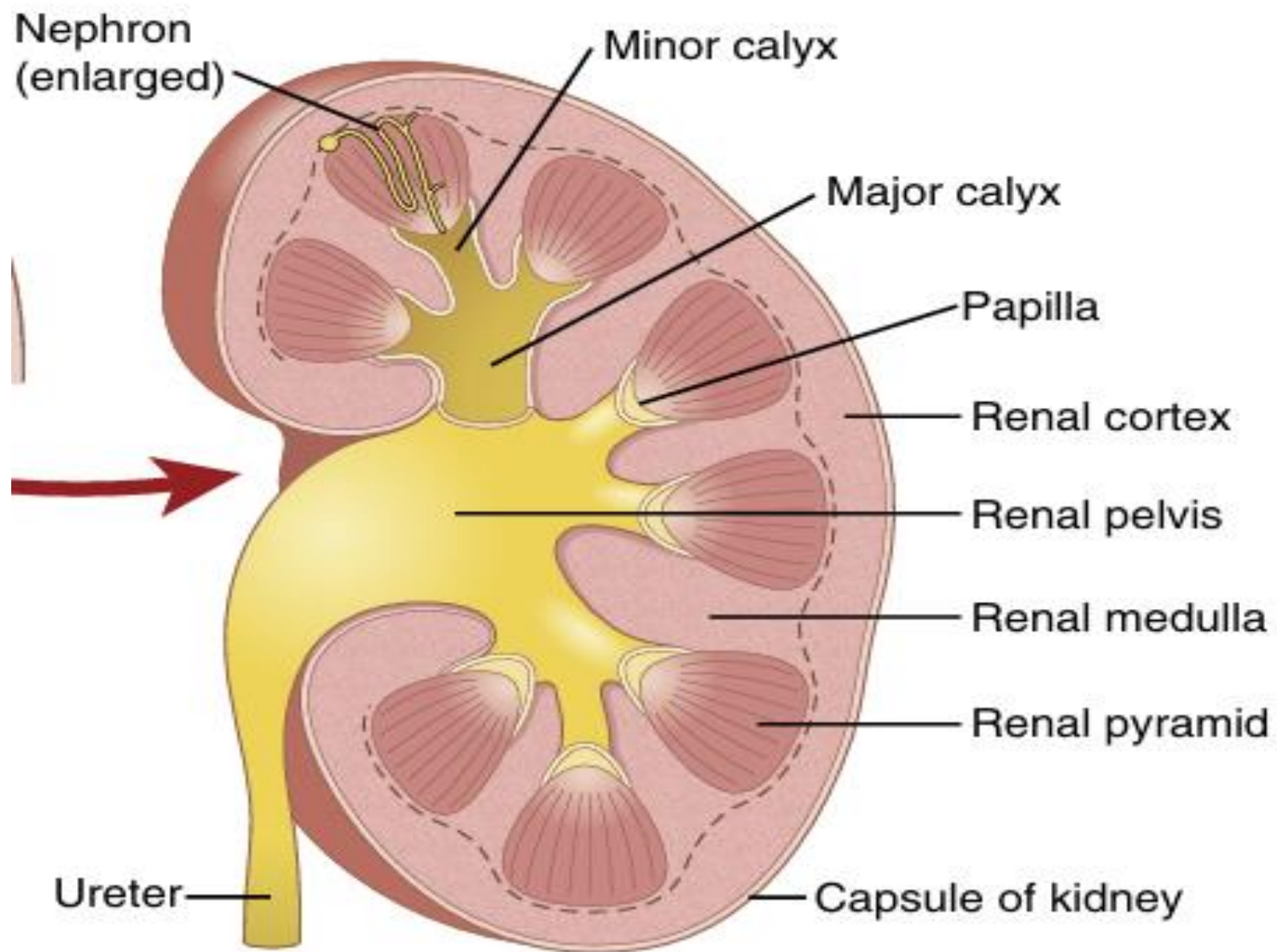
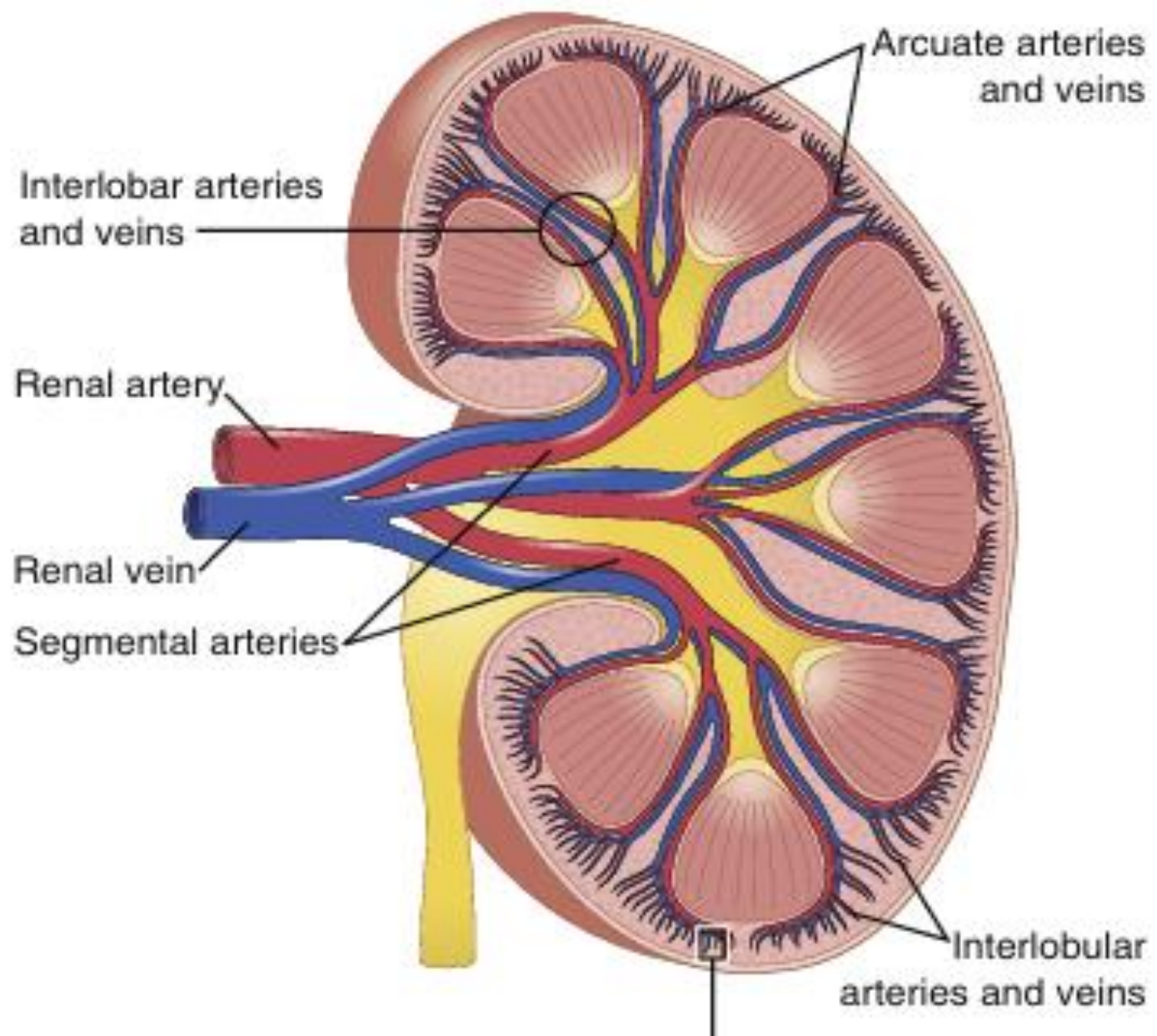
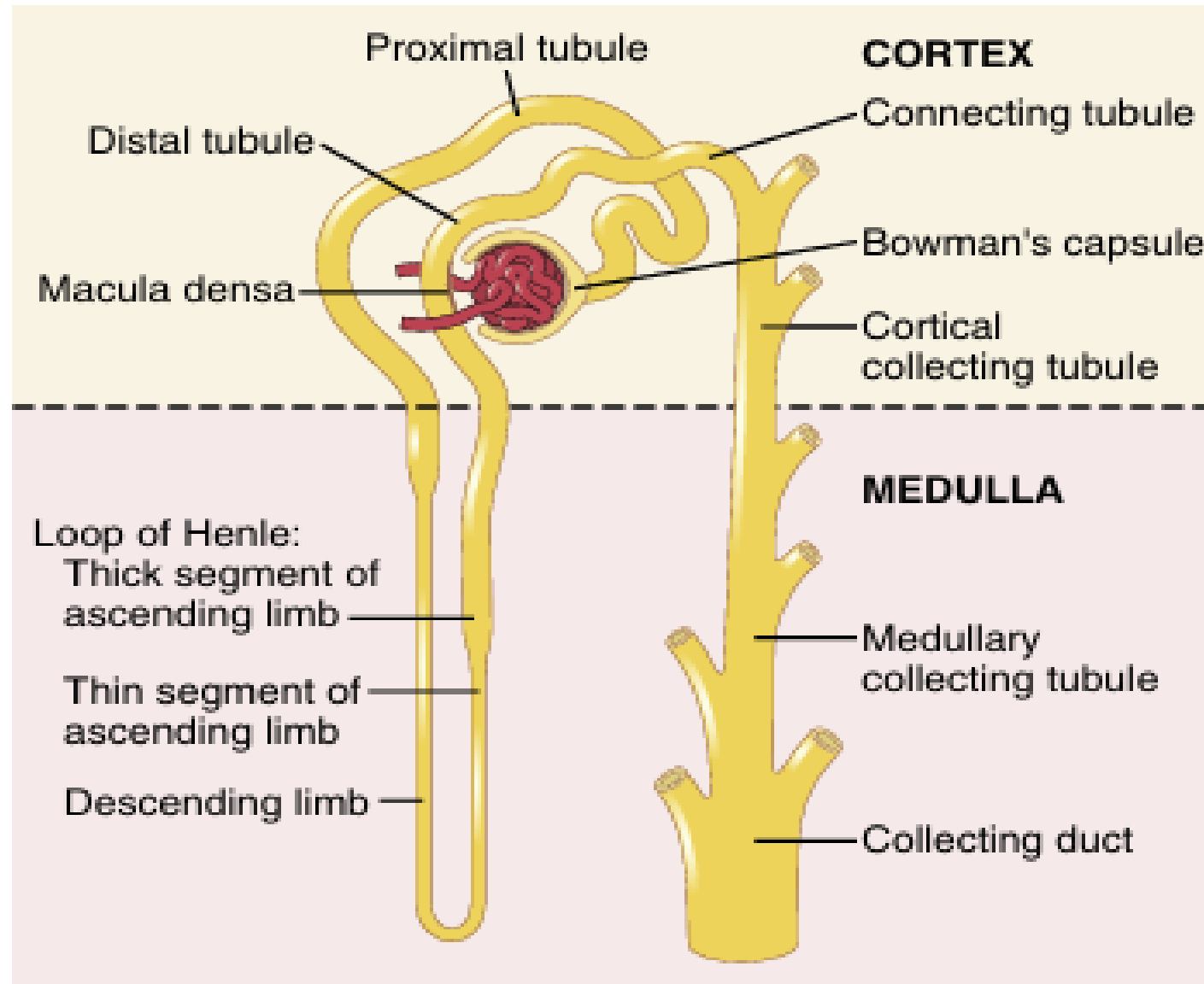


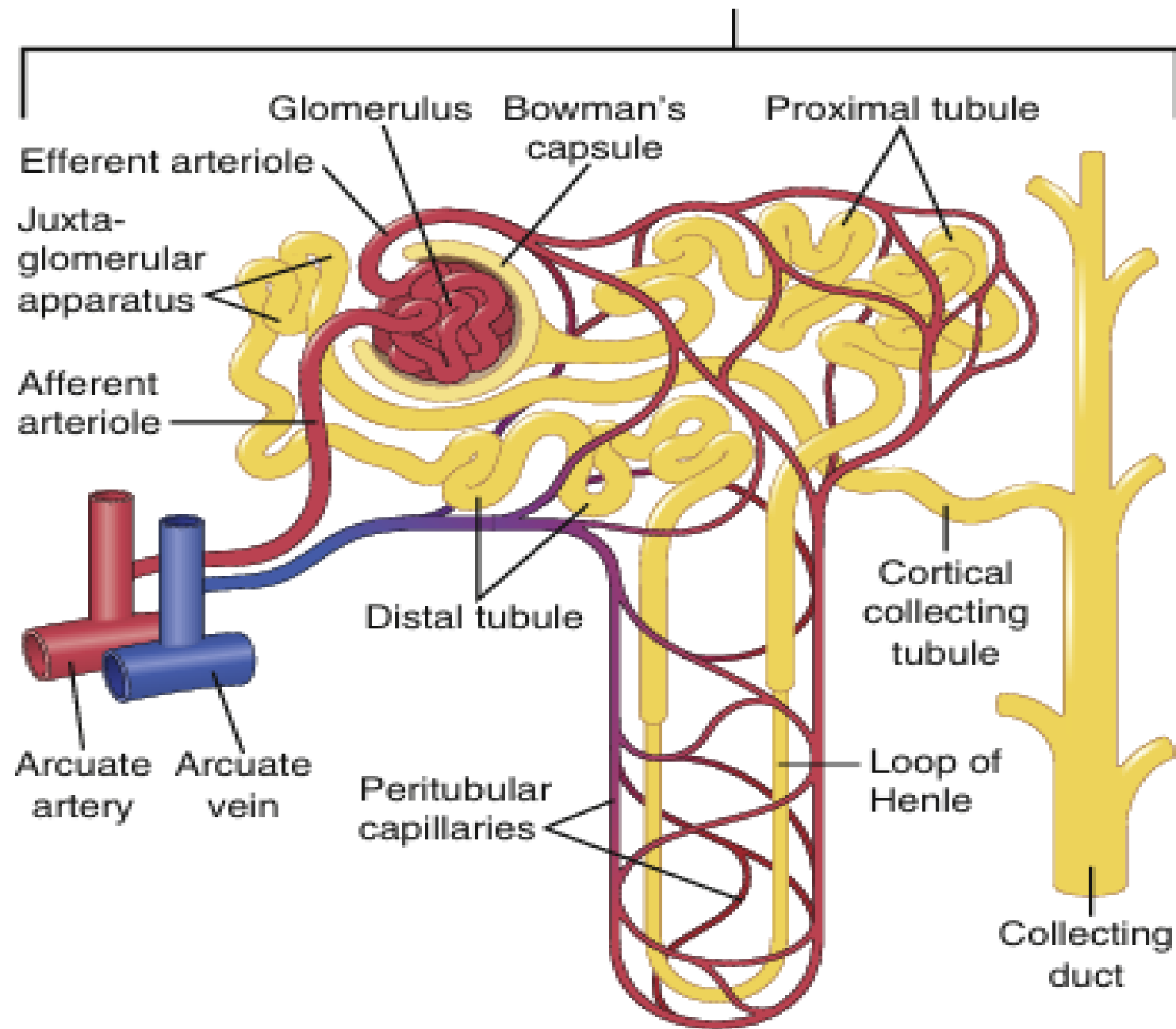
Renal Physiology

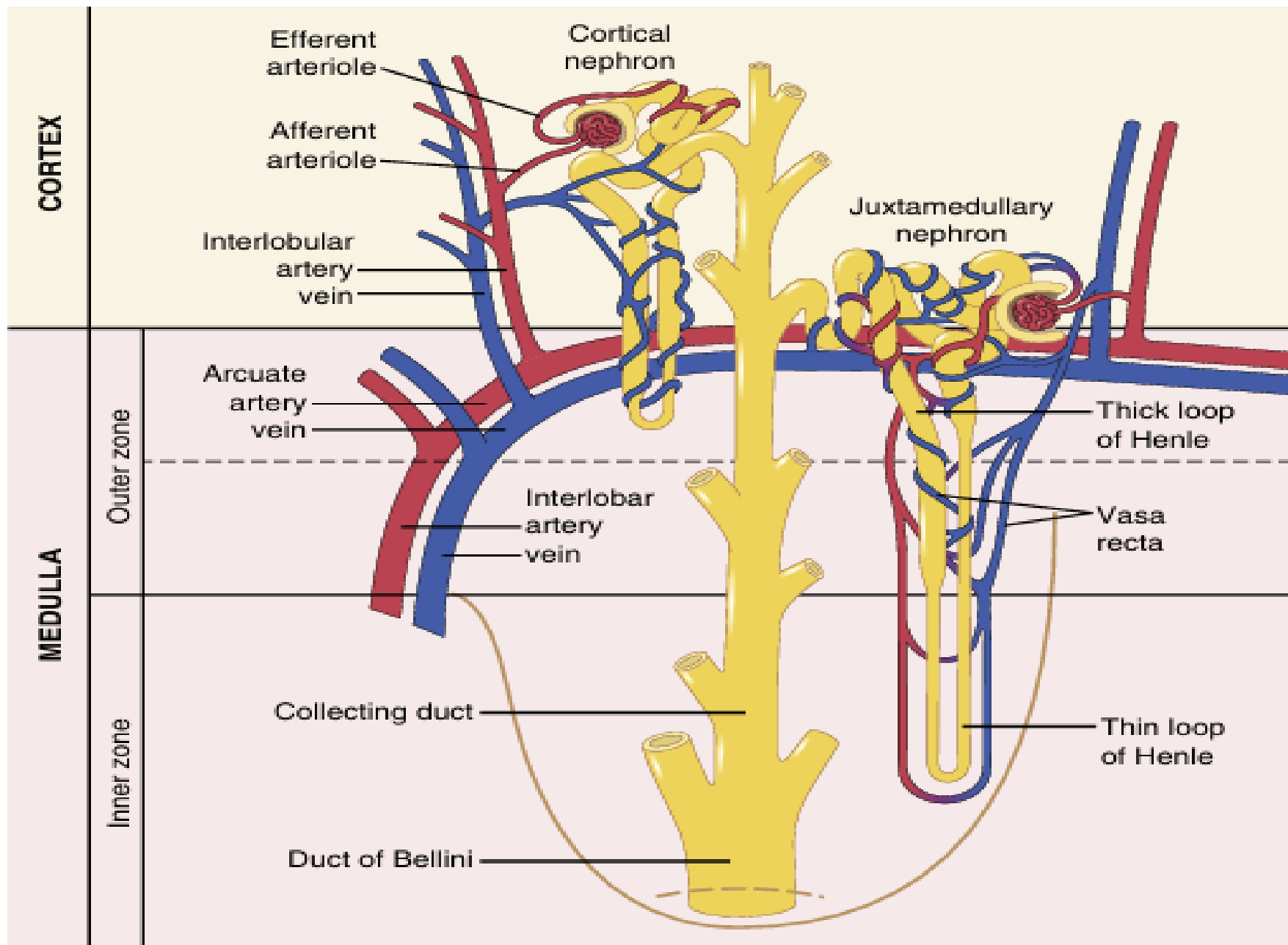








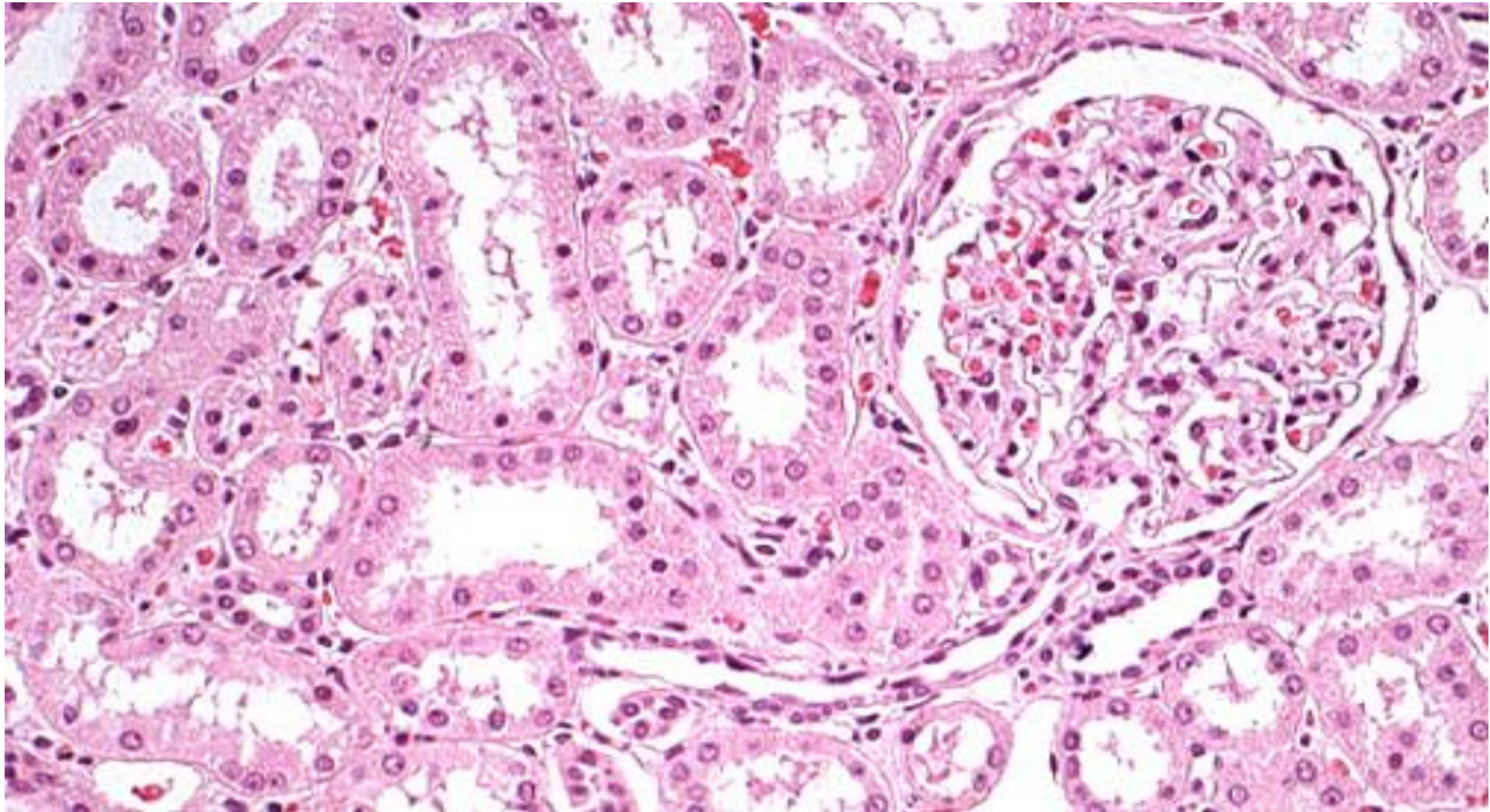




Multiple Functions of the Kidneys

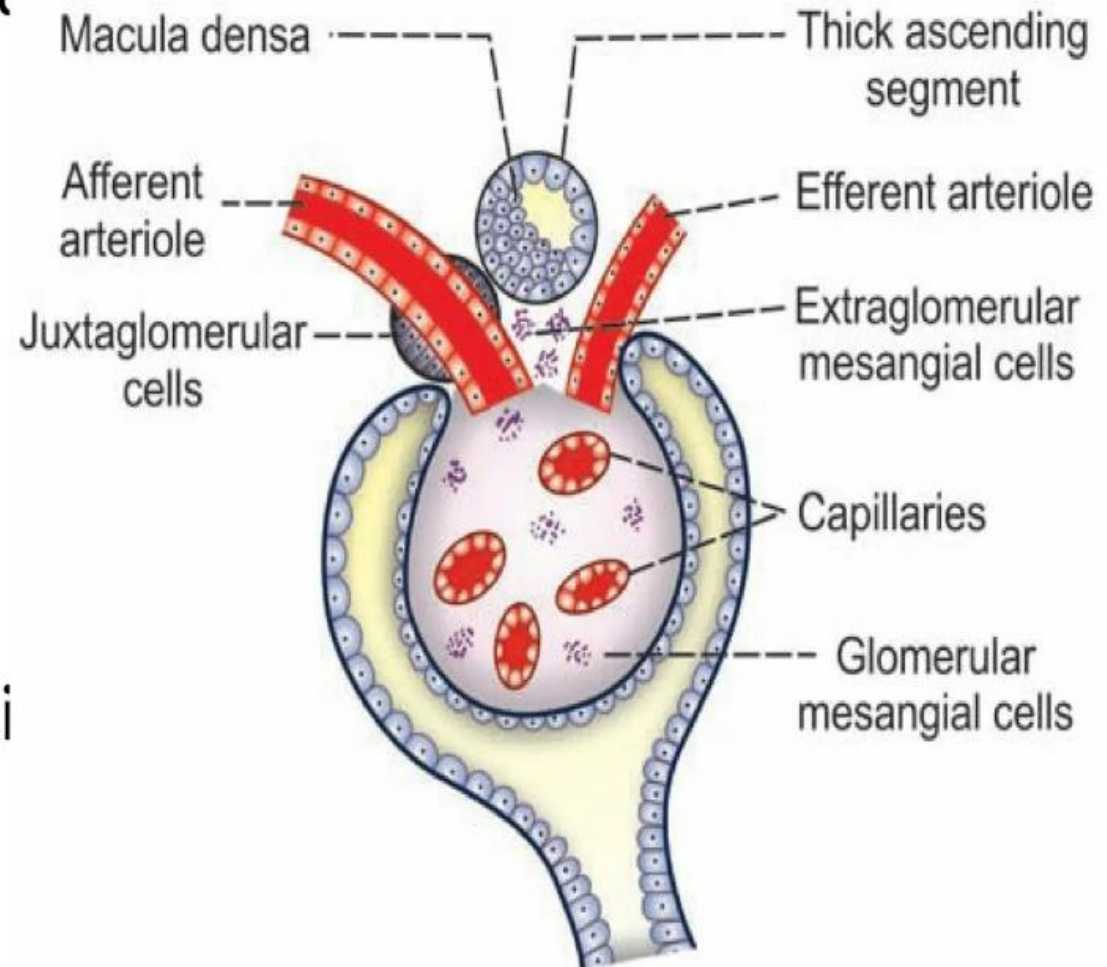
- 1- Excretion of metabolic waste products, foreign chemicals, drugs and hormone metabolites*
- 2- Regulation of water and electrolyte balances*
- 3- Regulation of arterial pressure*
- 4- Regulation of body fluid osmolality*
- 5- Regulation of acid-base balance*
- 6- Regulation of erythrocyte production*
- 7- Gluconeogenesis*
- 8- Regulation of vitamin D3 production*

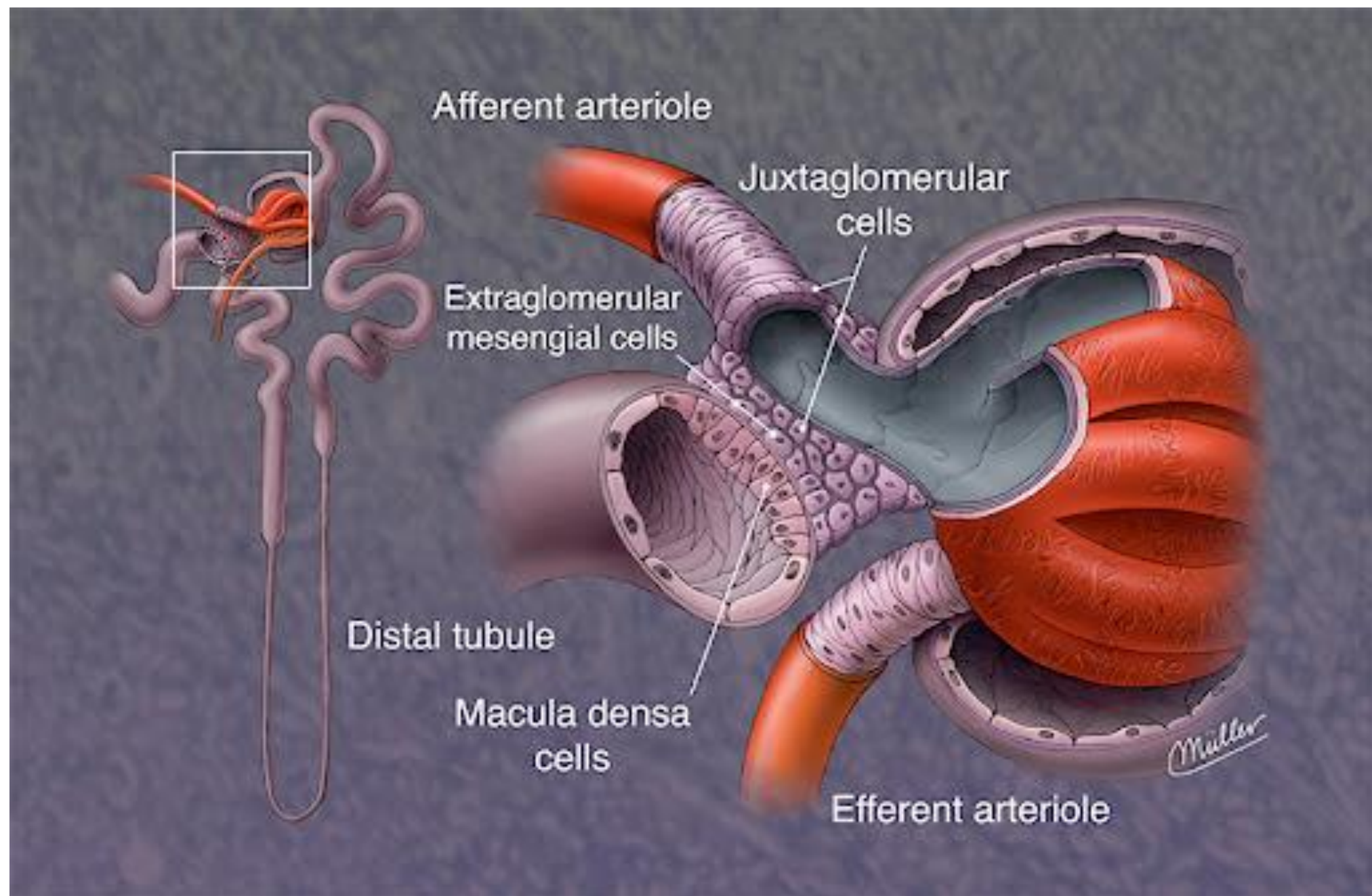
JuxtaGlomerular Apparatus(JGA)

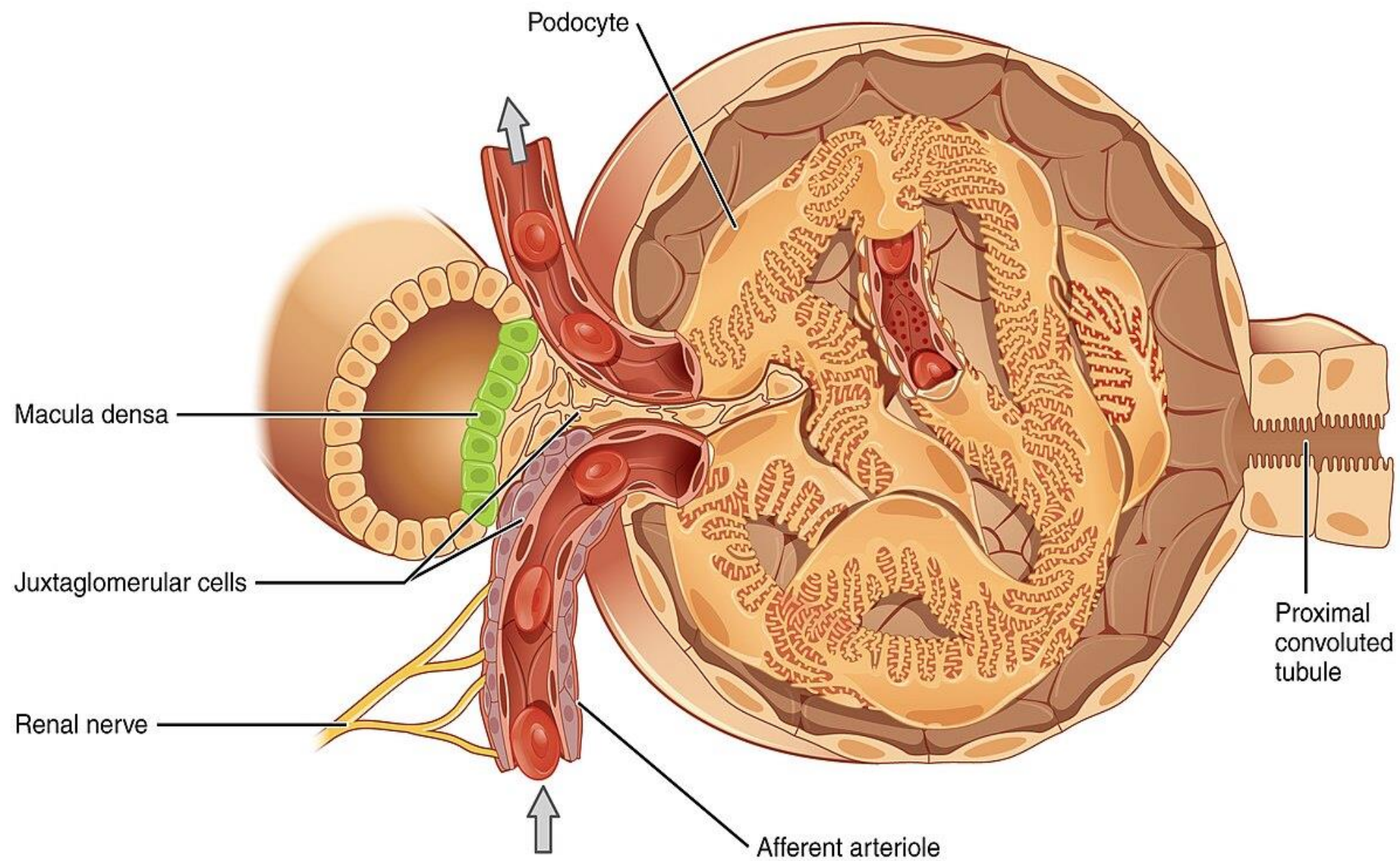


JUXTAGLOMERULAR APPARATUS

- Juxtaglomerular apparatus is a specialized organ situated near the glomerulus of each nephron (juxta =near).
- **Formed by;**
 1. Macula densa
 2. Extraglomerular mesangial cells
 3. Juxtaglomerular cells.







(a)

Filtration, Reabsorption, Secretion



GFR

- **Glomerular filtration rate (GFR)** *is defined as the volume of fluid filtered from the kidney's glomerular capillaries into the Bowman capsule per unit time, influenced by hydrostatic and colloid osmotic forces, membrane permeability, and surface area*

Renal Autoregulation

- ***Autoregulation** is a fundamental component of renal function. It integrates intrinsic intrarenal mechanisms that stabilize **RBF** and glomerular filtration rate (**GFR**) during changes in renal perfusion pressure (**RPP**) over a defined range*

Myogenic mechanism

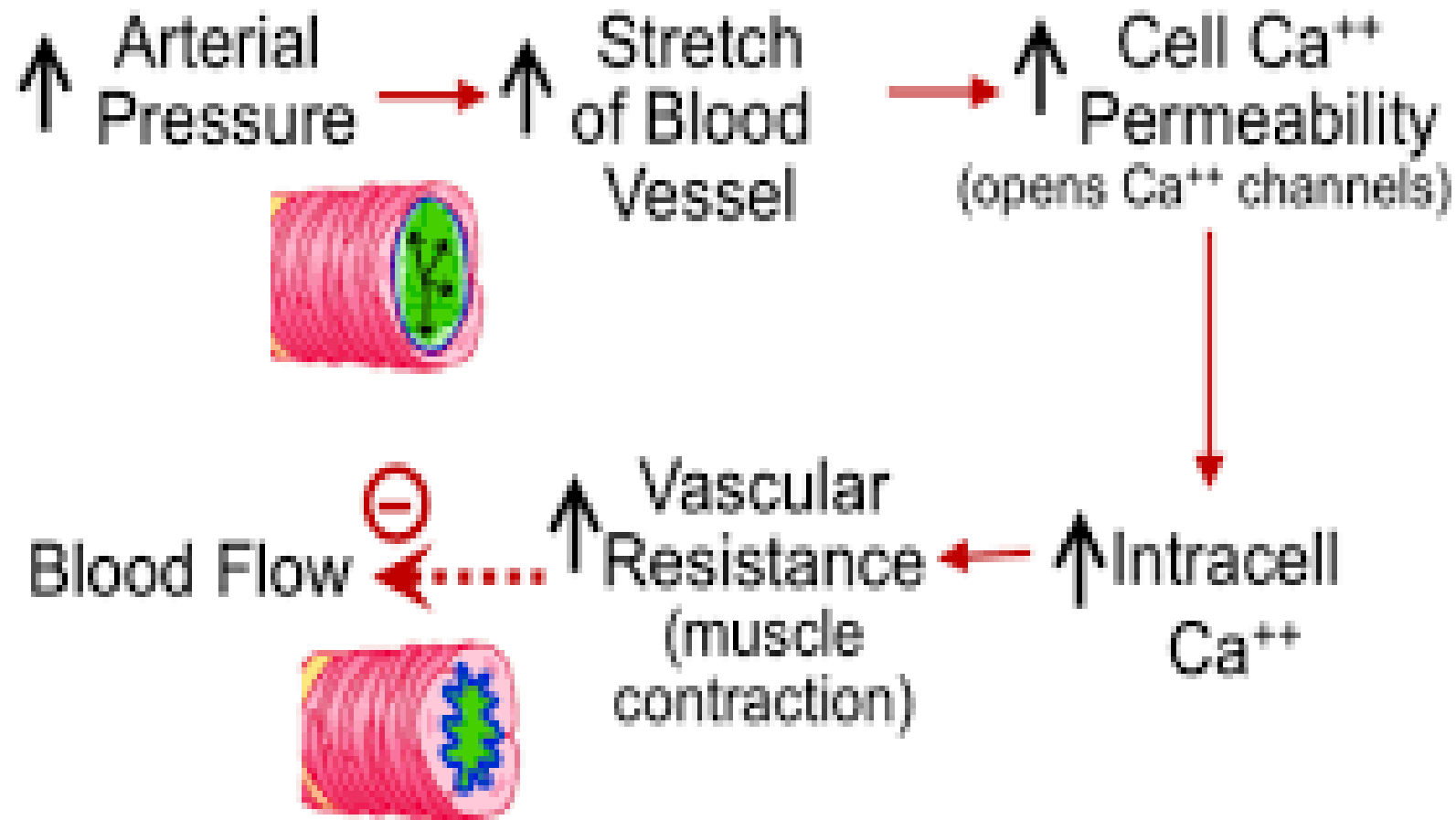
Mechanism of autoregulation, cont.....

Myogenic mechanism:

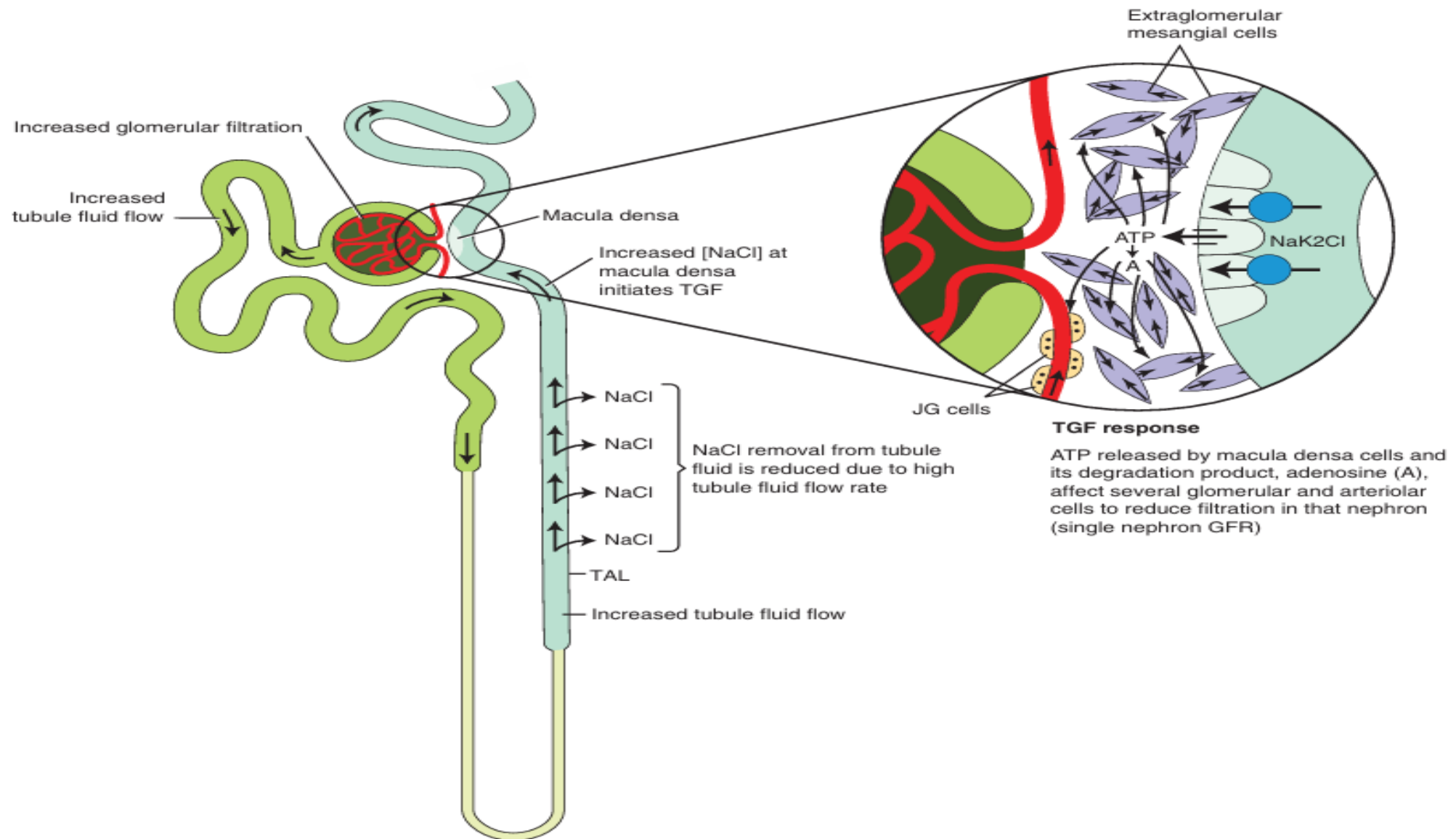
It is the intrinsic capability of blood vessels to constrict when blood pressure is increased. The constriction prevents excess increase in renal blood flow and GFR when blood pressure rises.

When blood pressure decreases the myogenic mechanism reduces vascular resistance and the vessel dilates.

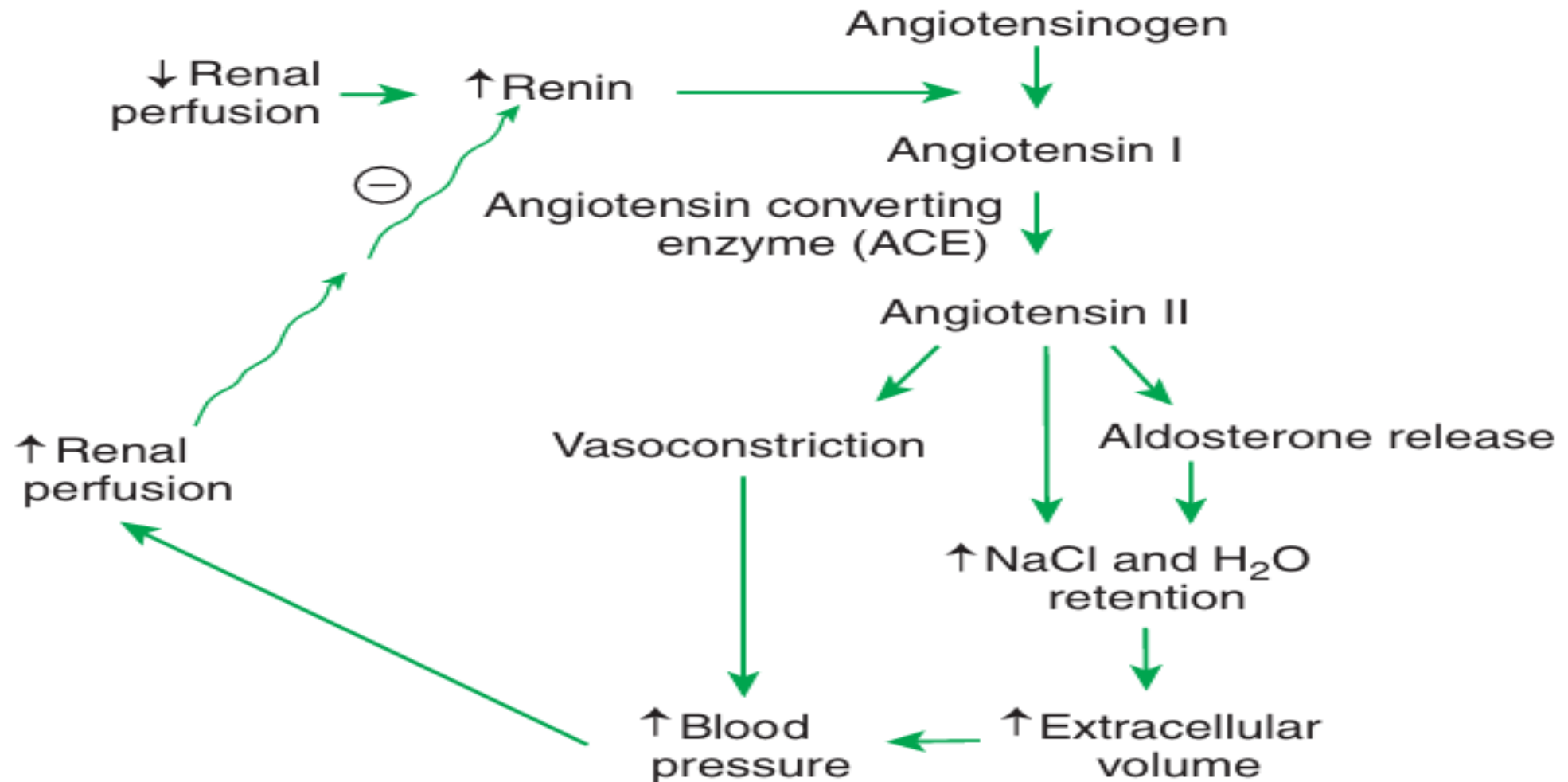
The Myogenic Mechanism

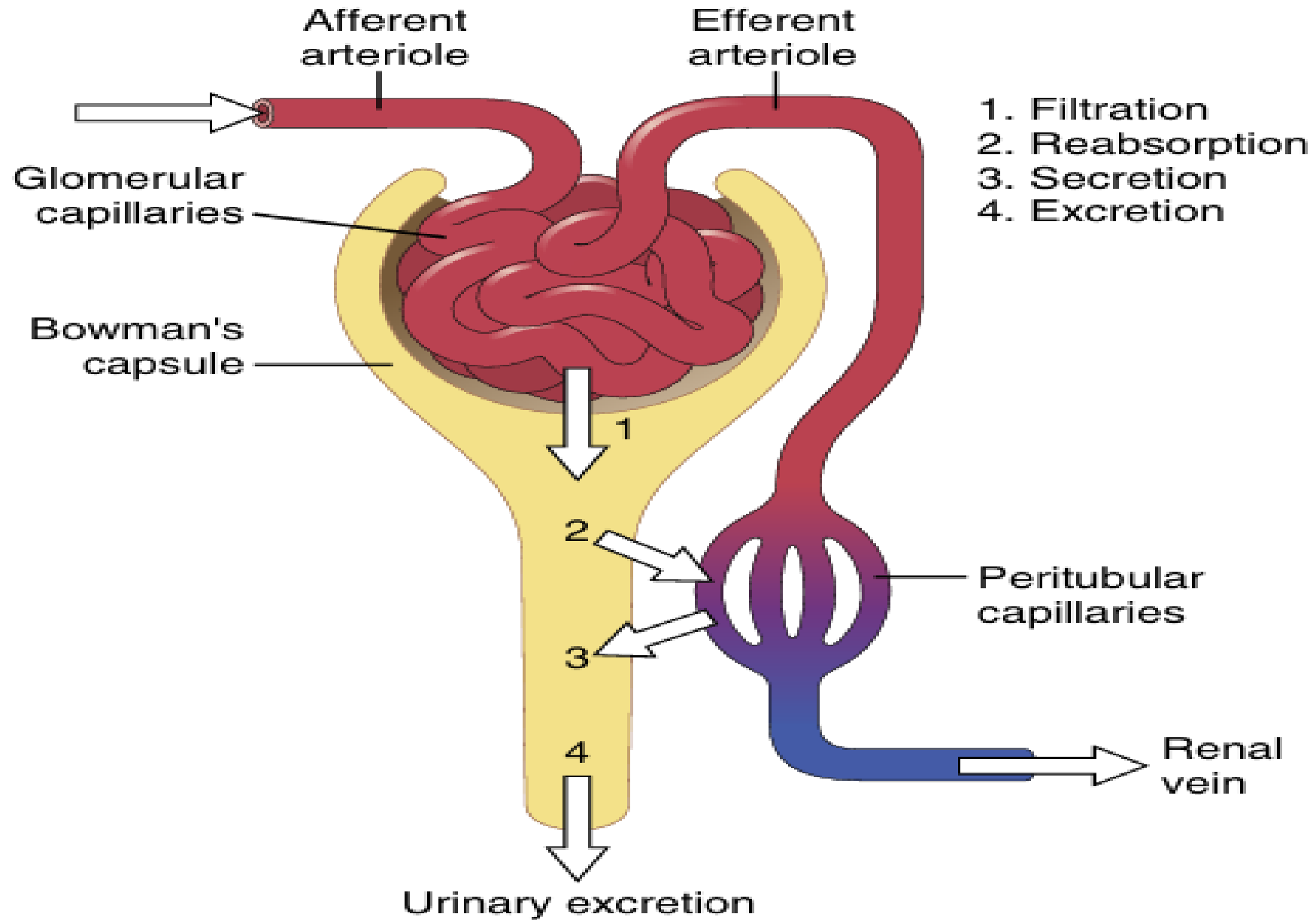


TubuloGlomerular Feedback(TGF)

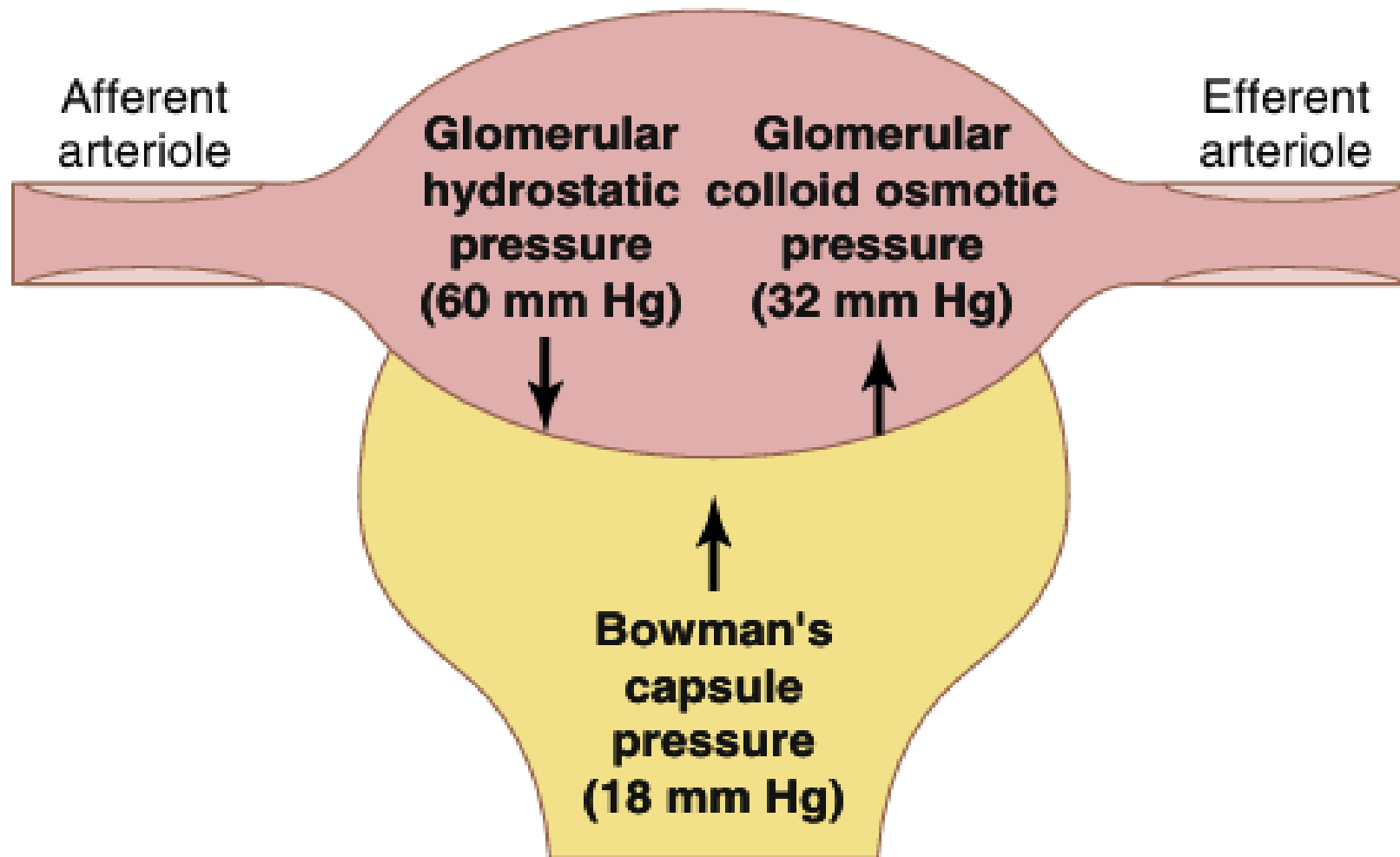


Renin-Angiotensin-Aldosterone System(RAAS)

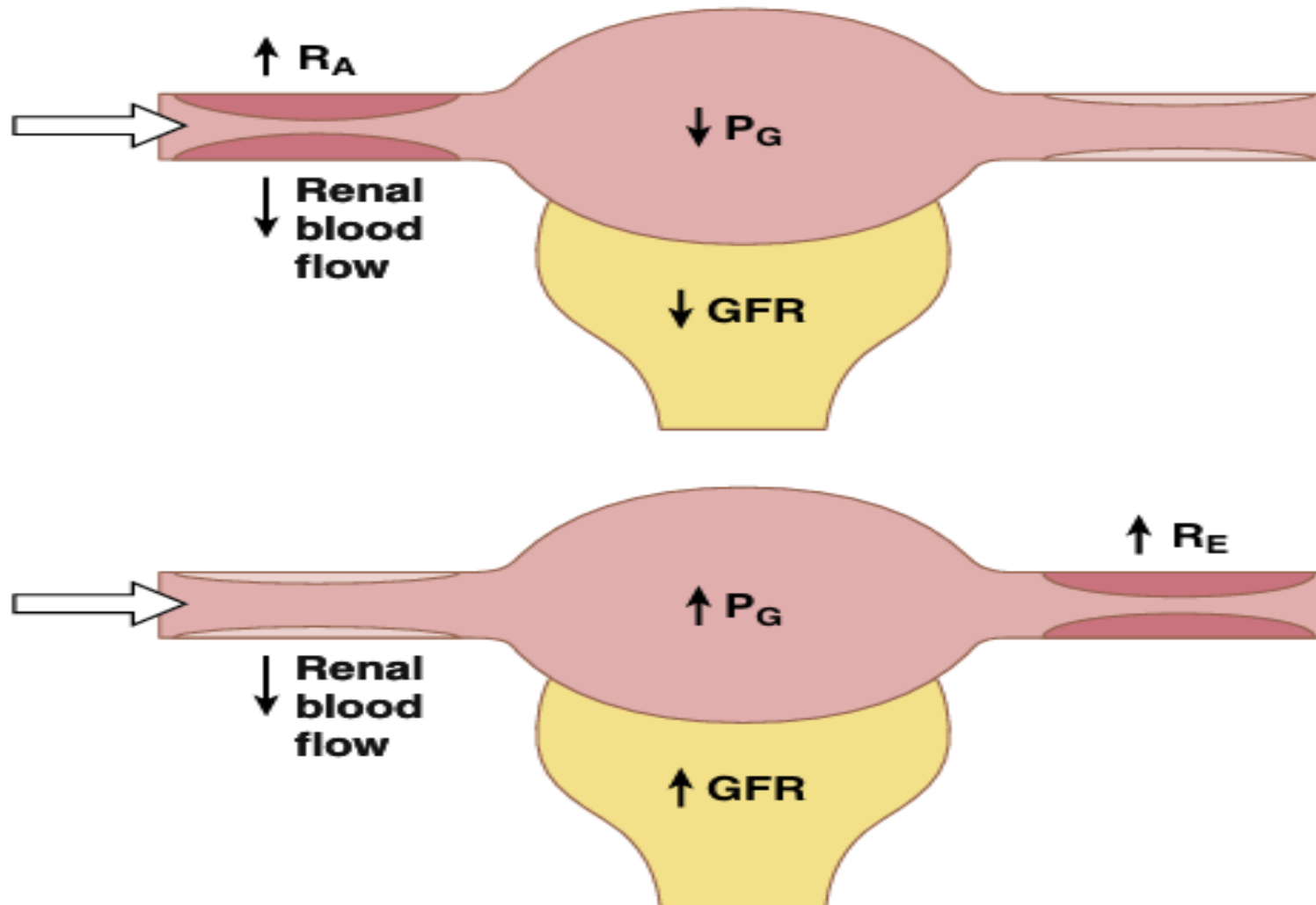




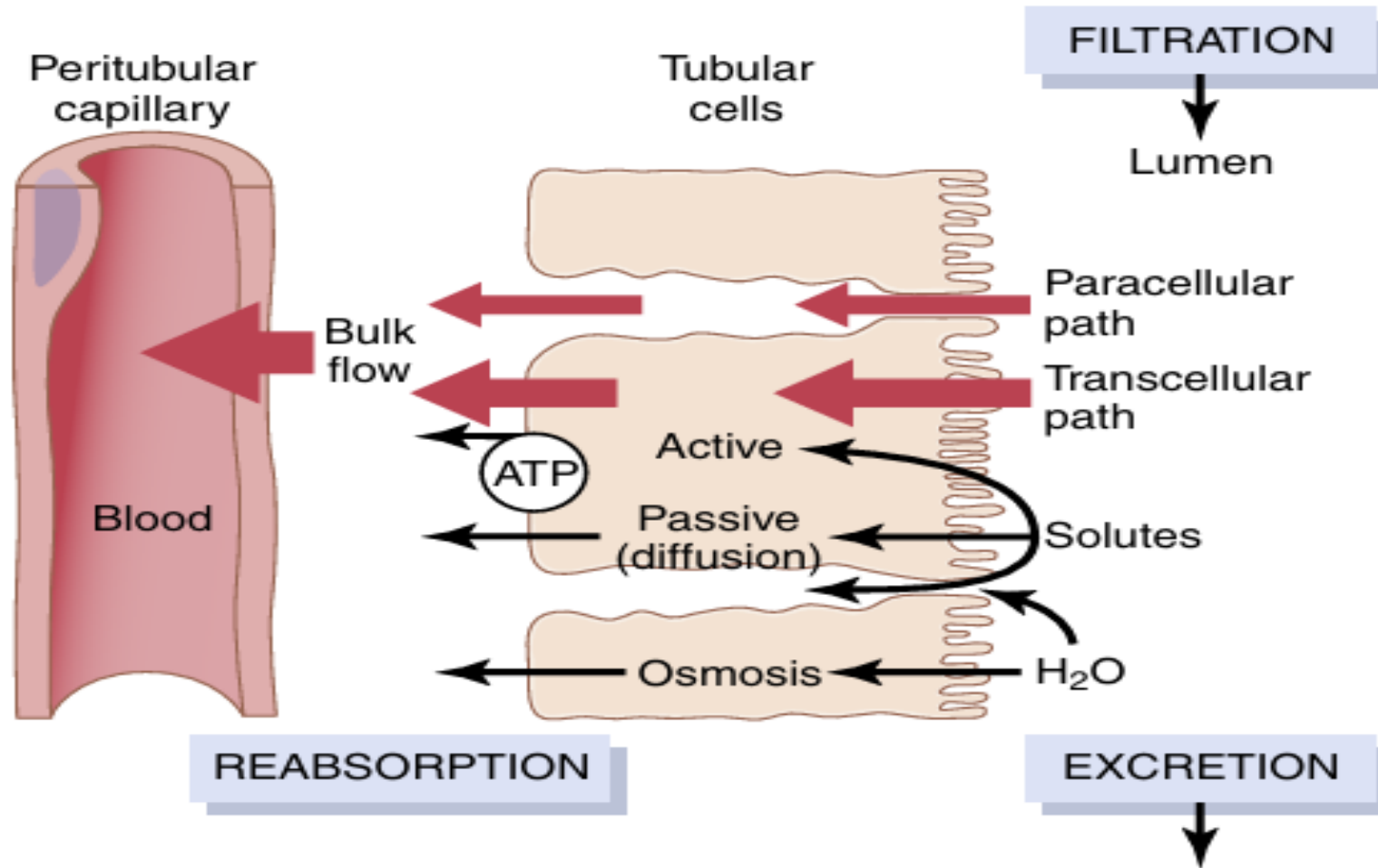
Forces causing Filtration



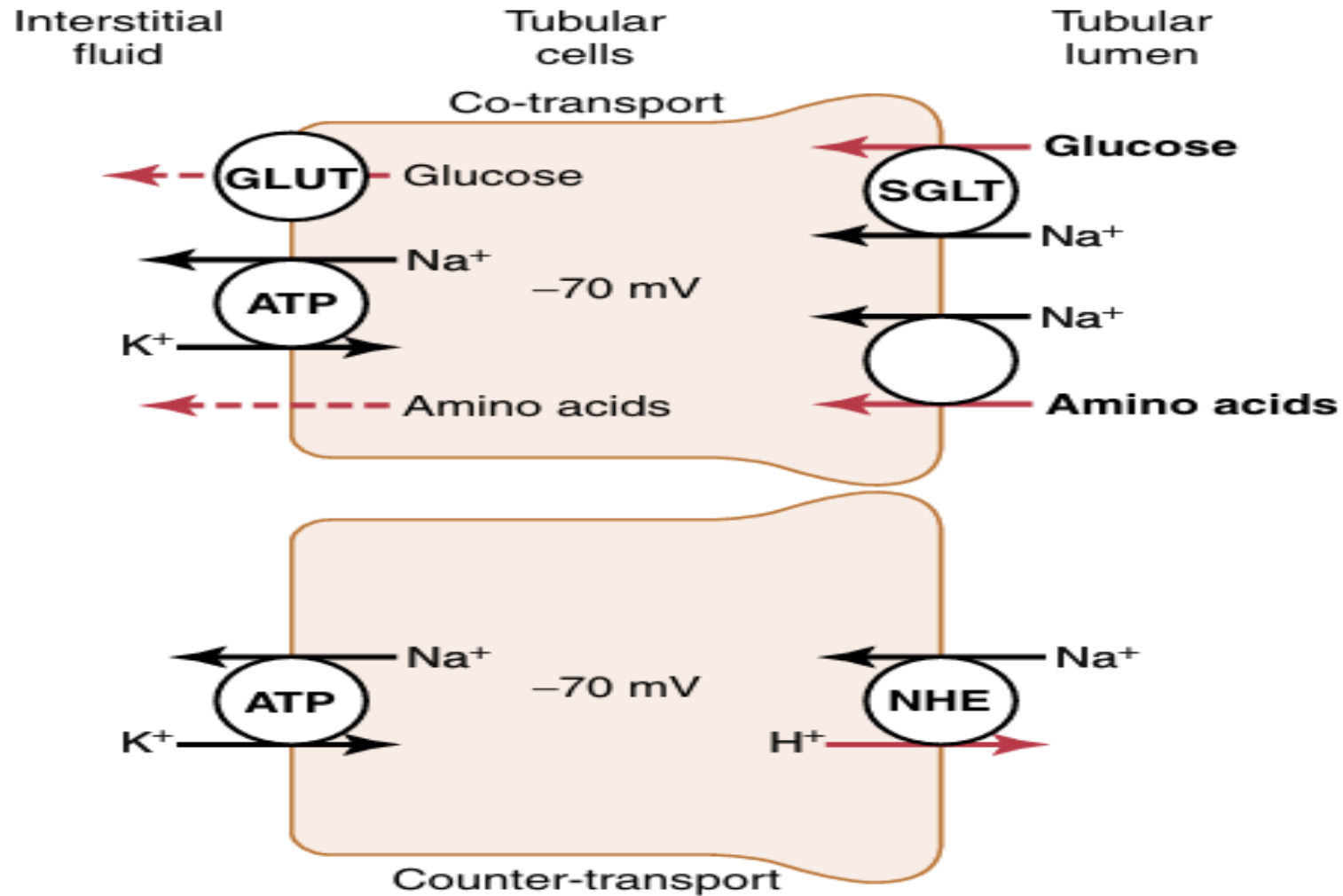
Effect of Afferent & Efferent Arteriolar Resistance



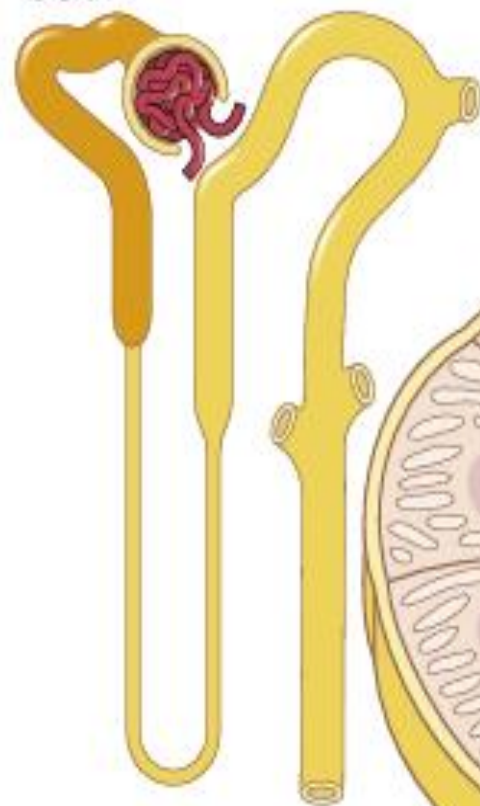
Reabsorption



Co-transport & Counter-transport



65%

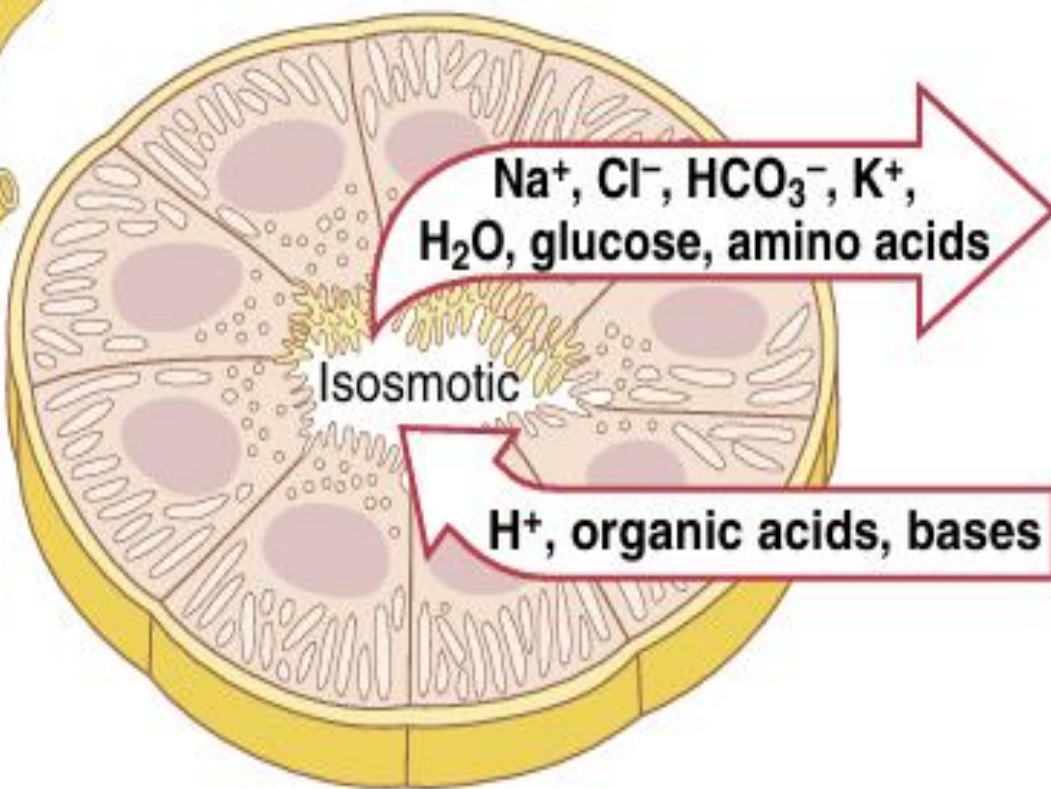


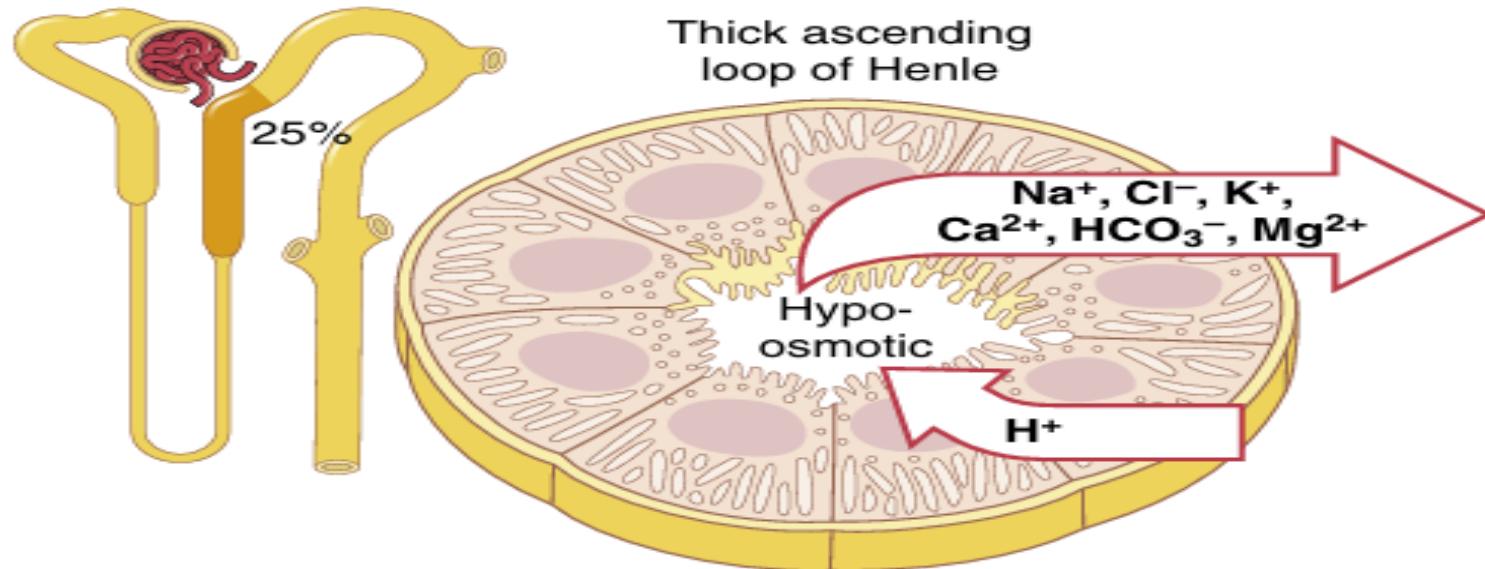
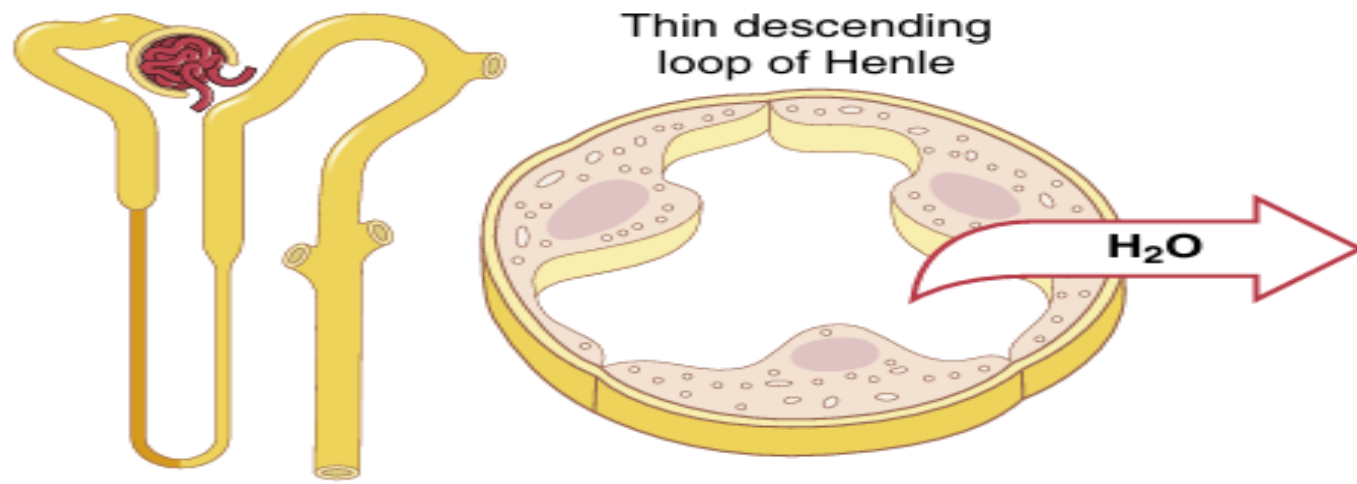
Proximal tubule

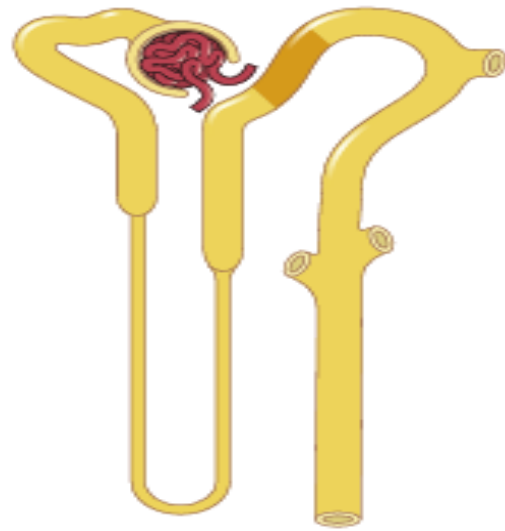
Na^+ , Cl^- , HCO_3^- , K^+ ,
 H_2O , glucose, amino acids

Isosmotic

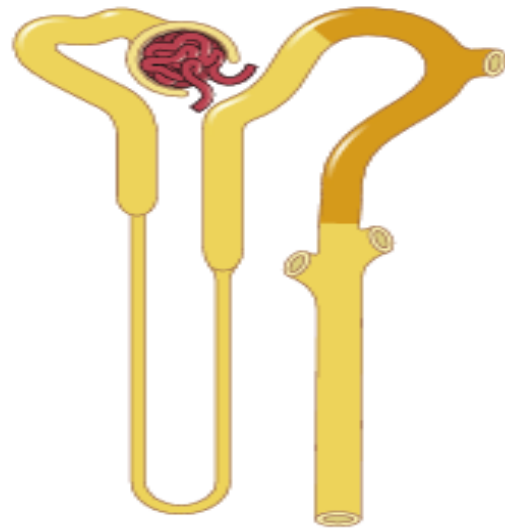
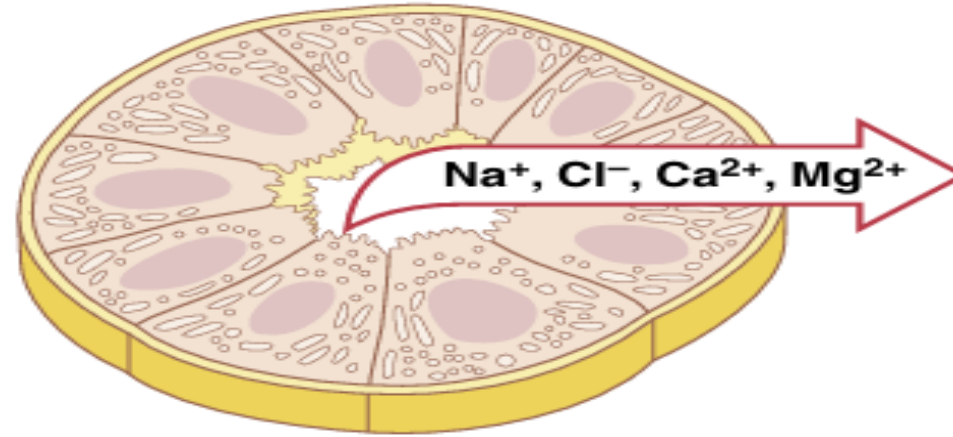
H^+ , organic acids, bases



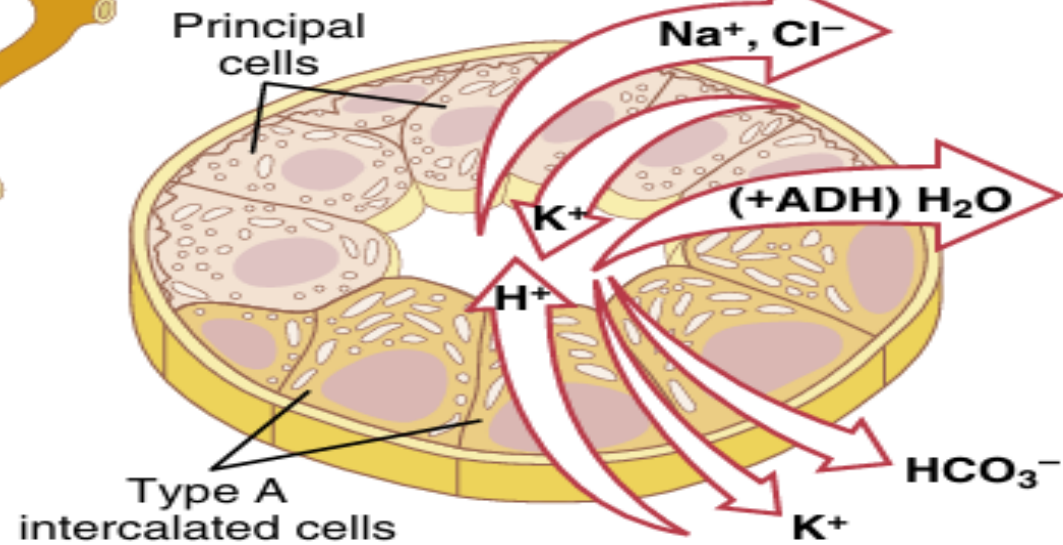


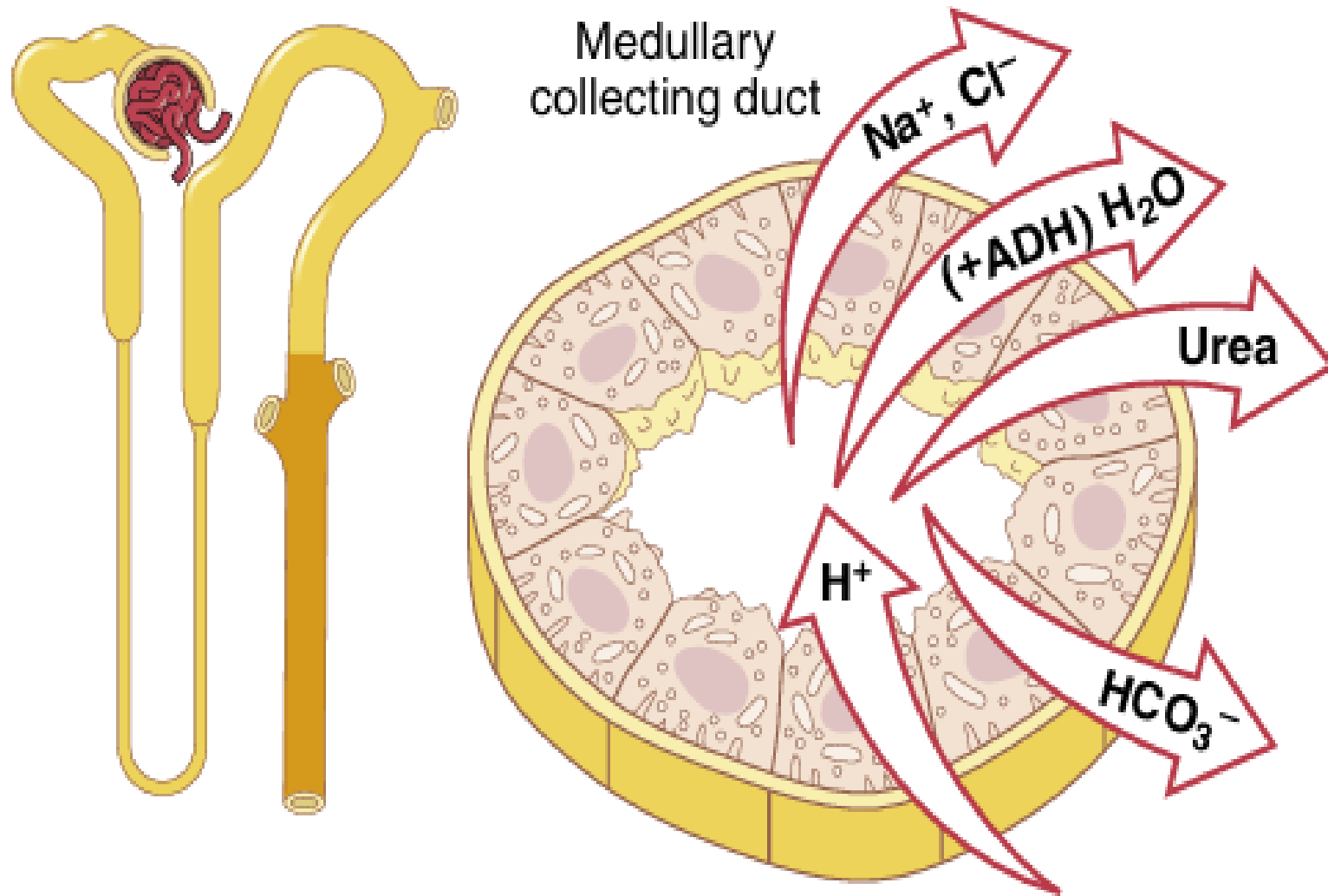


Early distal tubule

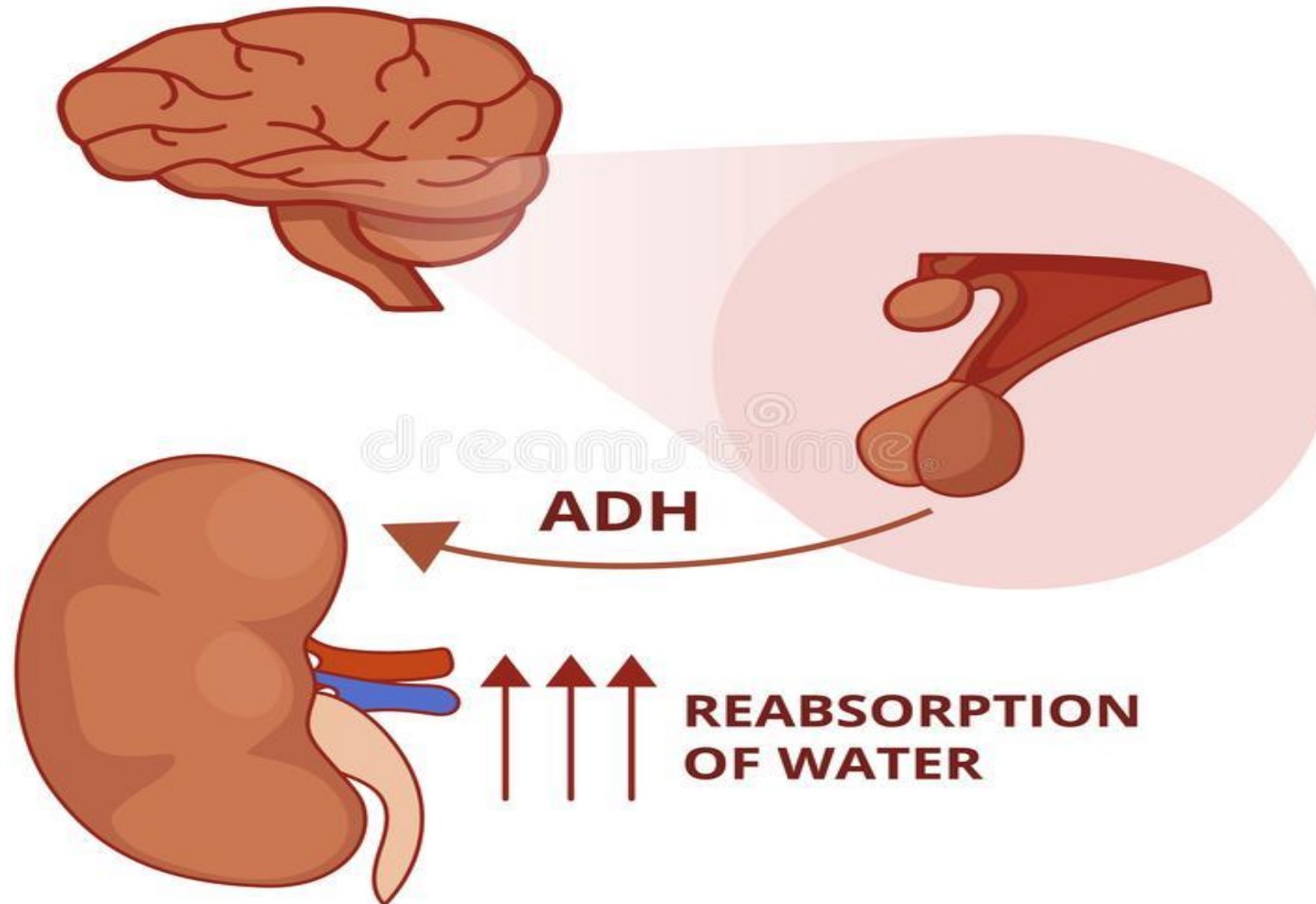


Late distal tubule and cortical collecting tubule

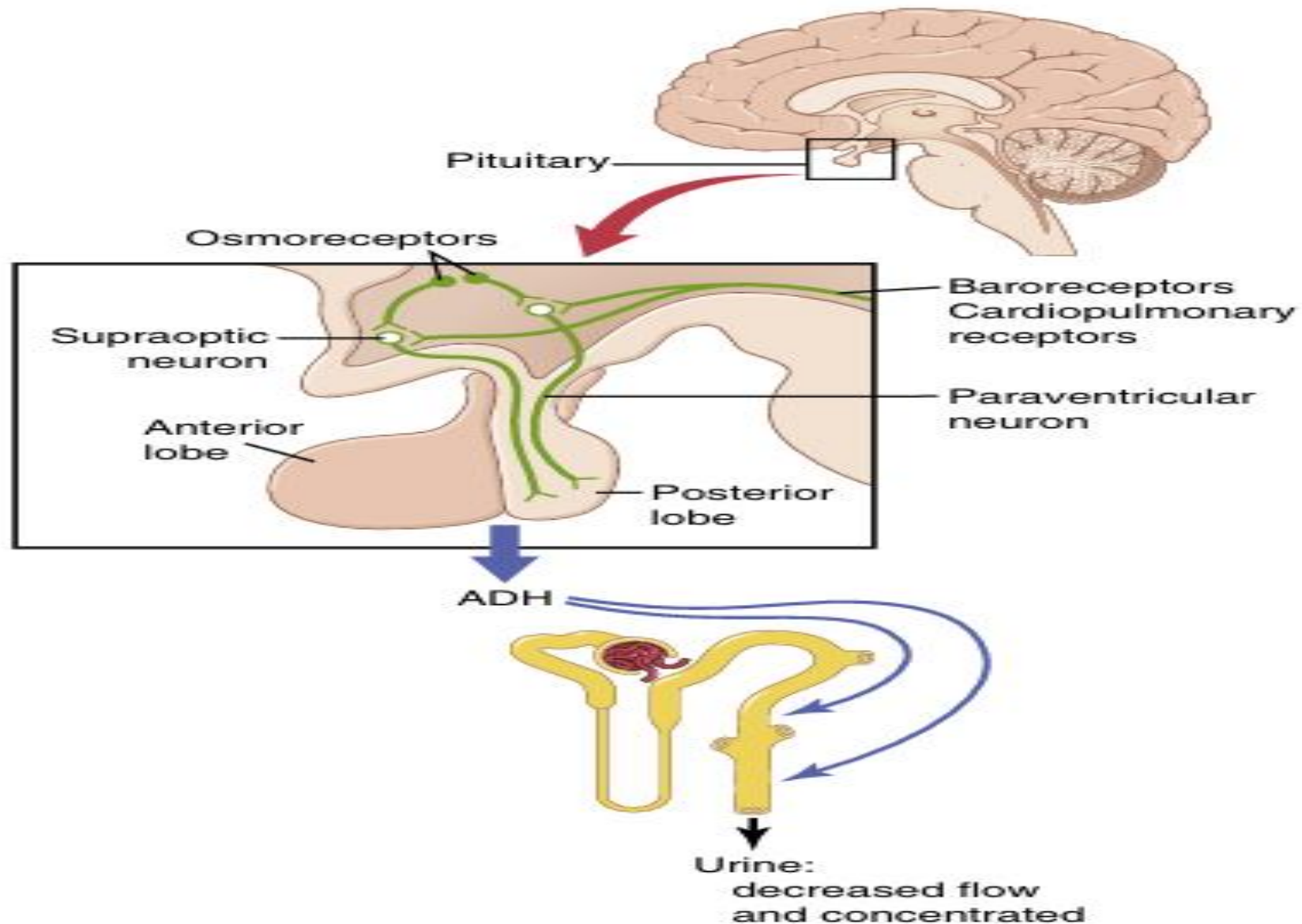




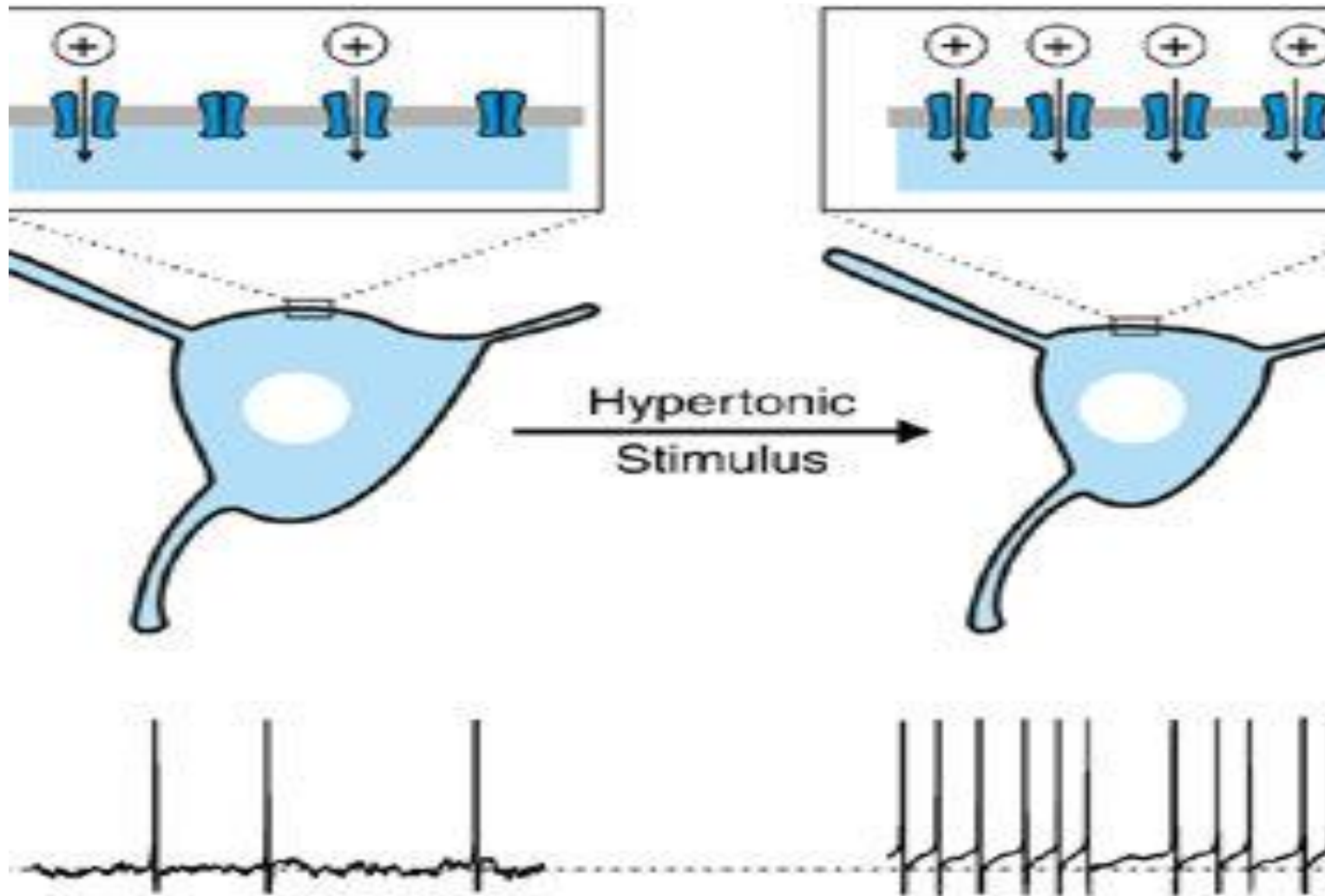
Regulation of body fluid osmolality

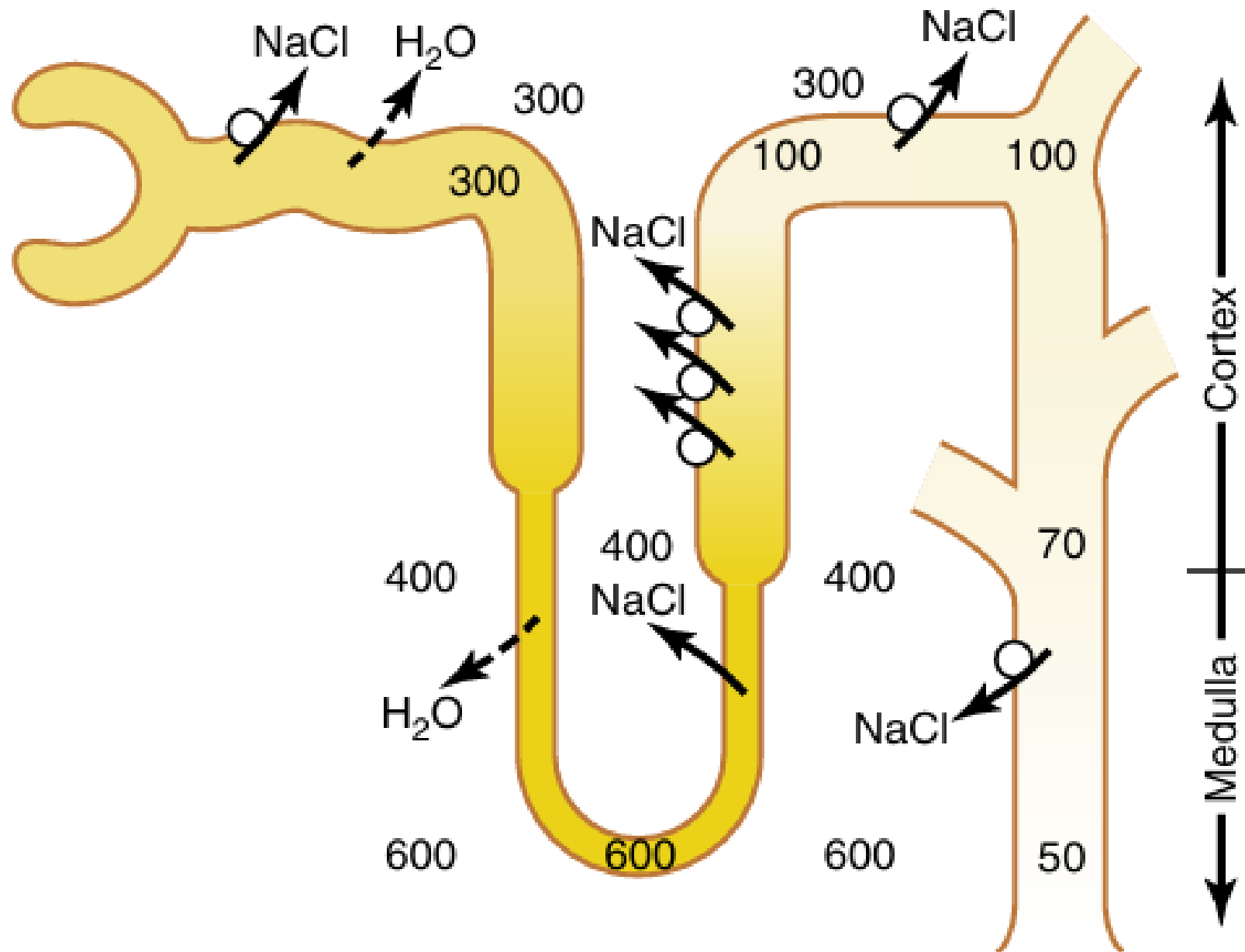


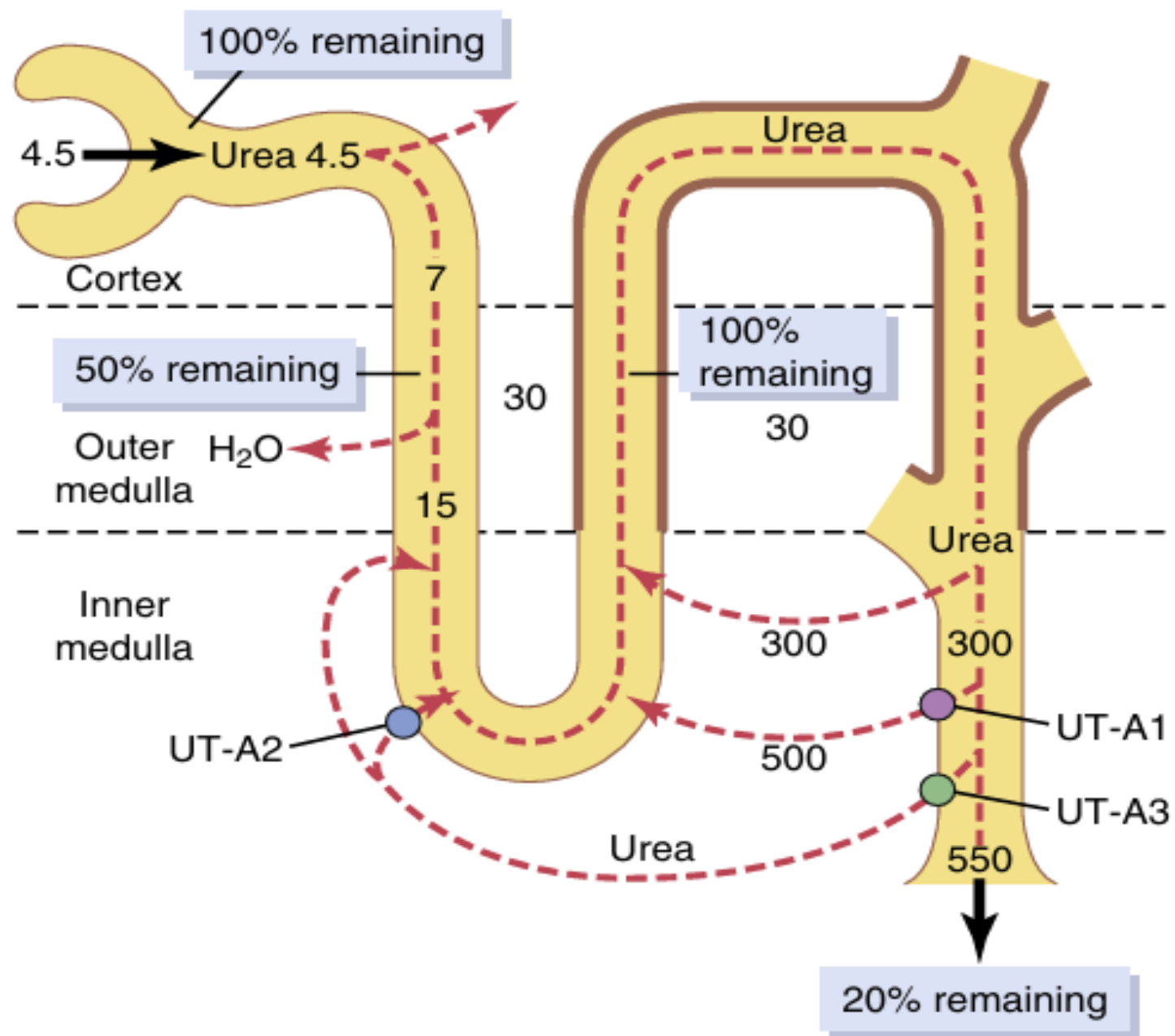
Regulation of body fluid osmolality



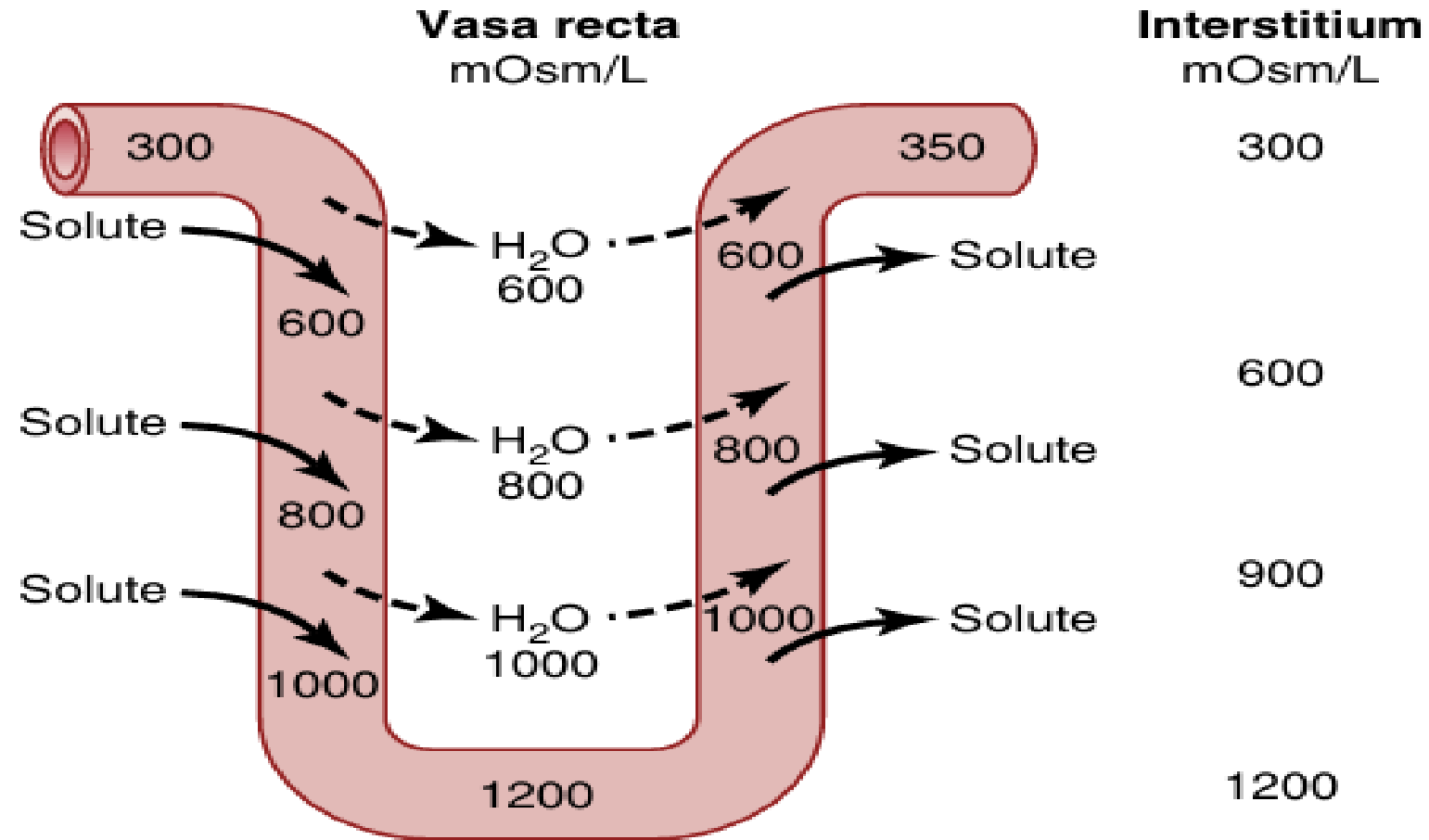
Osmoreceptors







Countercurrent Exchange



Regulation of acid-base balance

