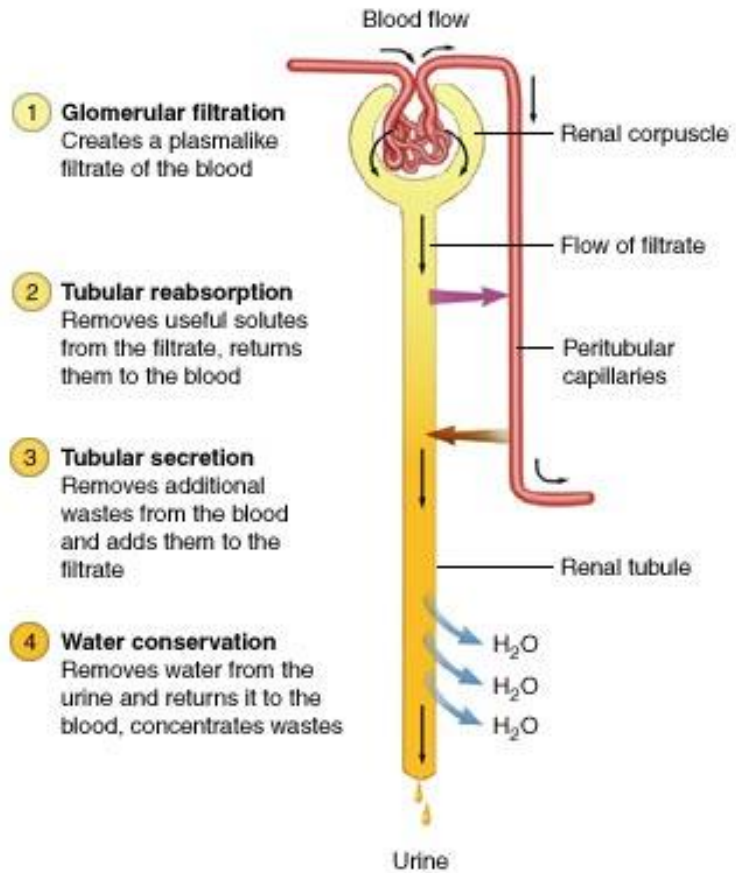
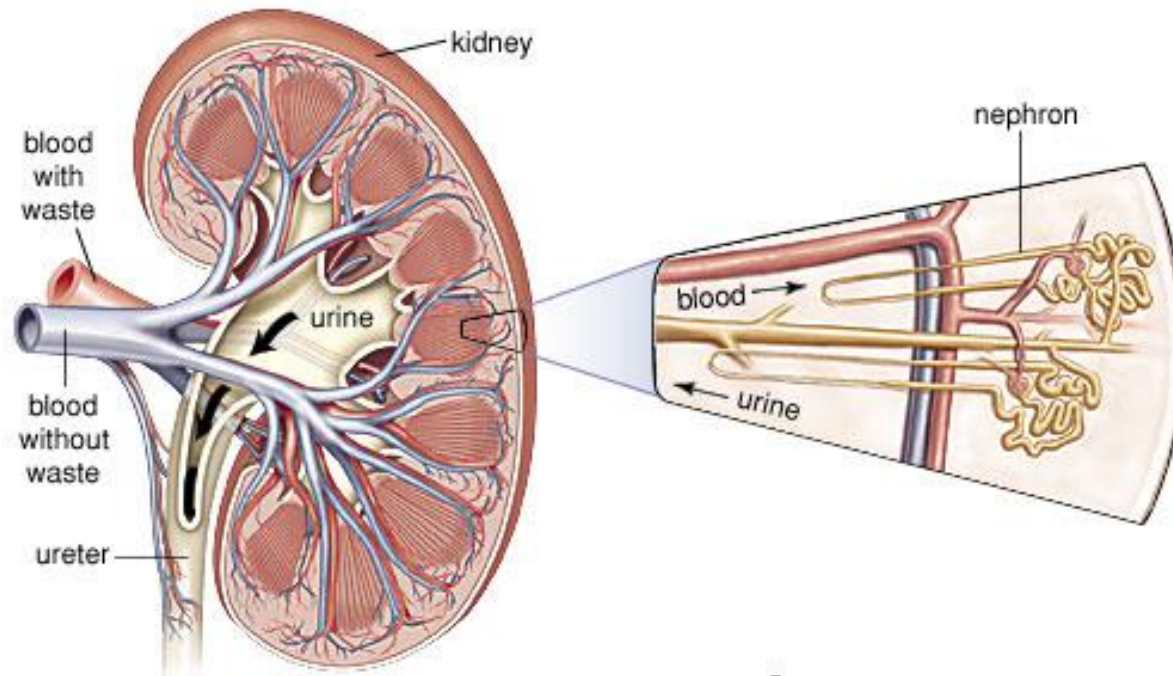


URINE FORMATION

U4:L3



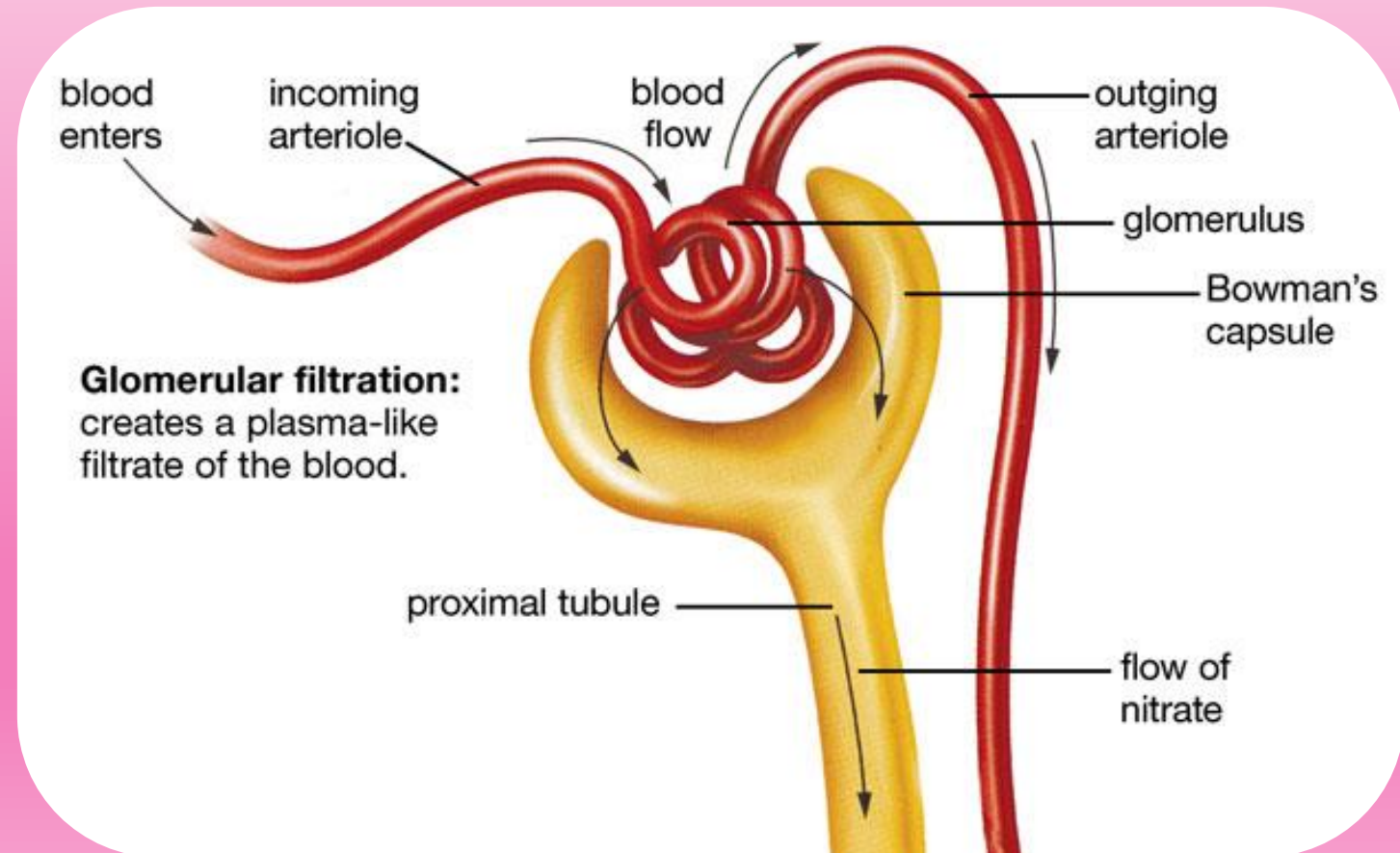
Nephrons remove wastes as well as excess amounts of dissolved substances from the blood



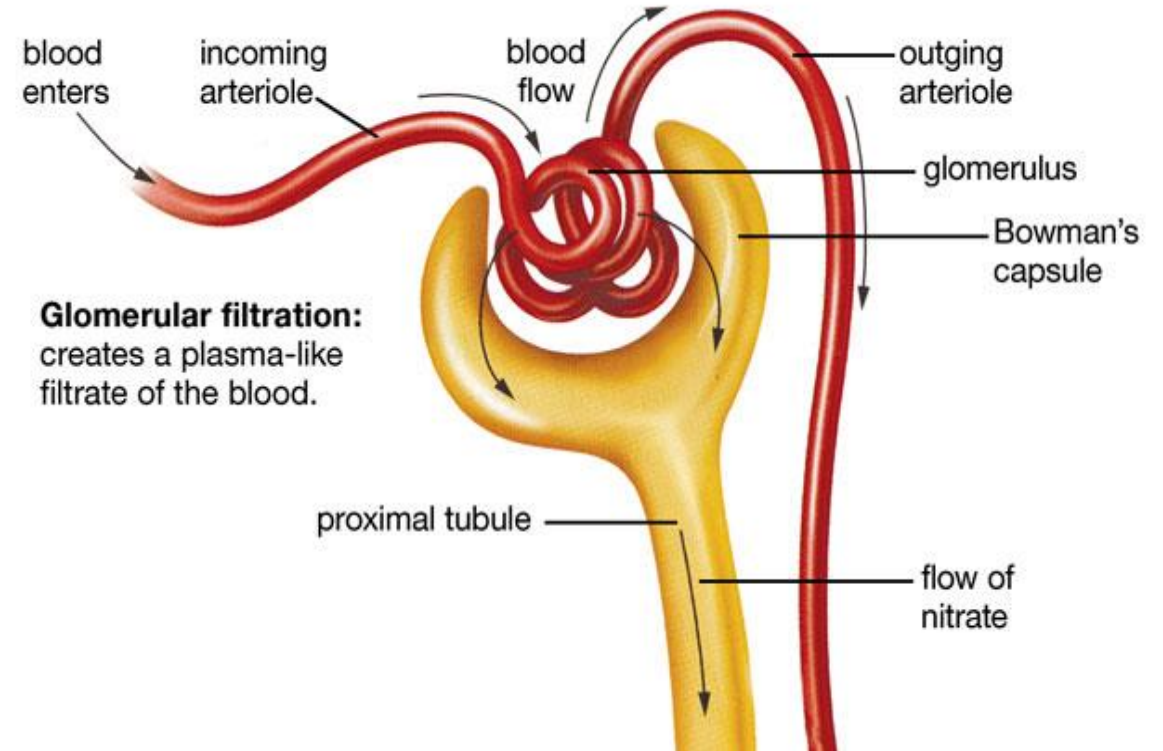
STEP ONE

GLOMERULAR FILTRATION

Certain fluids (filtrate), such as water and dissolved substances, pass from the glomerular capillaries into the Bowman's capsule

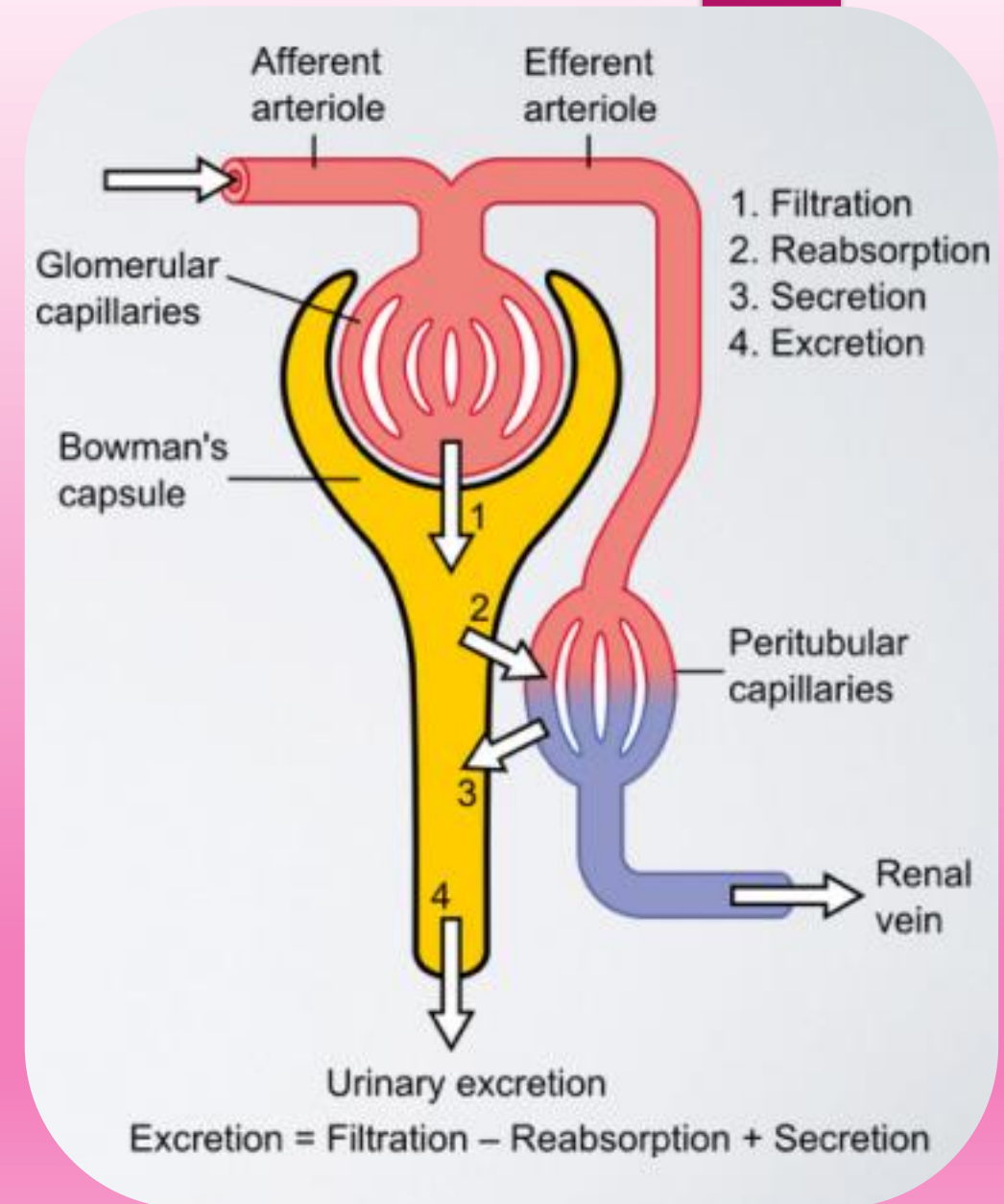


- **Blood pressure** pushes the fluid out of the glomerular capillaries
- This fluid is the **filtrate** (contains small molecules such as water, salts, glucose and urea). Large molecules such as glycogen and protein, remain in the blood.
- Filtrate then enters the **Bowman's capsule**



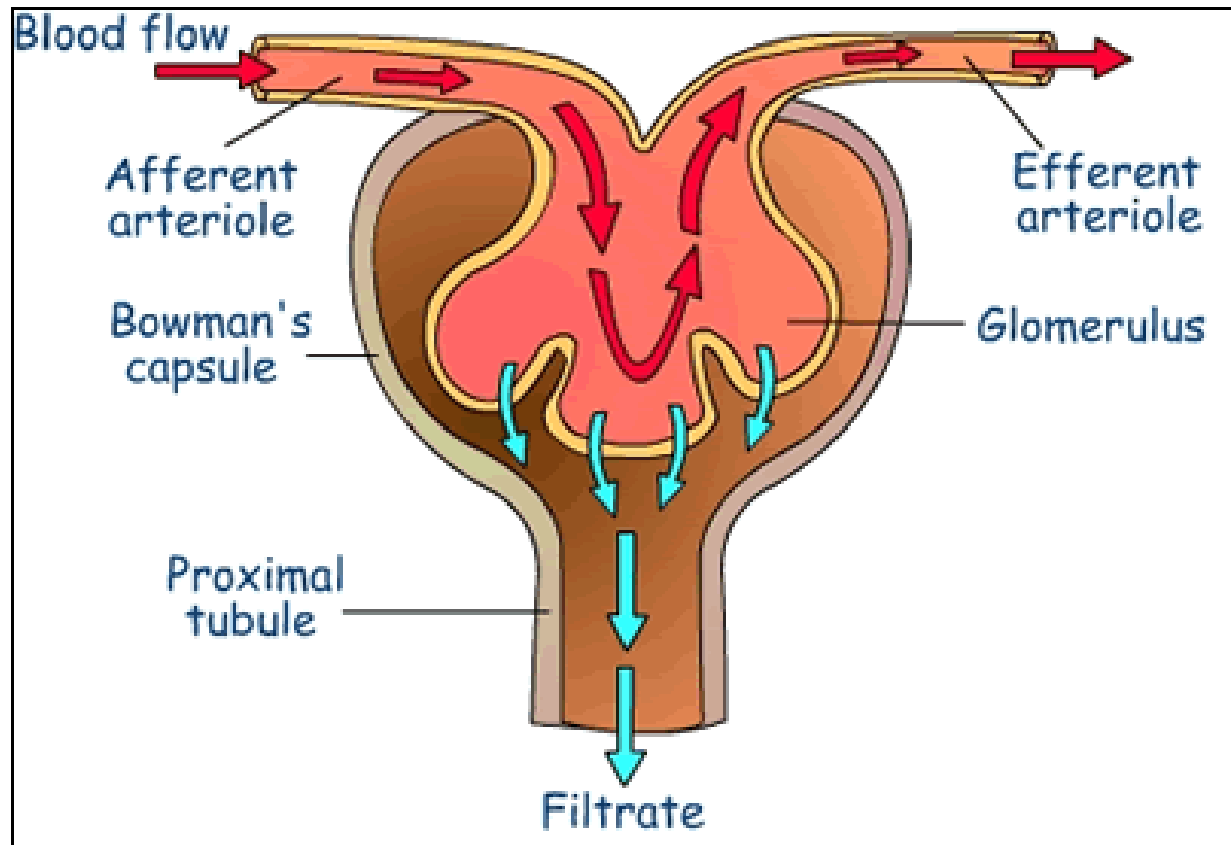
STEP TWO REABSORPTION

From the Bowman's capsule the filtrate enters the proximal tubule

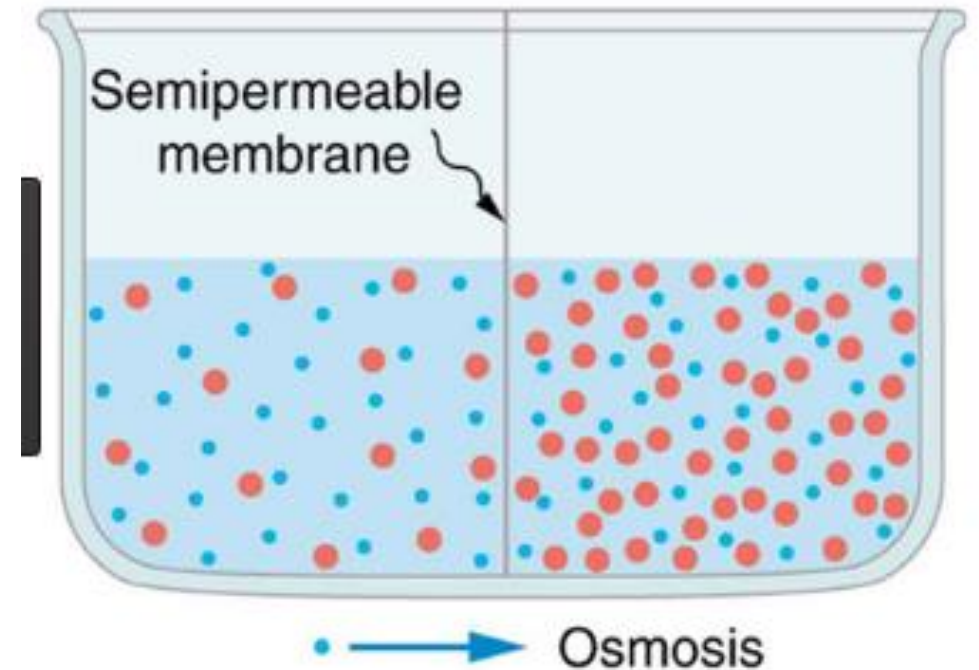


- As the filtrate flows through the tubules of the nephrons, certain substances, including water and nutrients, move from the filtrate back into the capillaries

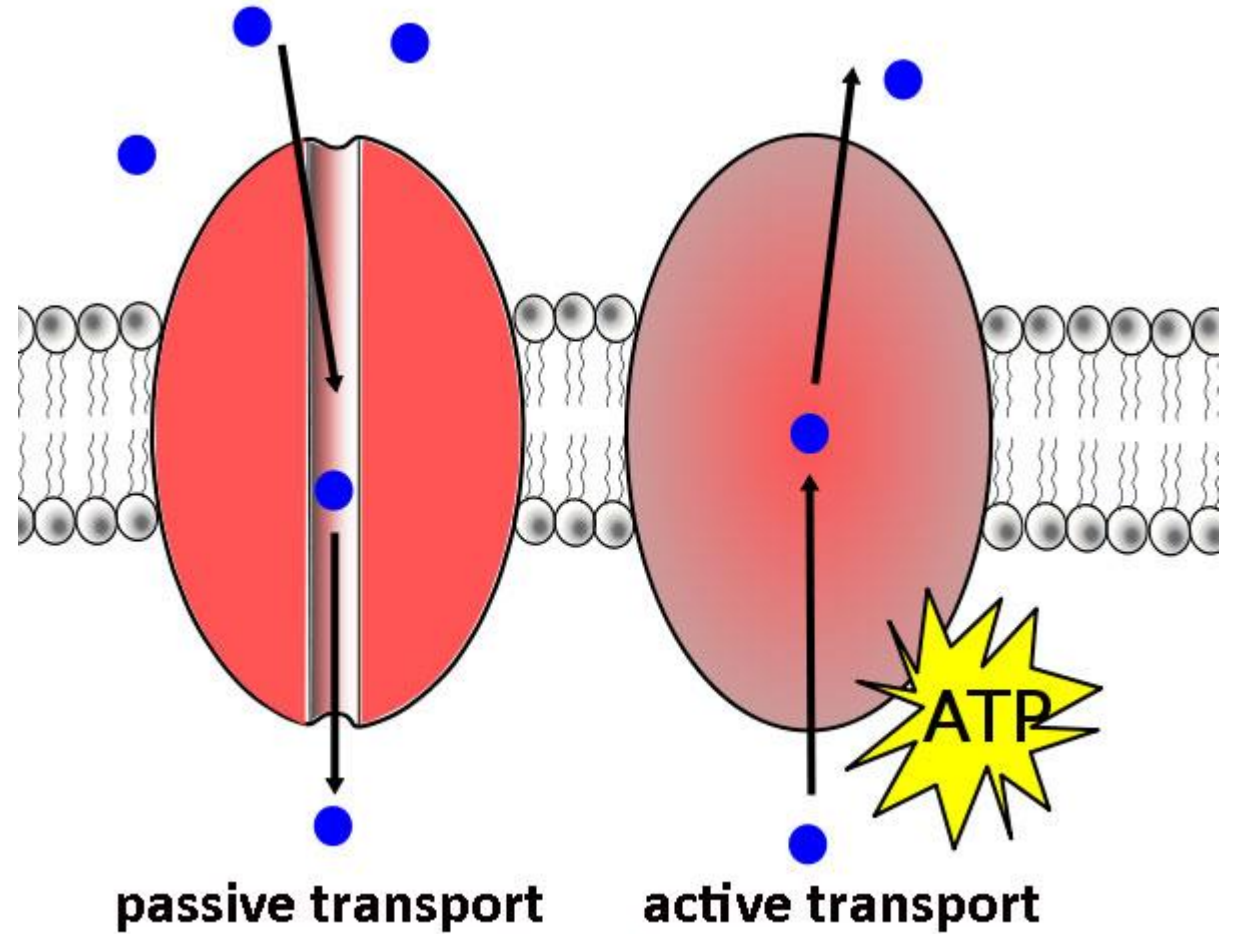
- This movement occurs by both active and passive transport

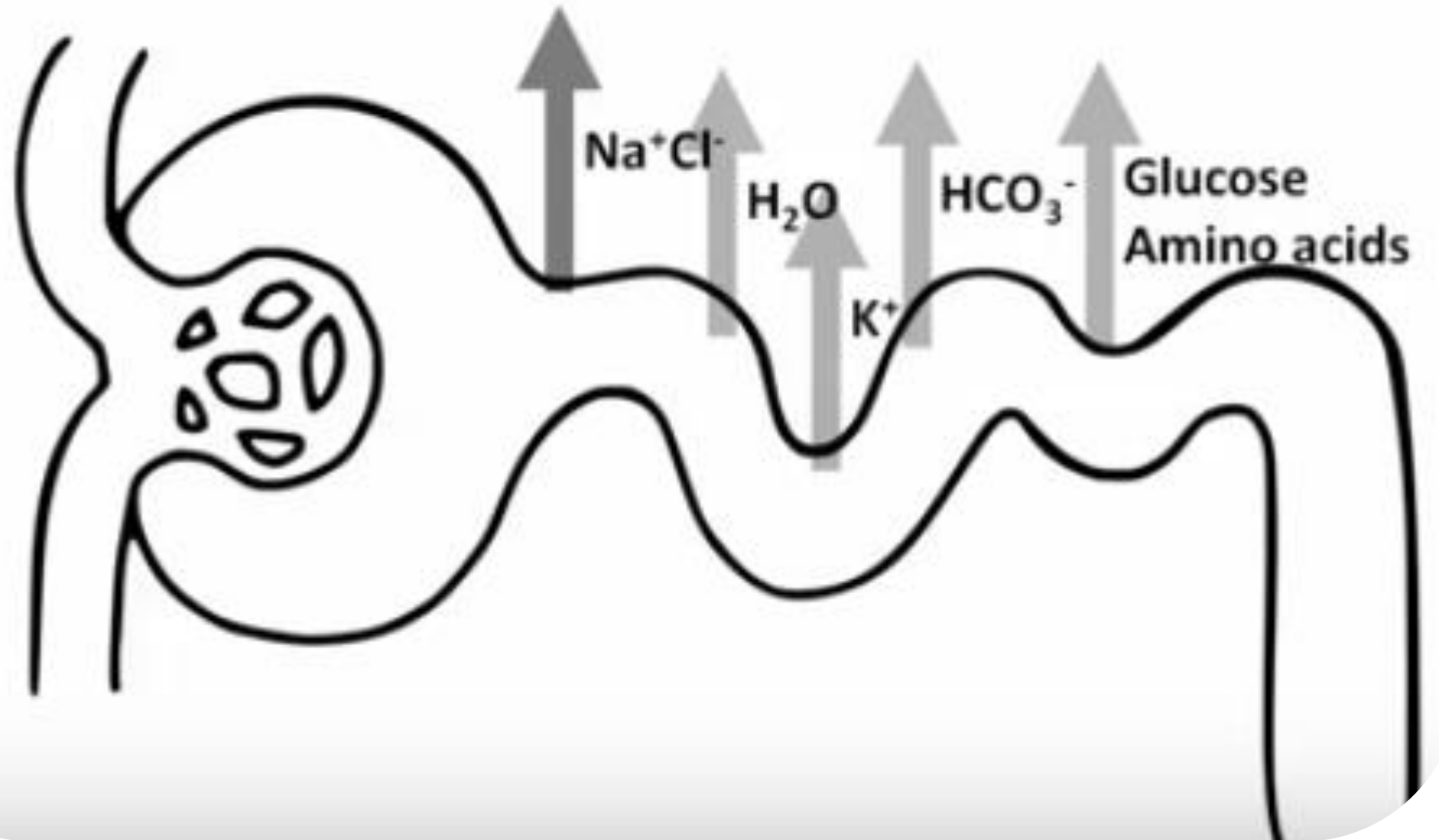


- Proximal tubule is **highly permeable** to water
- Because of the difference in concentration between the blood and filtrate, **water moves out by osmosis** after the ions and nutrients have been reabsorbed

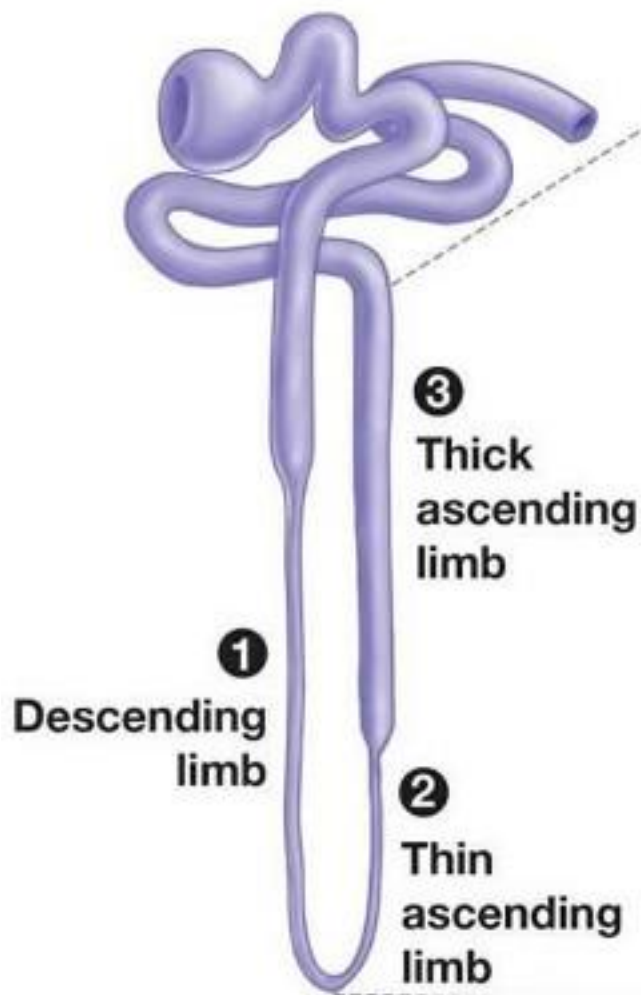


Salts and nutrients are pumped out and reabsorbed by active transport into the blood through the peritubular capillaries

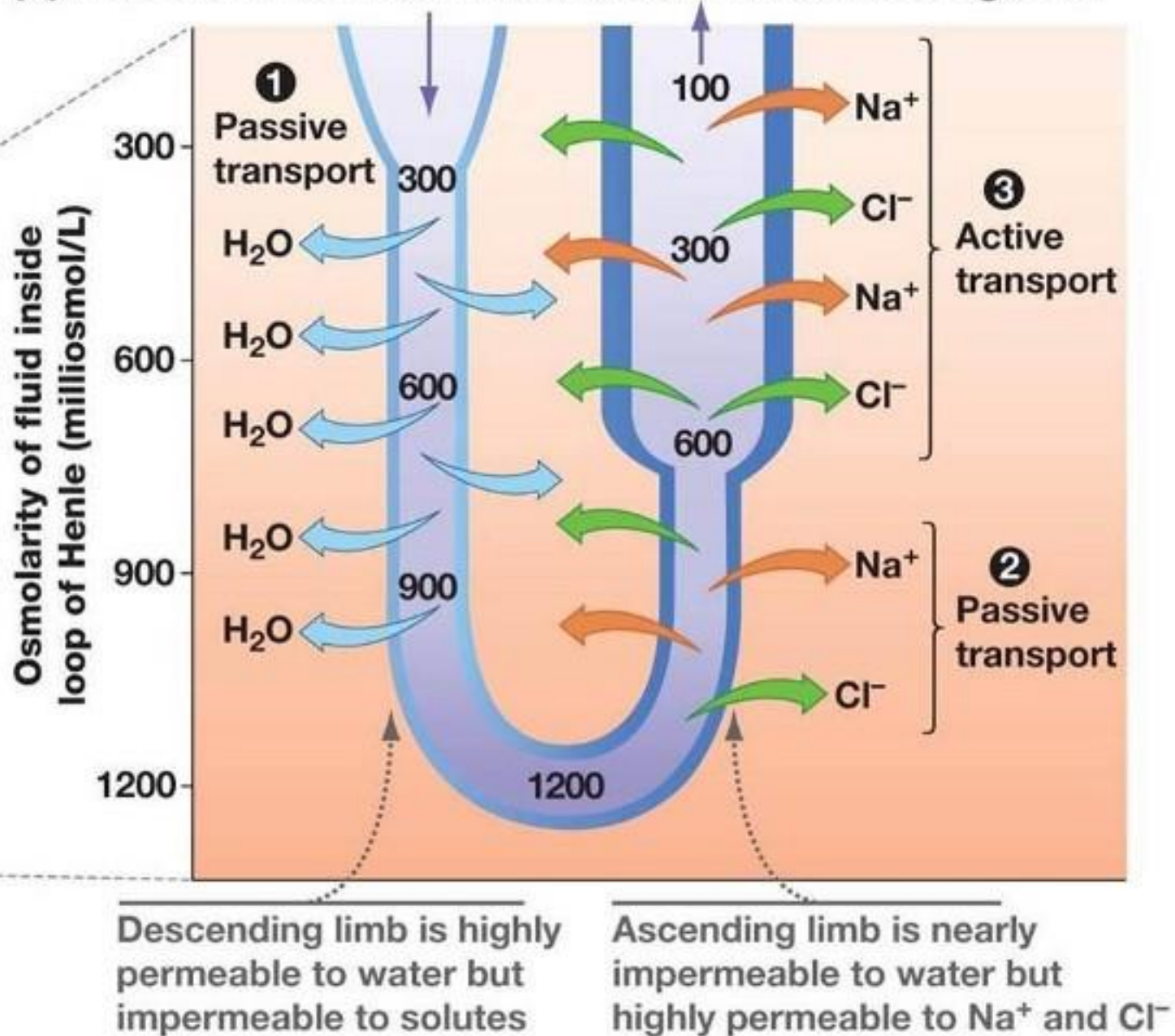




(a) Three regions in the loop of Henle

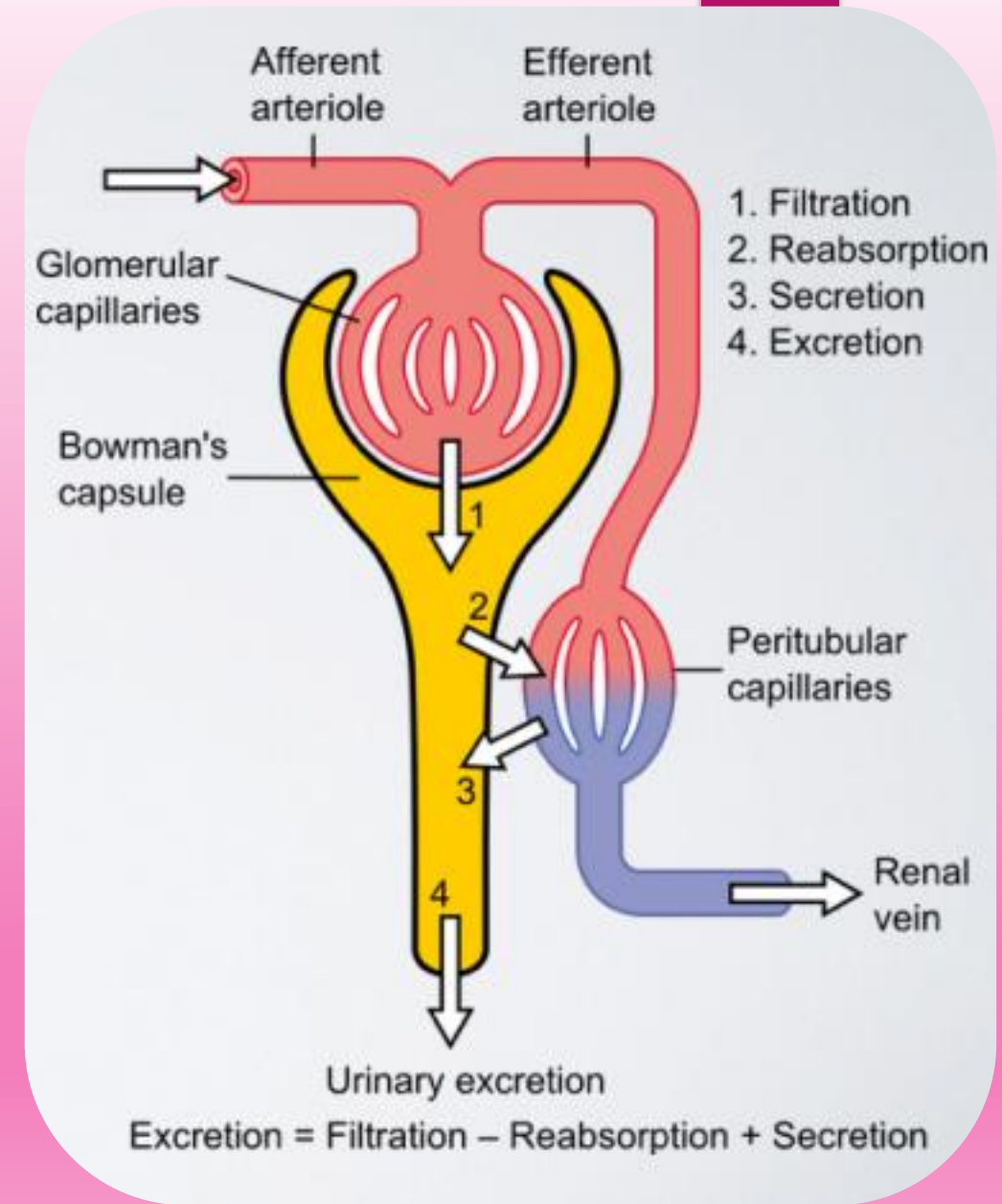


(b) Water and ion movement differ in the three regions.



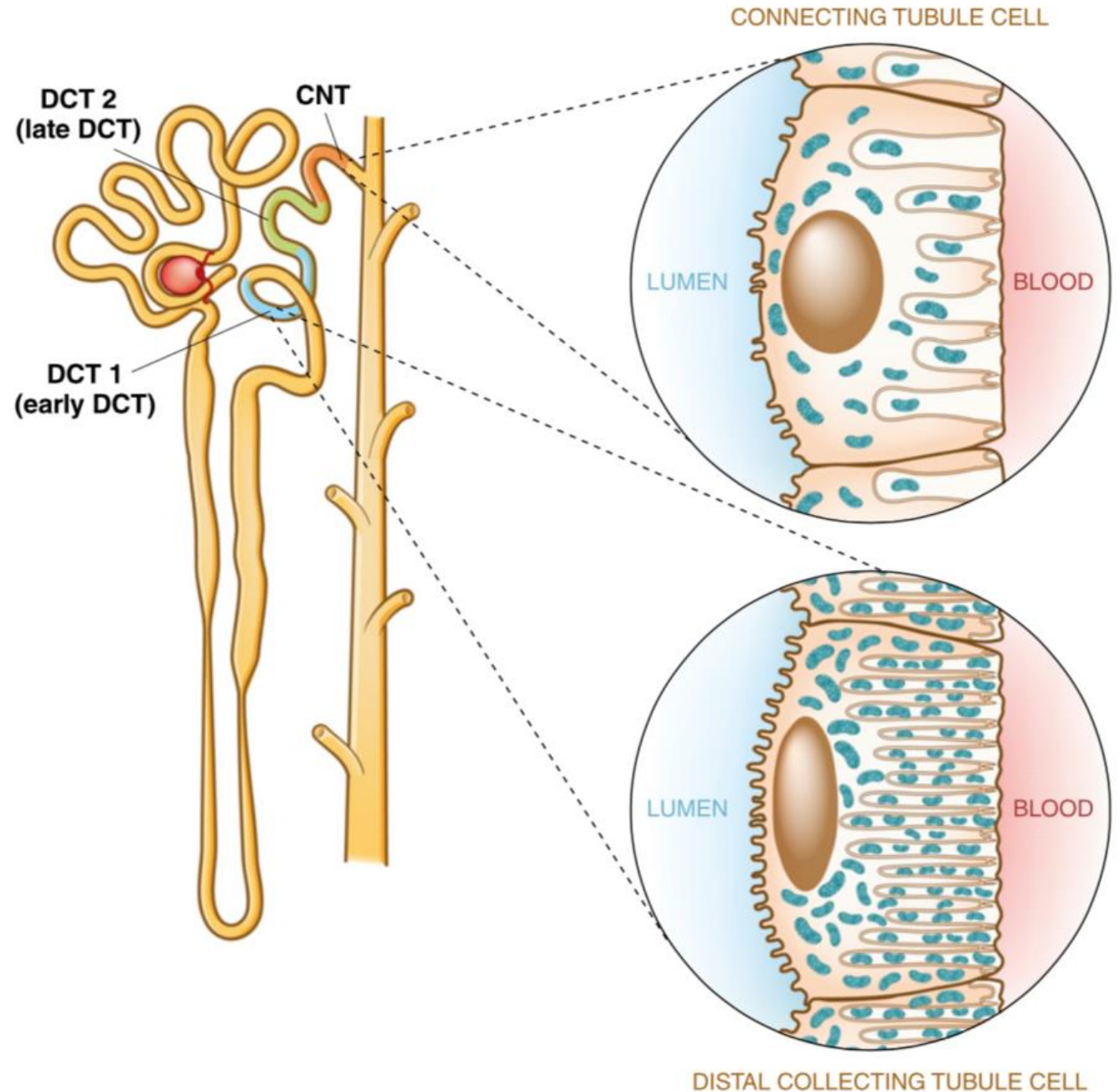
STEP THREE SECRETION

The filtrate then travels to the distal tubule

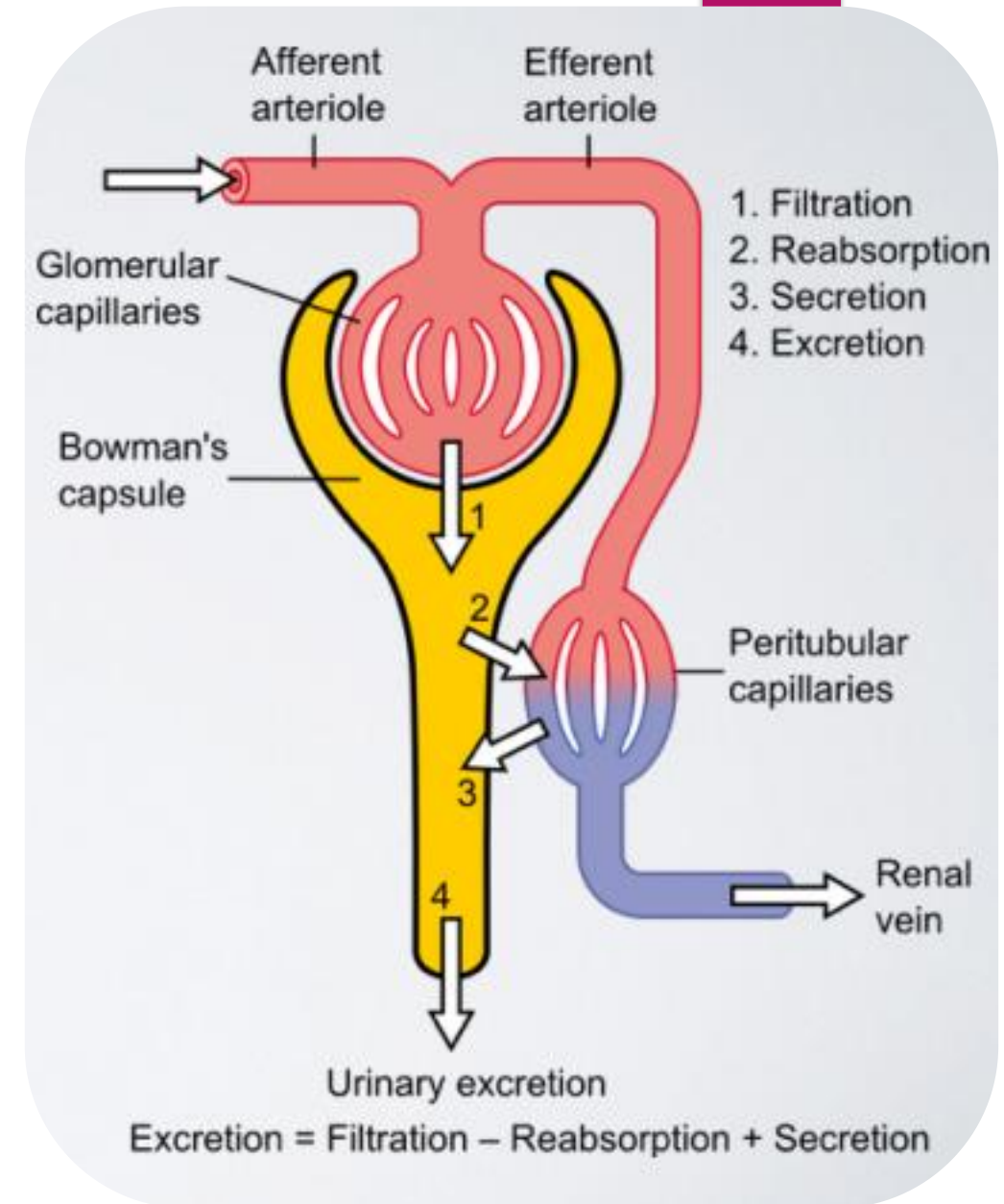


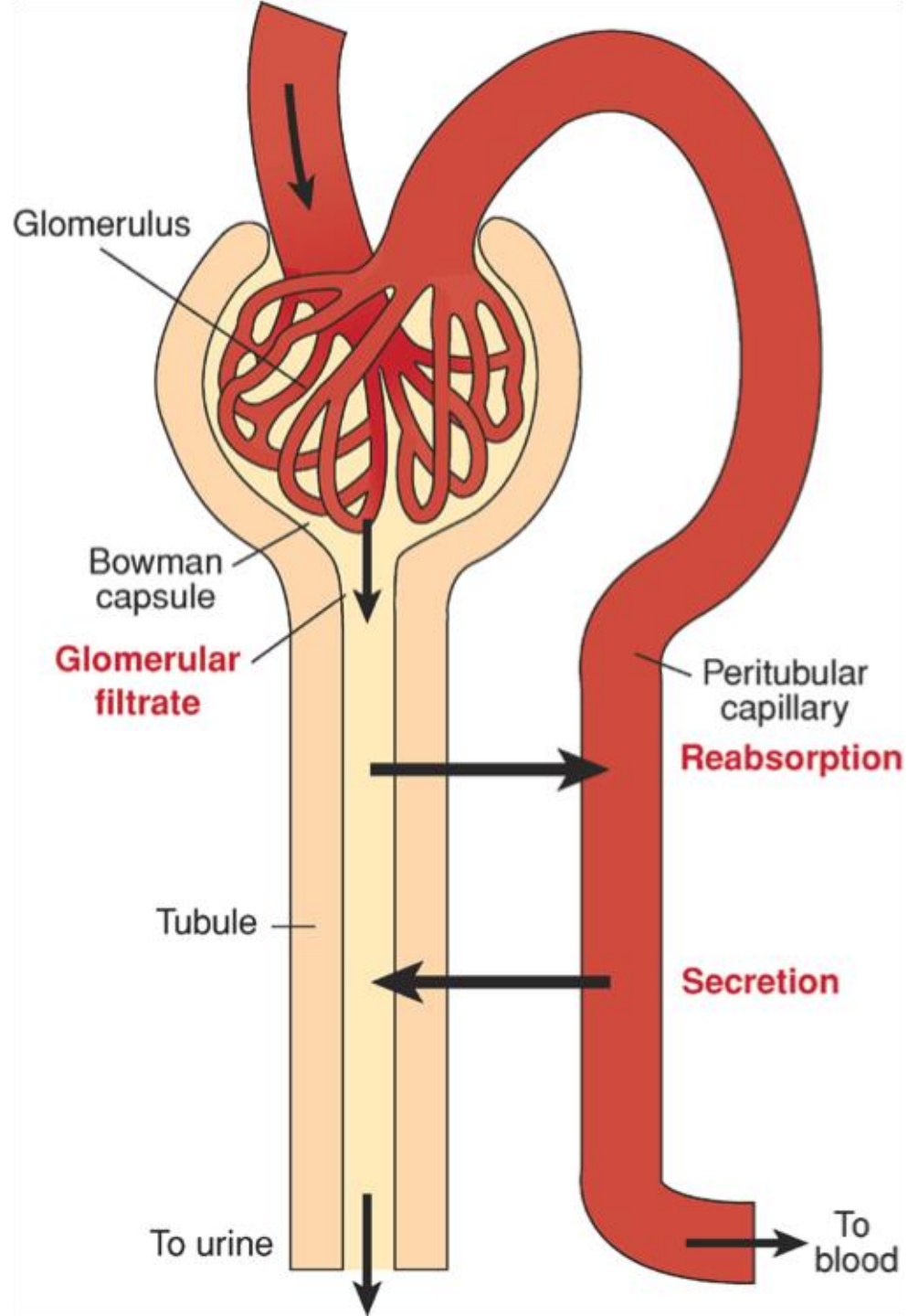
Water is reabsorbed and substances like penicillin, hydrogen ions and ammonia are secreted into the distal tubule (urine) from the peritubular capillary network (blood).

Cells lining the distal tubule are loaded with mitochondria



- Secretion occurs by **active transport** (like reabsorption) and molecules are transferred from the **blood into the nephron** (unlike reabsorption)

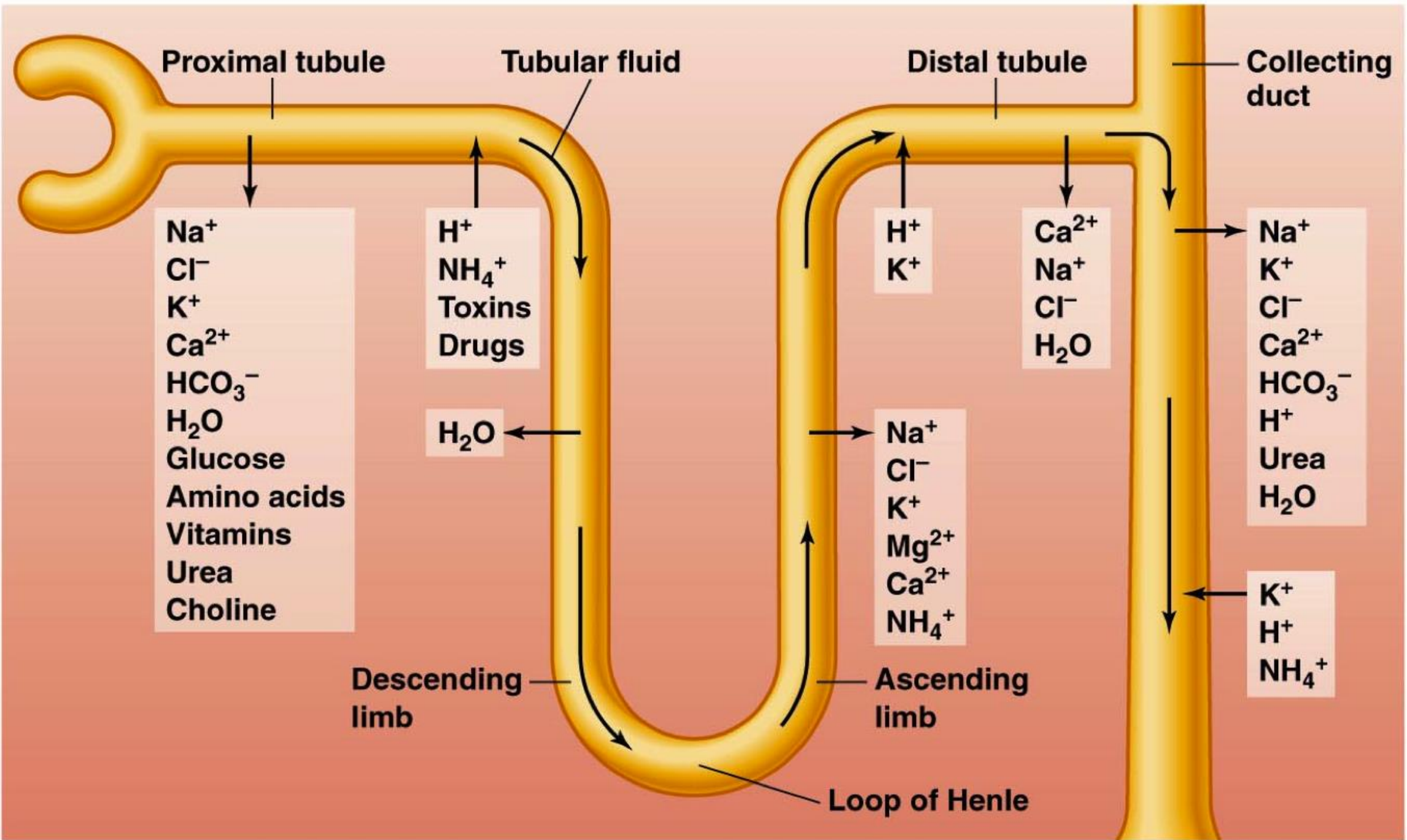




The filtrate then travels to the collecting duct and more water is absorbed. It is then collected in the renal pelvis of the kidney and sent to the urinary bladder via the ureter

- The substances that remain in the filtrate are wastes (urea, water, drugs, mineral salts)
- Collectively, these wastes make up urine





Proximal tubule

Tubular fluid

Distal tubule

Collecting duct

- Na^+
- Cl^-
- K^+
- Ca^{2+}
- HCO_3^-
- H_2O
- Glucose
- Amino acids
- Vitamins
- Urea
- Choline

- H^+
- NH_4^+
- Toxins
- Drugs

H_2O

- H^+
- K^+

- Ca^{2+}
- Na^+
- Cl^-
- H_2O

- Na^+
- K^+
- Cl^-
- Ca^{2+}
- HCO_3^-
- H^+
- Urea
- H_2O

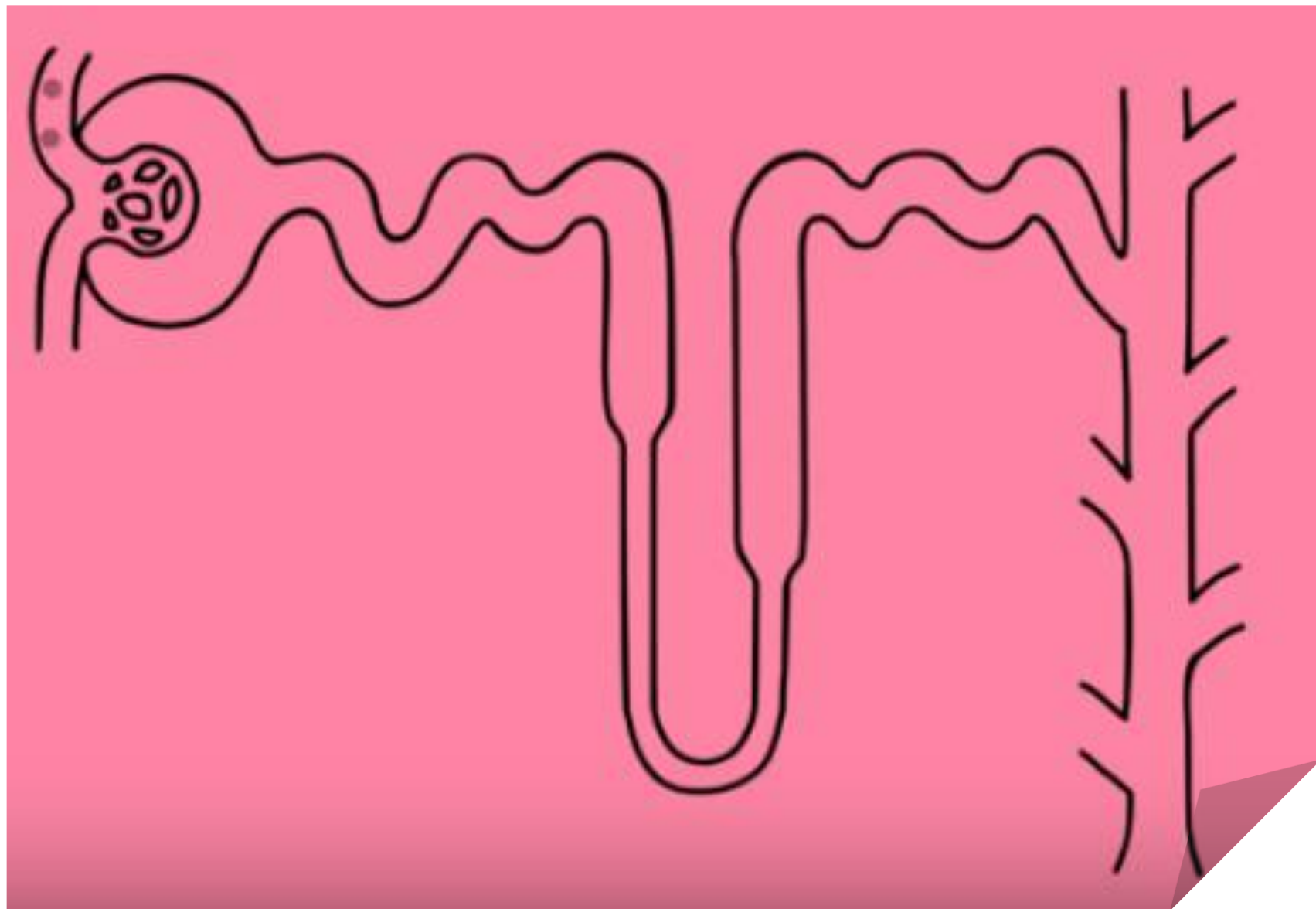
- K^+
- H^+
- NH_4^+

Descending limb

Ascending limb

Loop of Henle

<https://www.youtube.com/watch?v=8UVIXX-9x7Q>



U4 mini project

CHOICE ASSIGNMENT

+ **DRAMA:** write and perform a play which takes your audience through the journey of urine formation...must include a script!

+ **MUSIC:** write and perform or submit a song about urine formation...must include the written lyrics!

+ **ART:** write and illustrate a comic strip which explores urine formation.