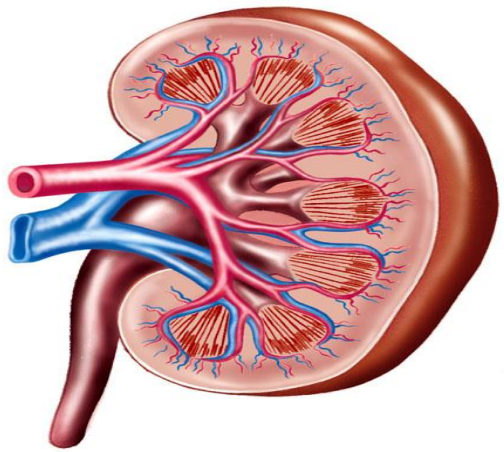
The Urinary System



- **Univerity of Basra**
- **Collage of Science**
- **Animal physiology**

Dr. Sundus Waleed Khalid

Organs of the Urinary system

Component of U.S.

- 2 Kidneys
- 2 Ureters
- Urinary bladder
- Urethra

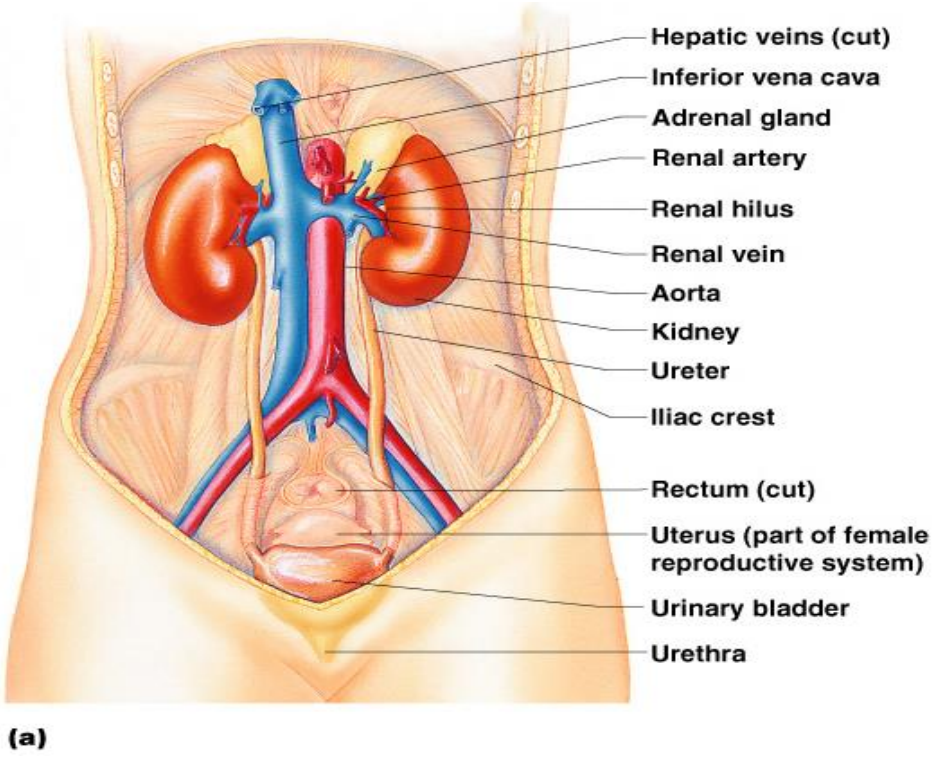


Figure 15.1a

- Urinary system is one of the four excretory systems in our body. The other three are intestine ,lungs and skin
- System functions to remove waste products from the blood
- Main functional units of the kidneys are the **nephrons**
- Nephrons filter the blood and form the urine
- Against the dorsal body wall
- The right kidney is slightly lower than the left
- Atop each kidney is an **adrenal gland**
- Lateral surface is convex
- Medial surface is concave
- **Hilus** is cleft :vessels,ureters,and nerves enter and leave

  Kidney has two region :-

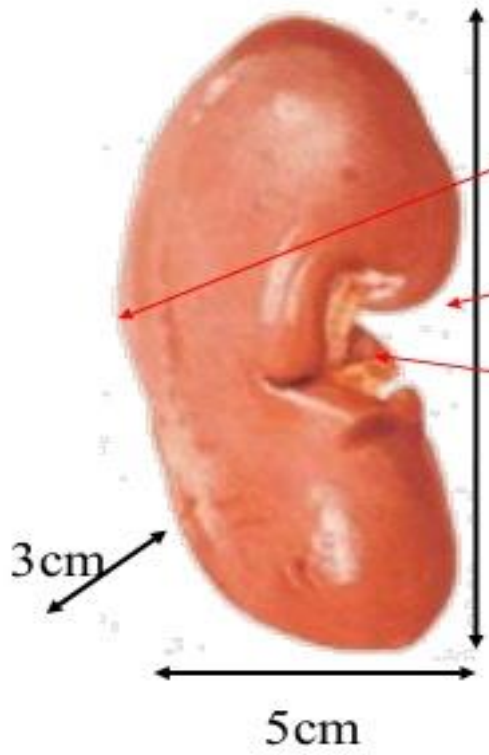
  1- **Cortex**: outer layer , columns of cortex divide medulla into pyramids

  2- **Medulla**: inner layer , darker ,cone-shaped medullary or renal pyramid, paralled bundles of urine- collecting tubules

The Kidneys/Renes

- ***Definition***

  – ***The kidneys are a pair of excretory organs situated on the posterior abdominal wall, one on each side of the vertebral column, behind the peritoneum.***

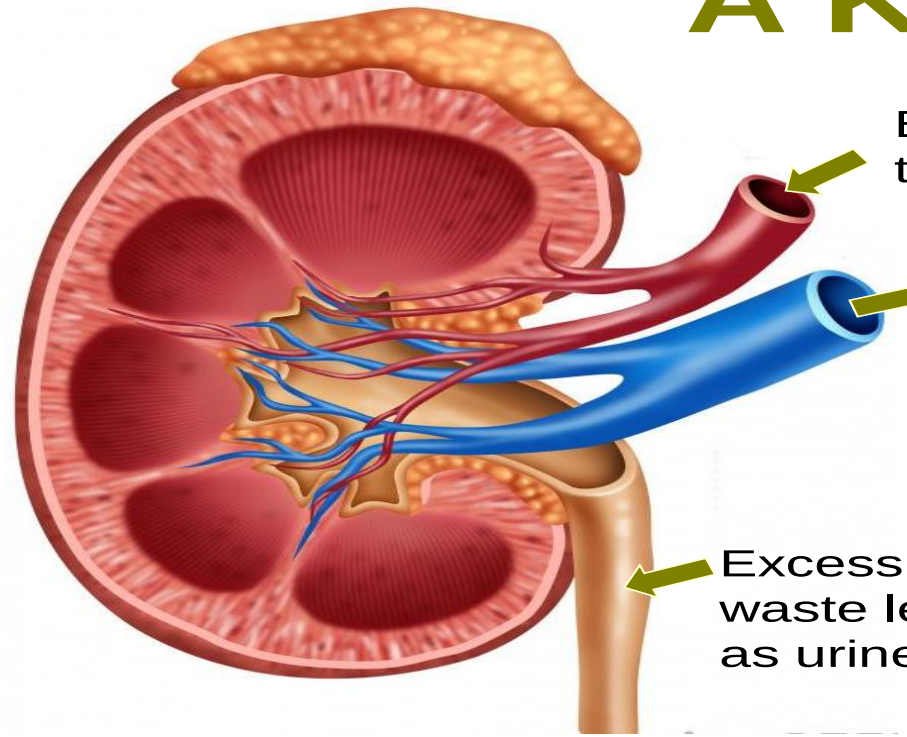


- The lateral border is convex.
- The medial border is concave.
- The middle part of the medial border is depressed and is known as hilum (hilus)

Kidney Functions

- Filter blood (toxins, metabolic waste ,excess water and excess ions)
- Dispose of nitrogenous waste from blood(urea,uric acid, creatinine)
- Regulates blood volume and pressure
- Regulates osmolarity of body fluids
- Secretes renin, activates angiotensin ,aldosterone (controls BP,electrolytes balance)
- Secretes erythropoietin controls RBCs count
- Regulates acid – base balance
- Gluconeogenesis

A Kidney



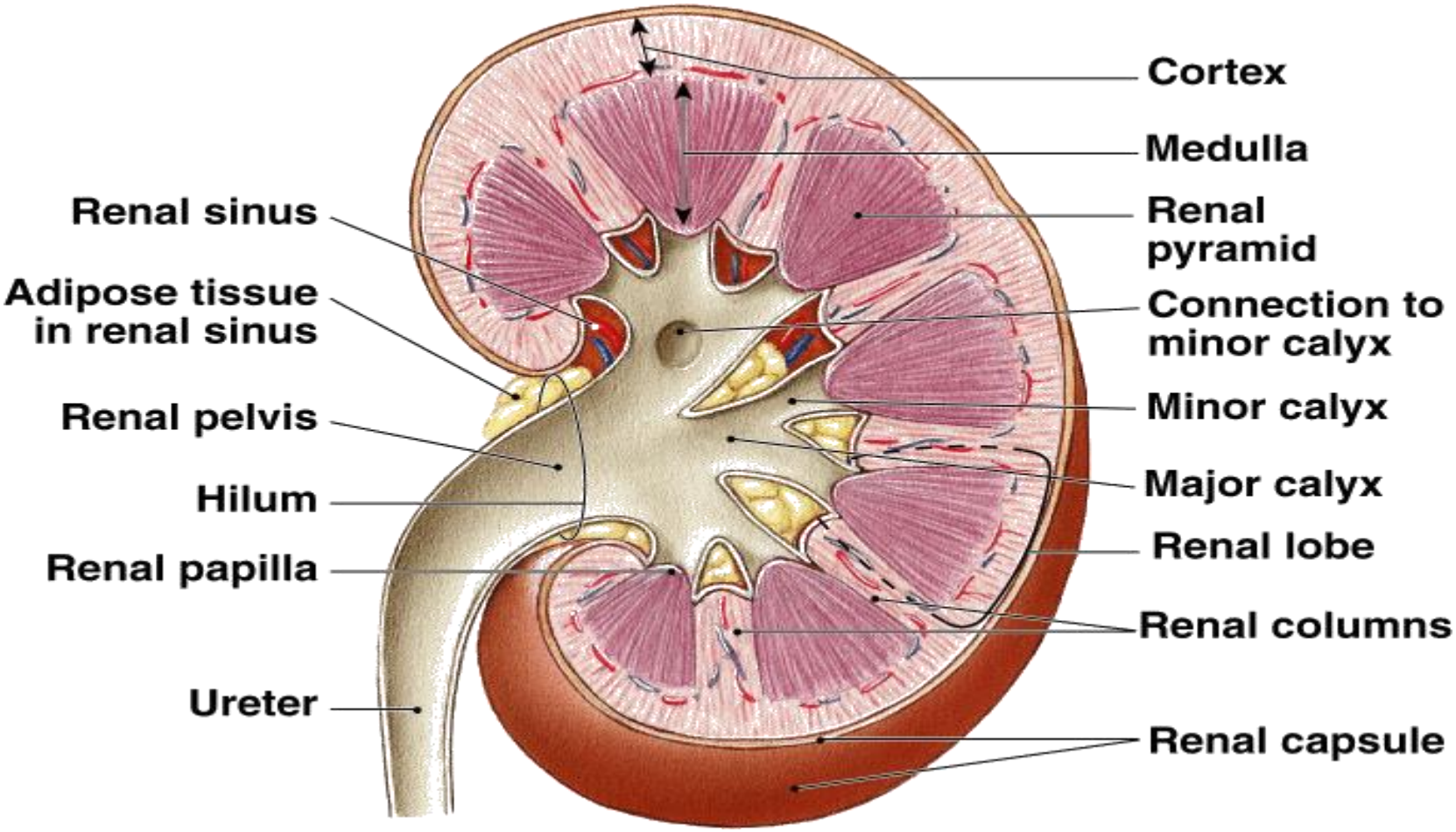
Blood and waste enter through renal artery

Filtered blood leaves through renal vein

Excess water and toxic waste leaves through ureter as urine

Coverings of the Kidneys

- Renal capsule
  - Surrounds each kidney
- Adipose capsule
  - Surrounds the kidney
  - Provides protection to the kidney
  - Helps keep the kidney in its correct location



Section of left kidney structure

Renal Tubule

- Proximal convoluted tubule (PCT)
  - Cuboidal cells with dense microvilli and large mitochondria
  - Functions in reabsorption and secretion
  - Confined to the cortex

Renal Tubule

- **Loop of Henle with descending and ascending limbs**
  - **Thin segment usually in descending limb**
    - **Simple squamous epithelium**
    - **Freely permeable to water**
  - **Thick segment of ascending limb**
    - **Cuboidal to columnar cells**

Renal Tubule

- Distal convoluted tubule (DCT)
  - Cuboidal cells with very few microvilli
  - Function more in secretion than reabsorption
  - Confined to the cortex

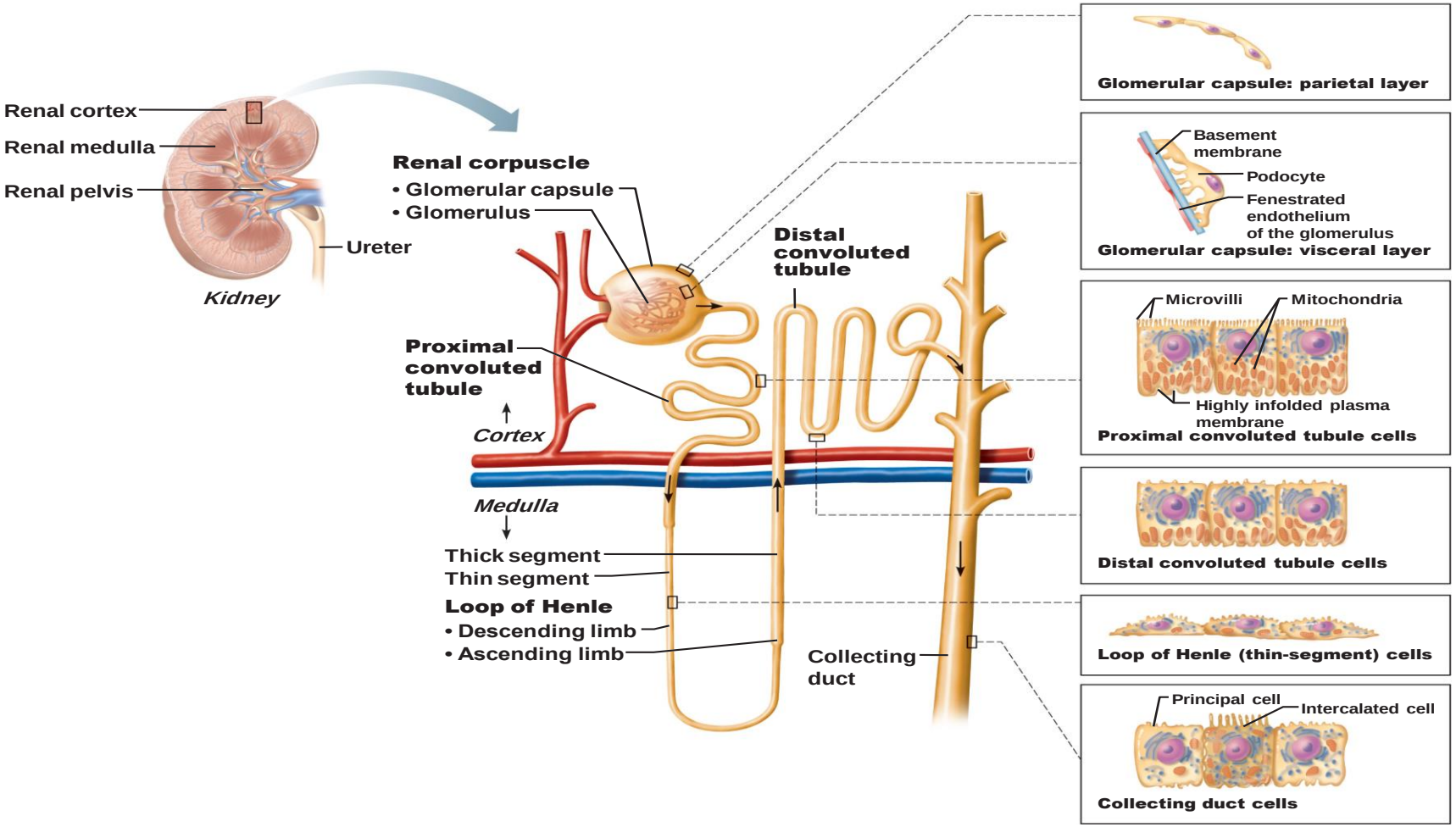


Figure 25.5

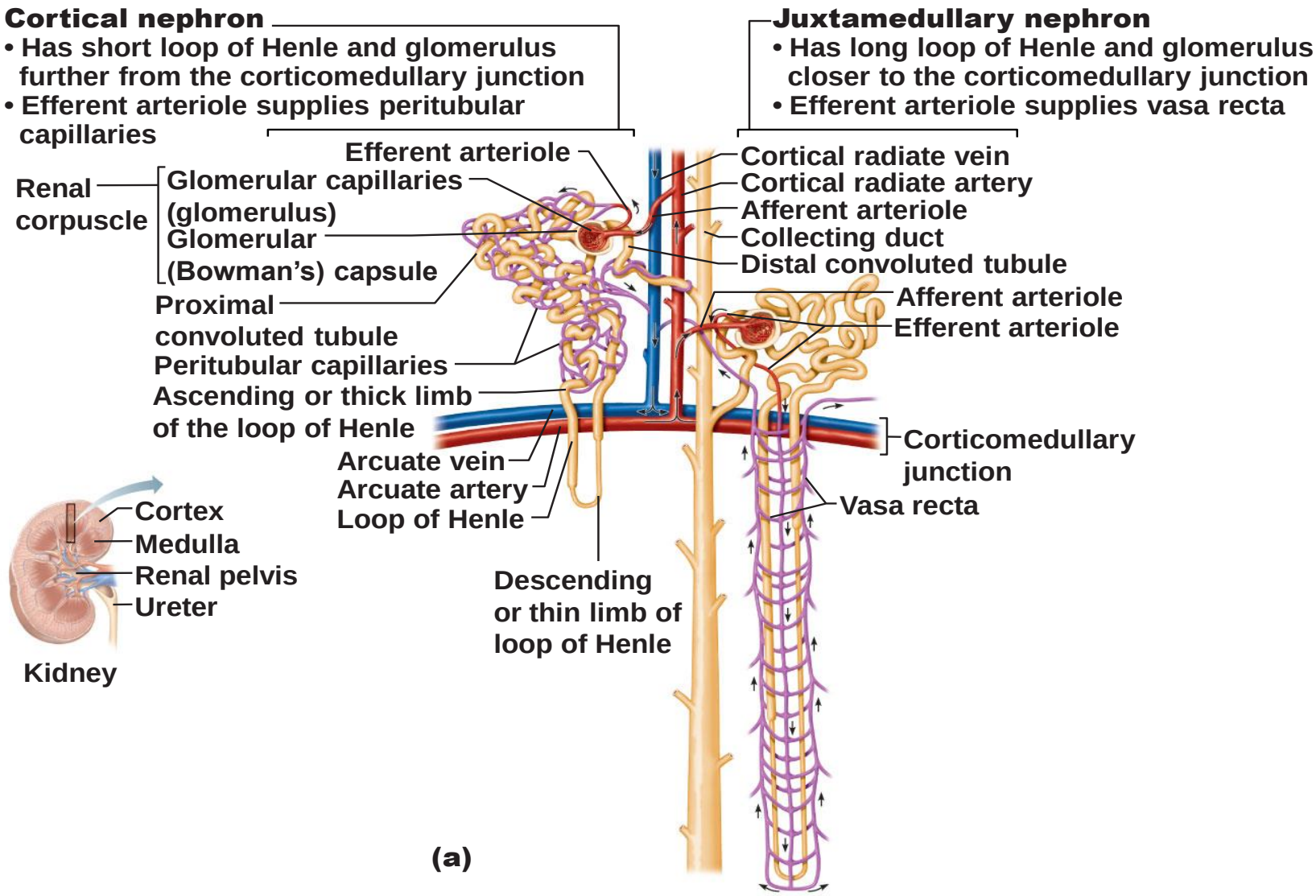


Figure 25.7a

Types of Nephrons

- Cortical nephrons
  - Located entirely in the cortex
  - Includes most nephrons
- Juxtamedullary nephrons
  - Found at the boundar of the cortex and medulla

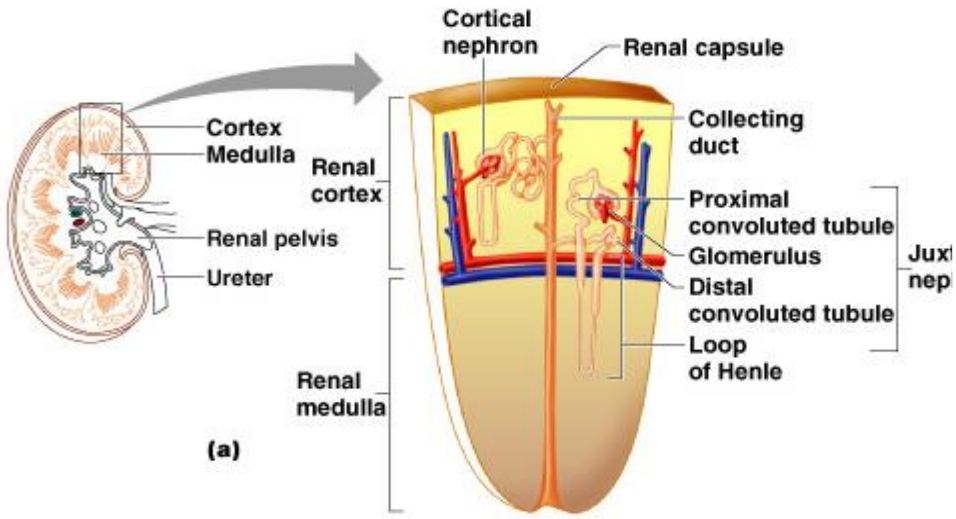
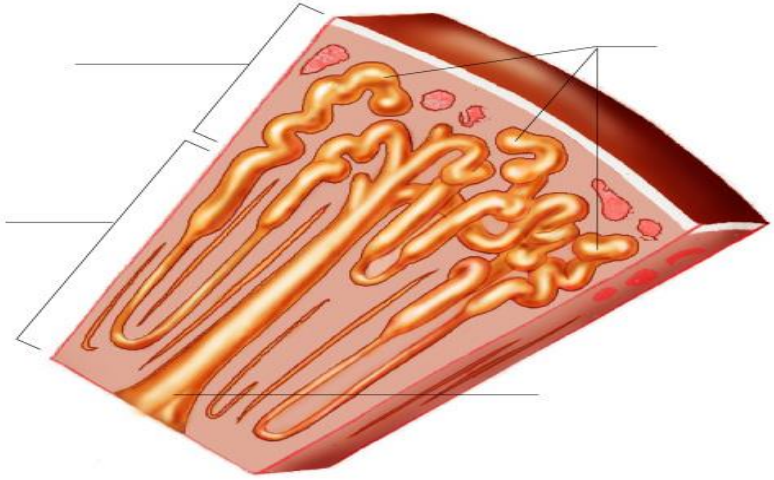


Figure 15.3a

Urine Formation Processes

- Filtration
- Reabsorption
- Secretion



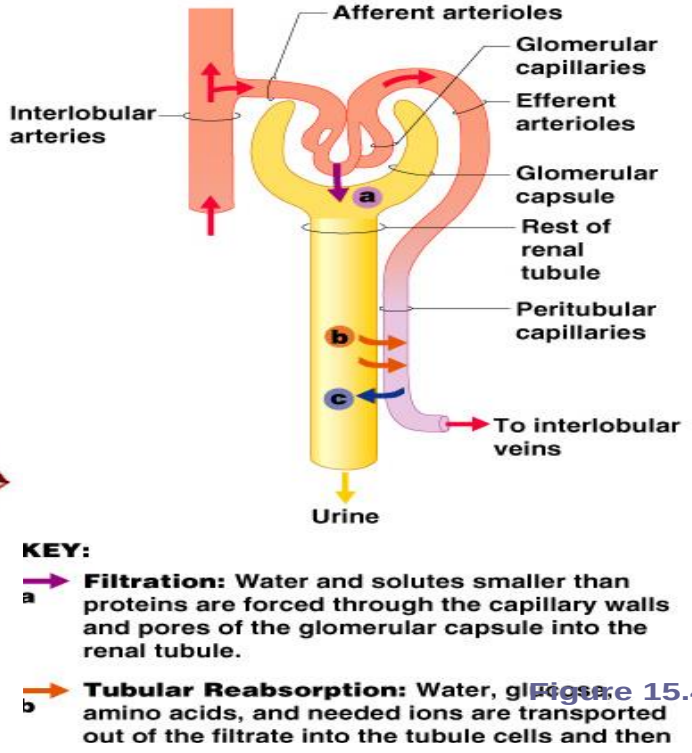


Figure 15.4

Filtration

- Nonselective passive process
- Water and solutes smaller than proteins are forced through capillary walls
- Blood cells cannot pass out to the capillaries
- Filtrate is collected in the glomerular capsule and leaves via the renal tubule

Secretion – Reabsorption in Reverse

- Some materials move from the peritubular capillaries into the renal tubules
  - Hydrogen and potassium ions
  - Creatinine
- Materials left in the renal tubule move toward the ureter

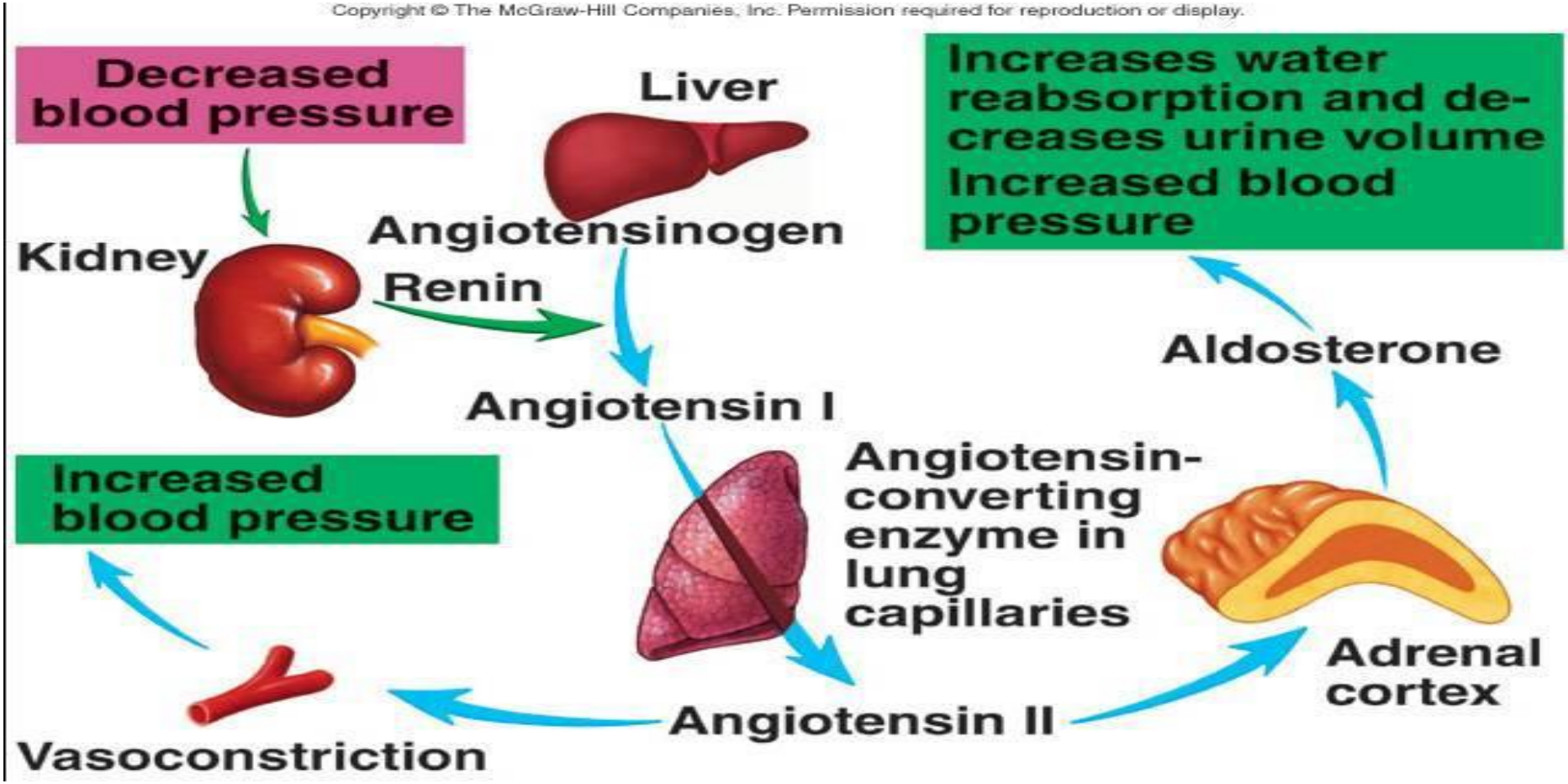
Reabsorption

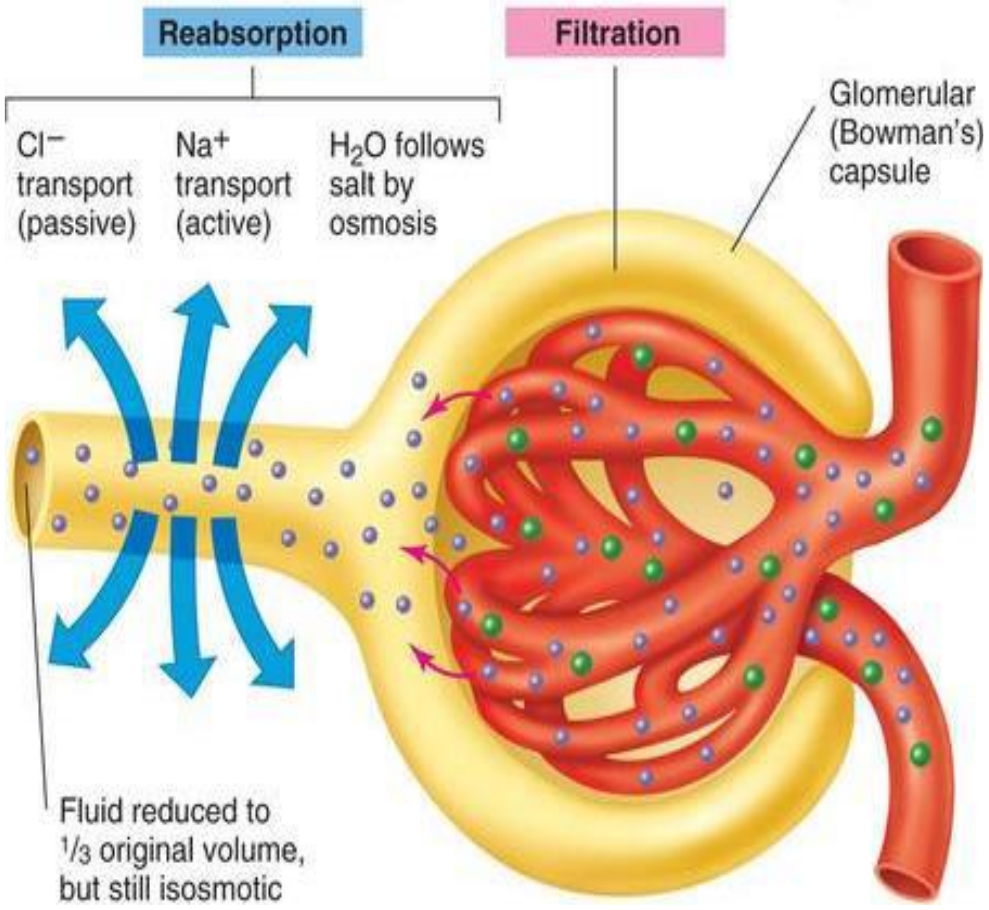
- The peritubular capillaries reabsorb several materials
  - Some water
  - Glucose
  - Amino acids
  - Ions
- Some reabsorption is passive, most is active
- Most reabsorption occurs in the proximal convoluted tubule

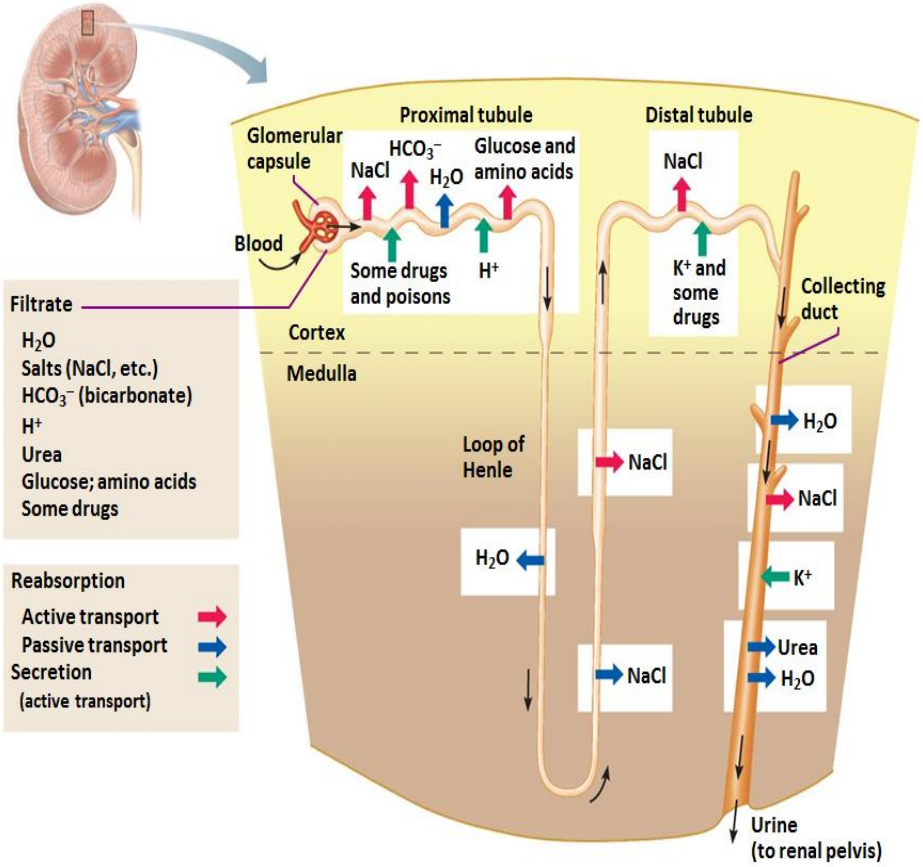
Materials Not Reabsorbed

- Nitrogenous waste products
  - Urea
  - Uric acid
  - Creatinine
- Excess water

convoluted tubule







Urine formation