Urinary System:

- **Outcome:** I can describe the specific filtration process kidneys use for blood.

- **Drill:**

  What are the four main structures/organs in the urinary system?

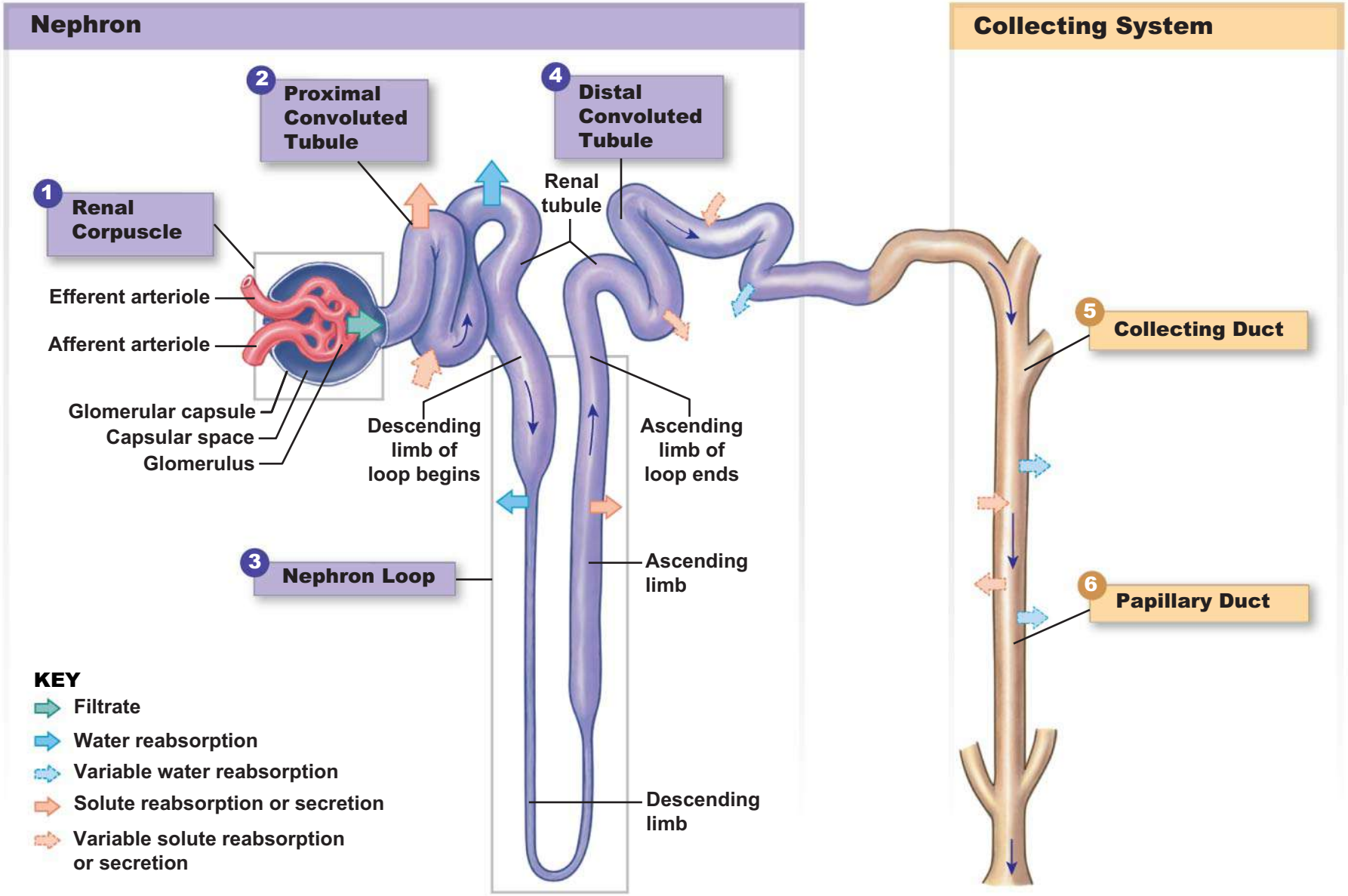

Figure 24.4 1 – 2

Types of nephrons and their location

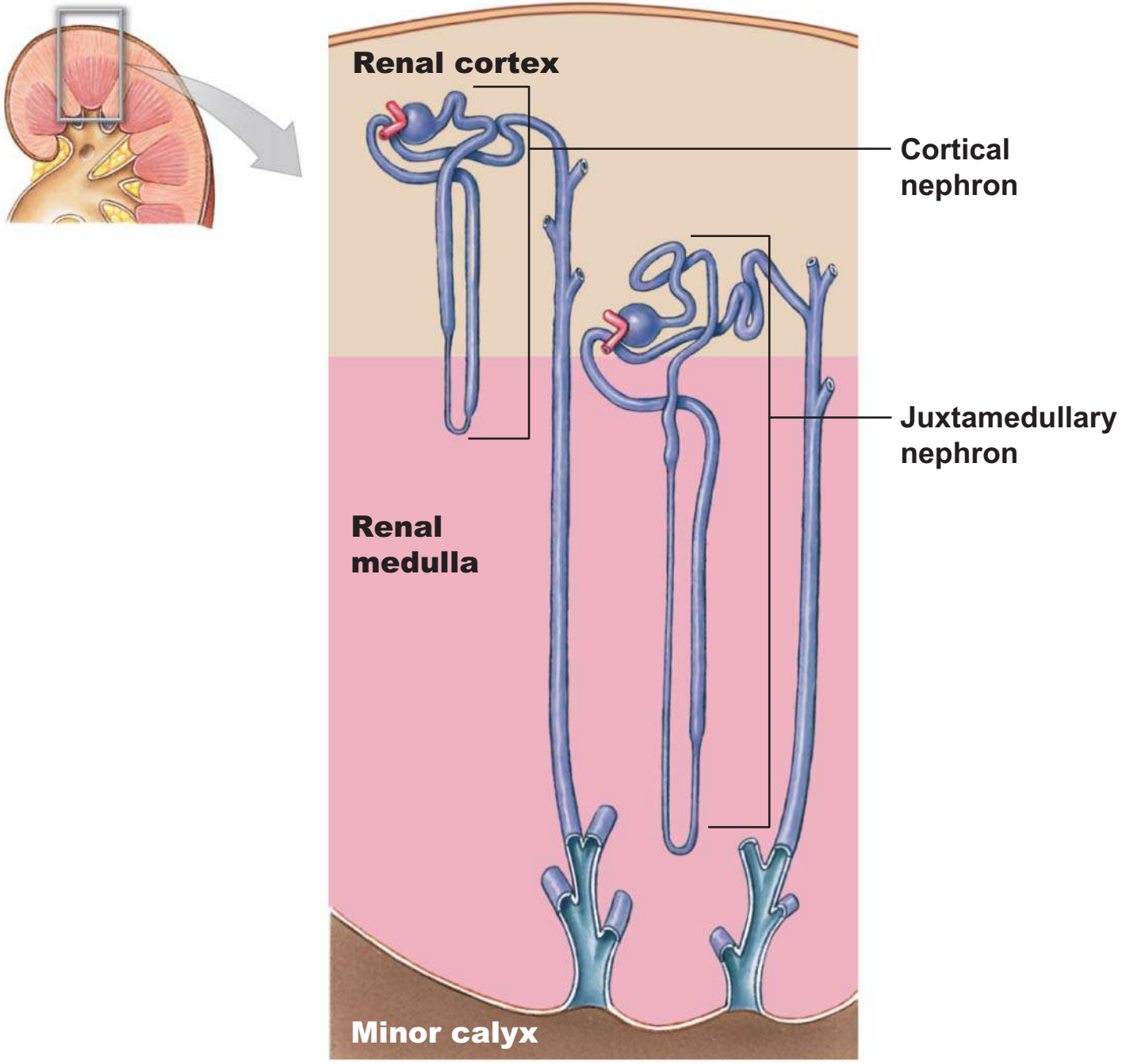

Figure 24.3 3

Segments of a Nephron

Nephron components

- Two components
  1. **Renal corpuscle**
     - Blood pressure forces water and solutes out of the glomerular capillaries in a process called filtration
       - Produces **filtrate** (protein-free solution, similar to blood plasma)
  2. **Renal tubule**
     - Tubular passageway
     - Receives filtrate and modifies it to create urine

Segments of a Nephron

Nephron segments

- **Renal corpuscle**
  - **Glomerular capsule** (cup-shaped chamber)
  - Capillary network (**glomerulus**)
- **Proximal convoluted tubule** (**PCT**)
  - Reabsorbs nutrients from the filtrate (now called **tubular fluid**)

Segments of a Nephron

Nephron segments (continued)

- **Nephron loop (Loop of Henle)**
  - Establishes osmotic gradient for water reabsorption
  - Each limb contains a **thin segment** and a **thick segment**
- **Distal convoluted tubule** (**DCT**)
  - Adjusts tubular fluid composition by reabsorption and secretion

Parts of a nephron

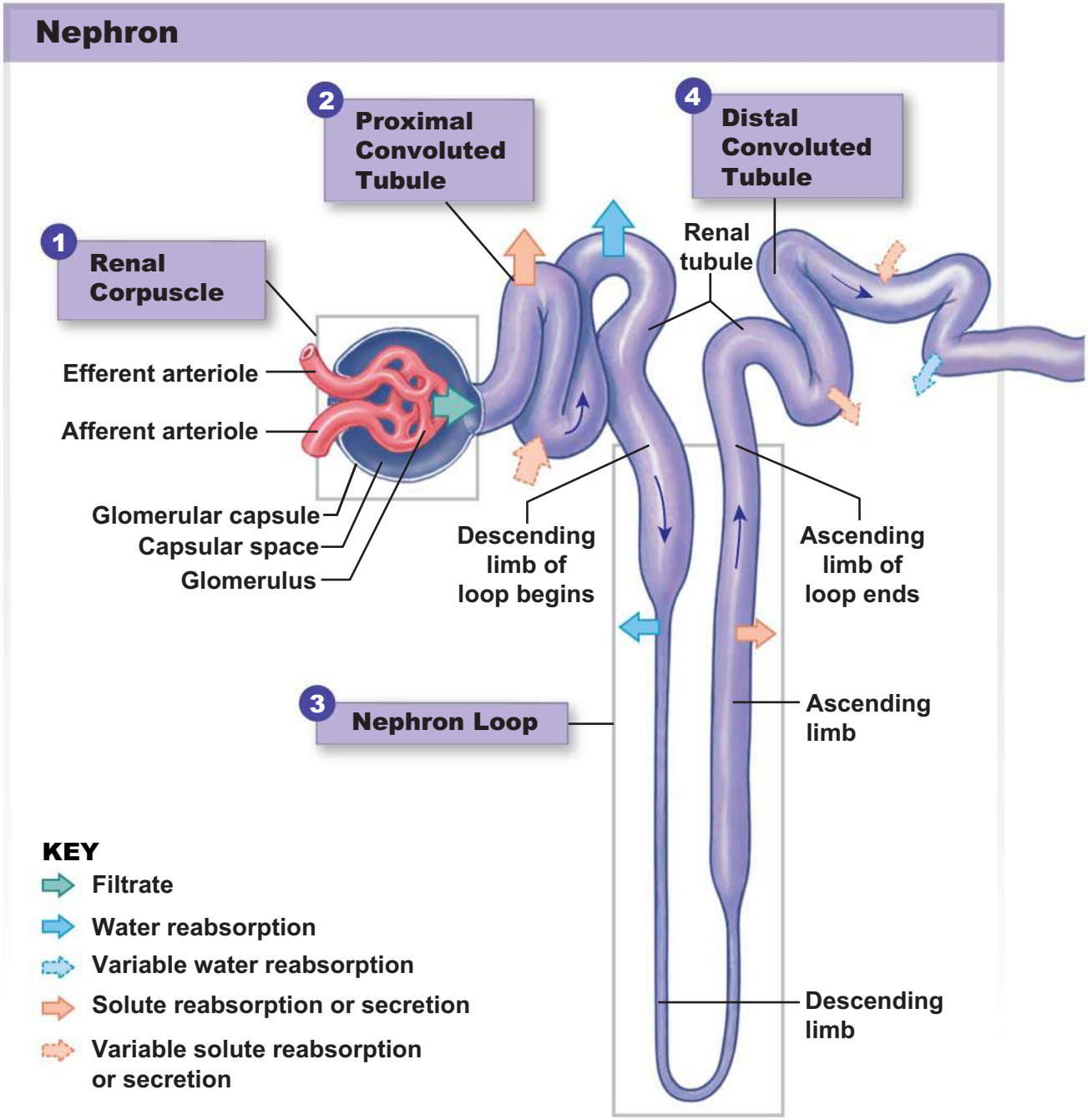

Figure 24.4 1

Circulation Patterns in the Kidney

Blood flow around a nephron

- **Afferent arteriole**
  - Supplies blood to each individual nephron
- **Glomerulus (FILTRATION OCCURS HERE)**
- **Efferent arteriole**
  - Carries blood from the glomerulus to the peritubular capillaries
- **Peritubular capillaries (in Cortical Nephron)**
- **Vasa Recta (in Juxtmedullary Nephron)**
  - Surround the entire renal tubule
  - Collect water and solutes absorbed by the nephron
  - Deliver other solutes to the nephron for secretion
  - Drain into cortical radiate veins

Cross-sectional view of the visceral layer of the glomerular capsule

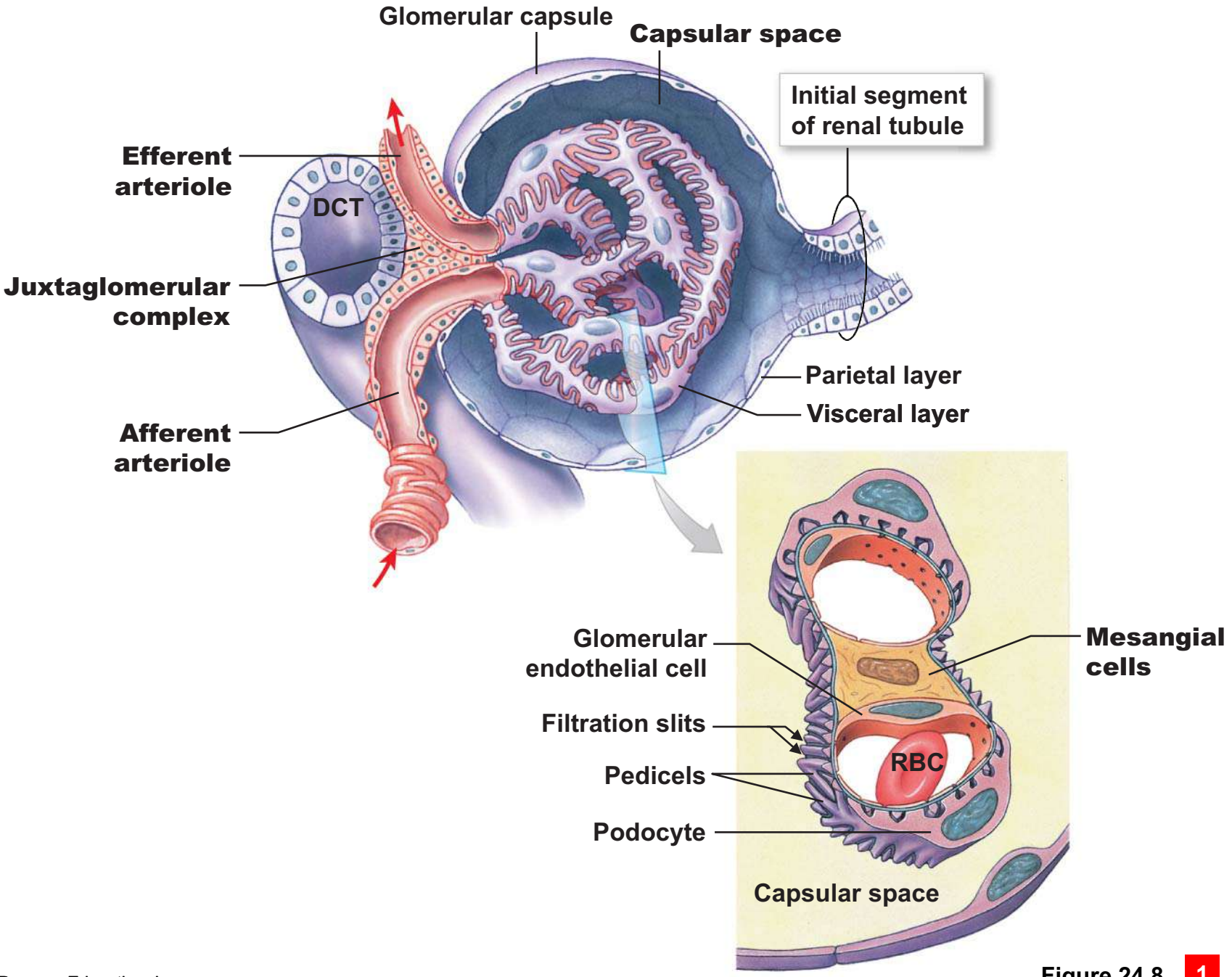

Figure 24.8 1 – 2

Peritubular capillaries in a cortical nephron

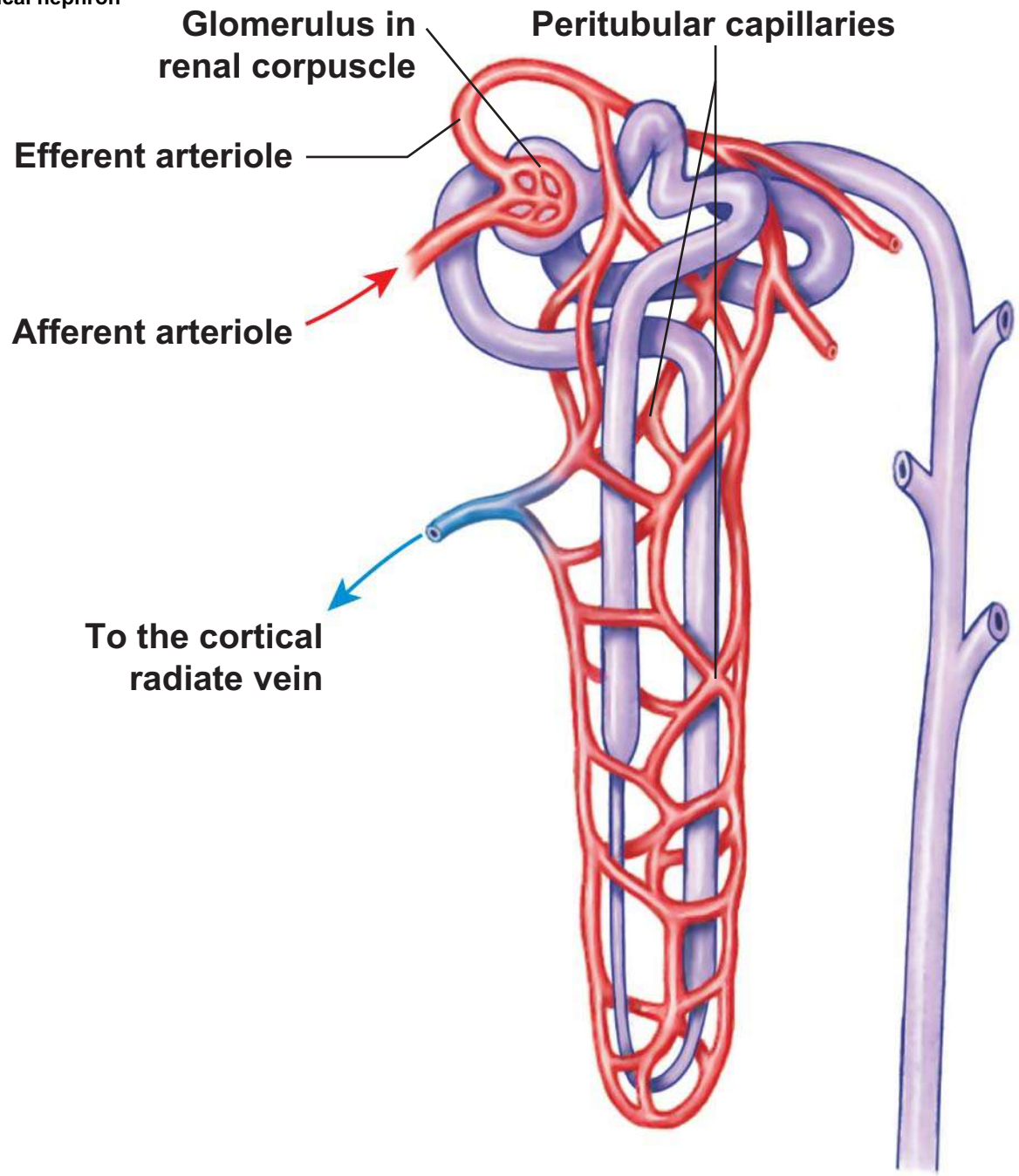

Figure 24.5 2

Vasa recta in a juxtamedullary nephron

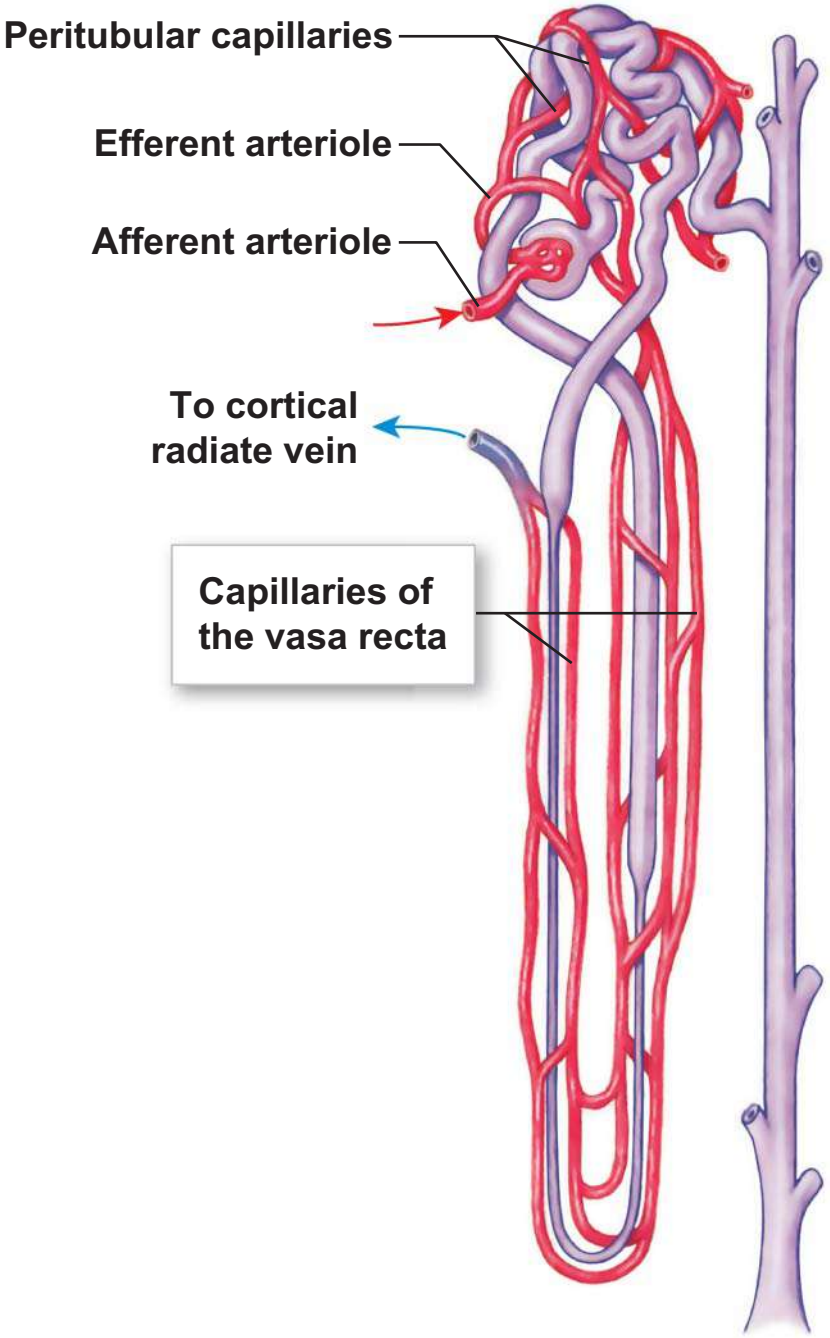

Figure 24.5 3

Locations of filtration, reabsorption, and secretion in the nephron and collecting system

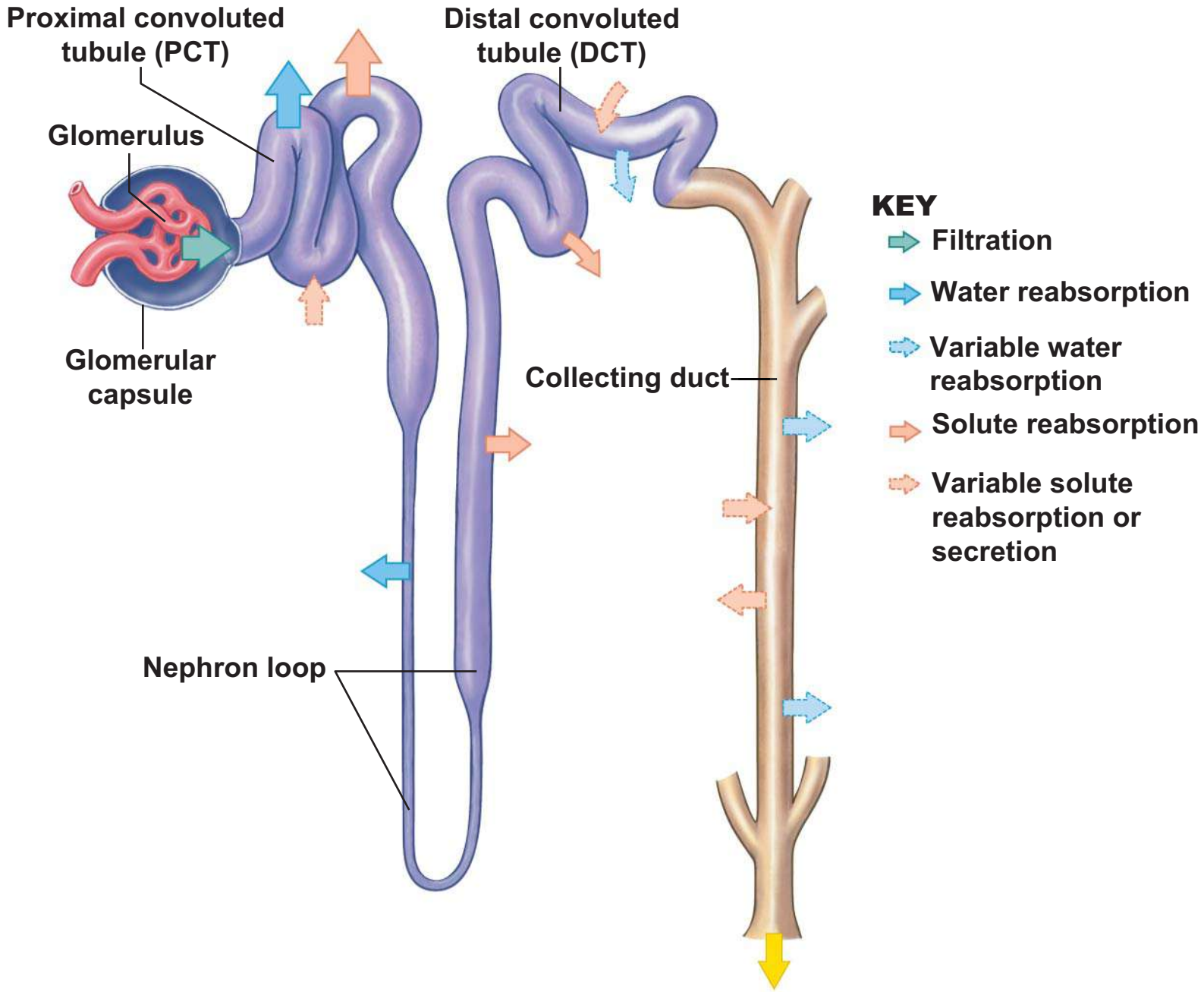

Figure 24.7 1

Glomerular Filtration Rate

Glomerular filtration rate (GFR)

- Amount of filtrate produced by the kidneys each minute
  - Each kidney has ~6 m^2 (64 sq. ft.) of filtration surface
  - GFR averages 125 mL/min (180 L/day)
    - ~99 percent is reabsorbed

Urinary System:

- **Exit Ticket:**
- Describe the pathway of blood flow into the kidney. What arteries are being pass through (in order)?