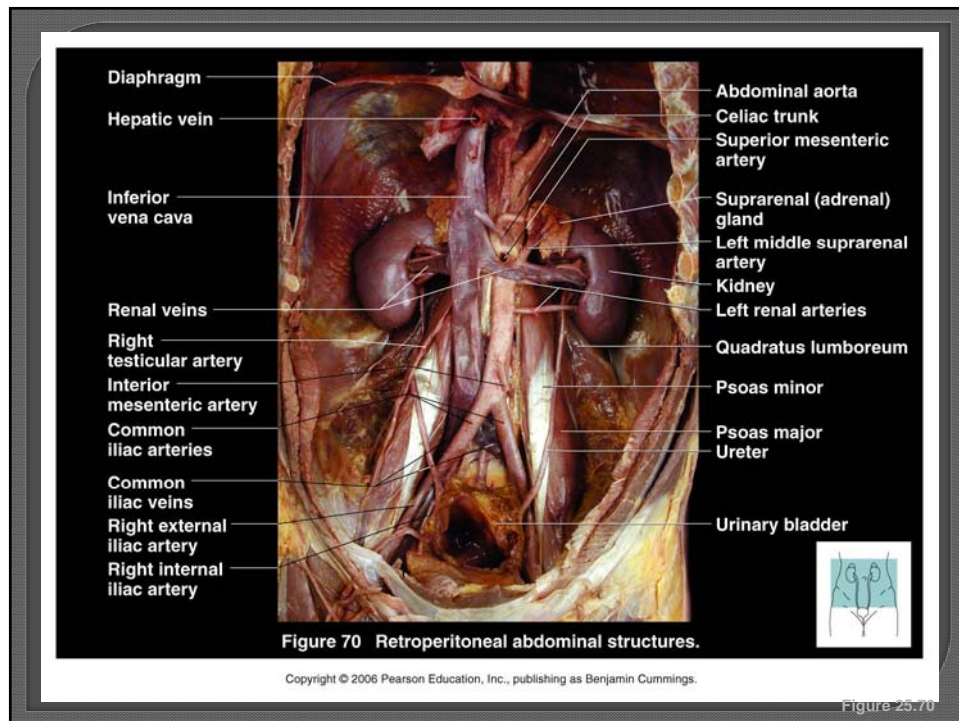
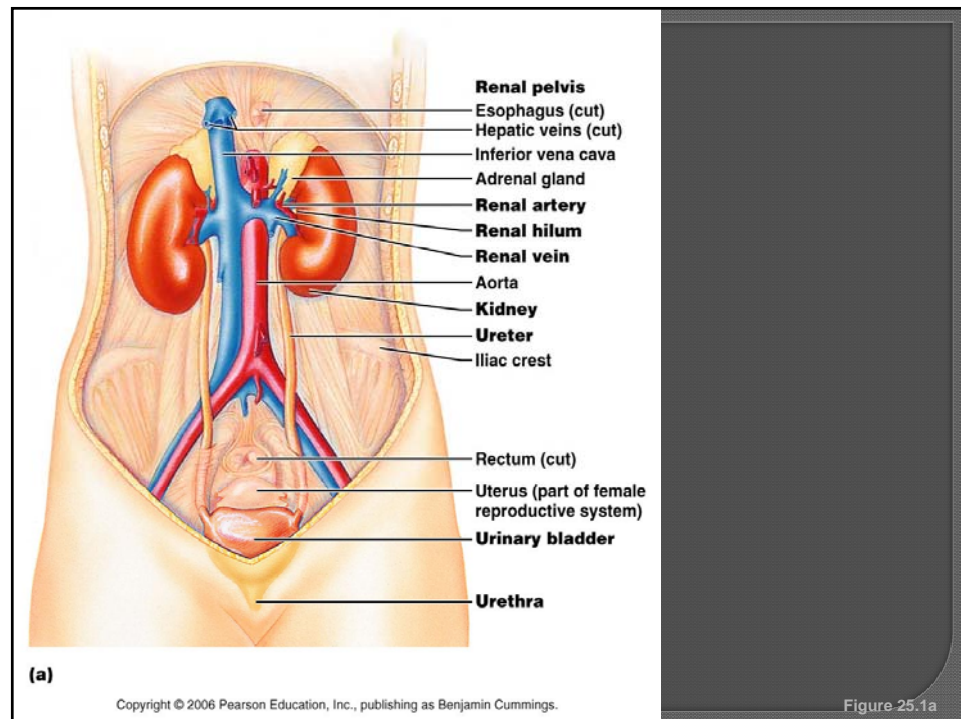
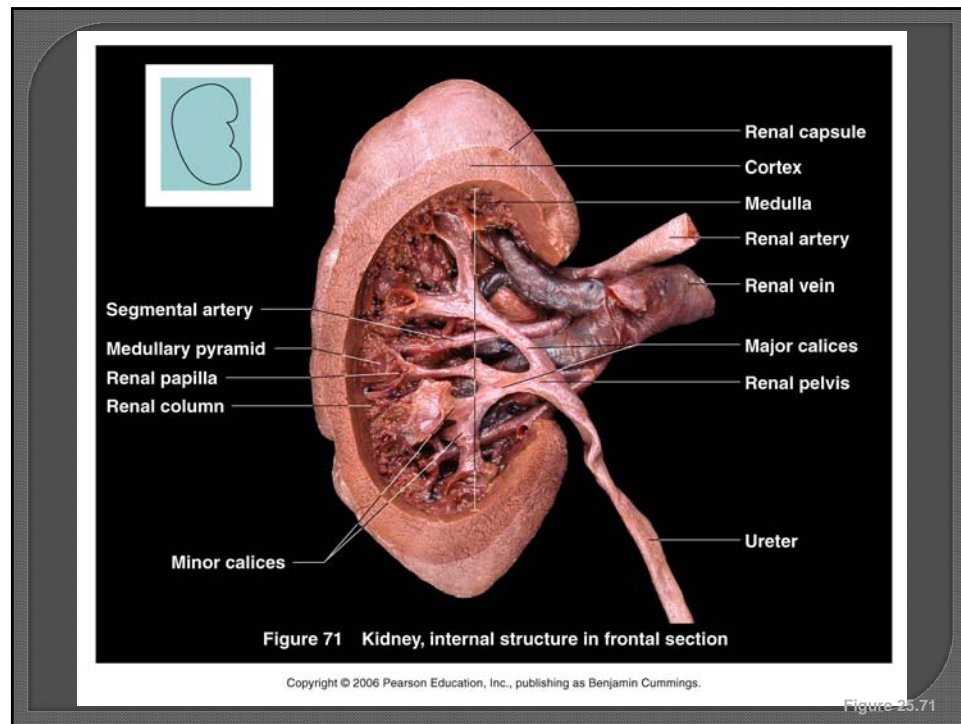
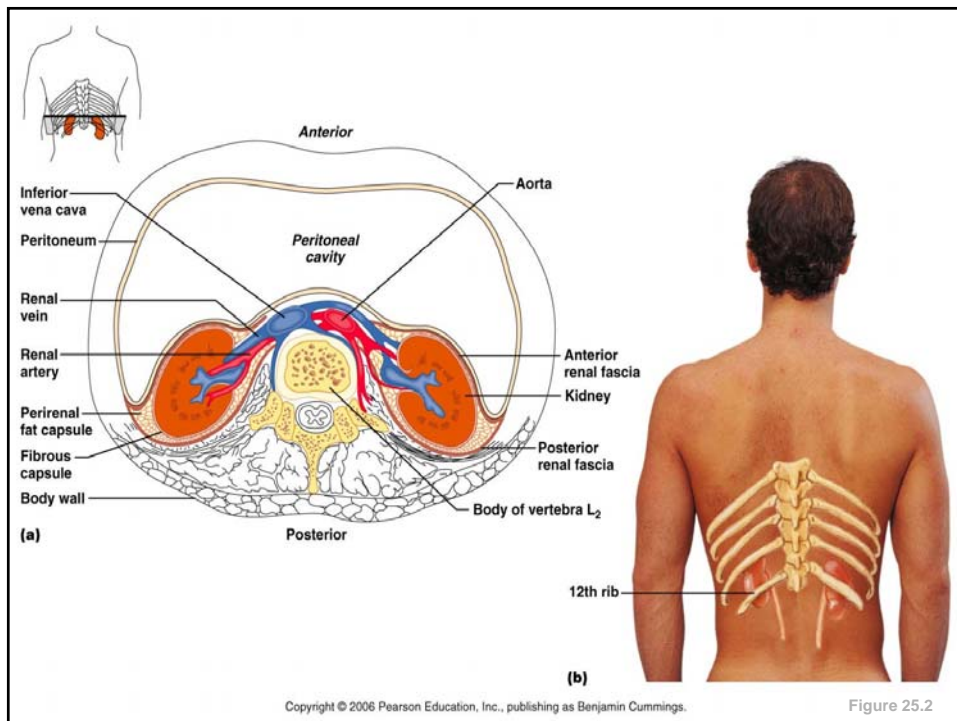
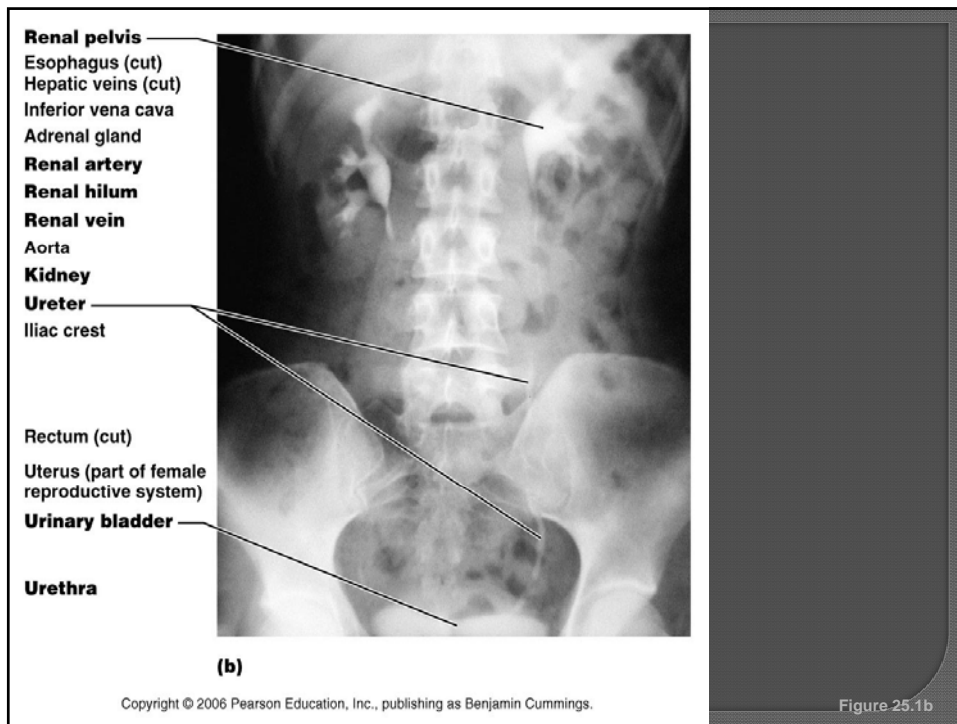
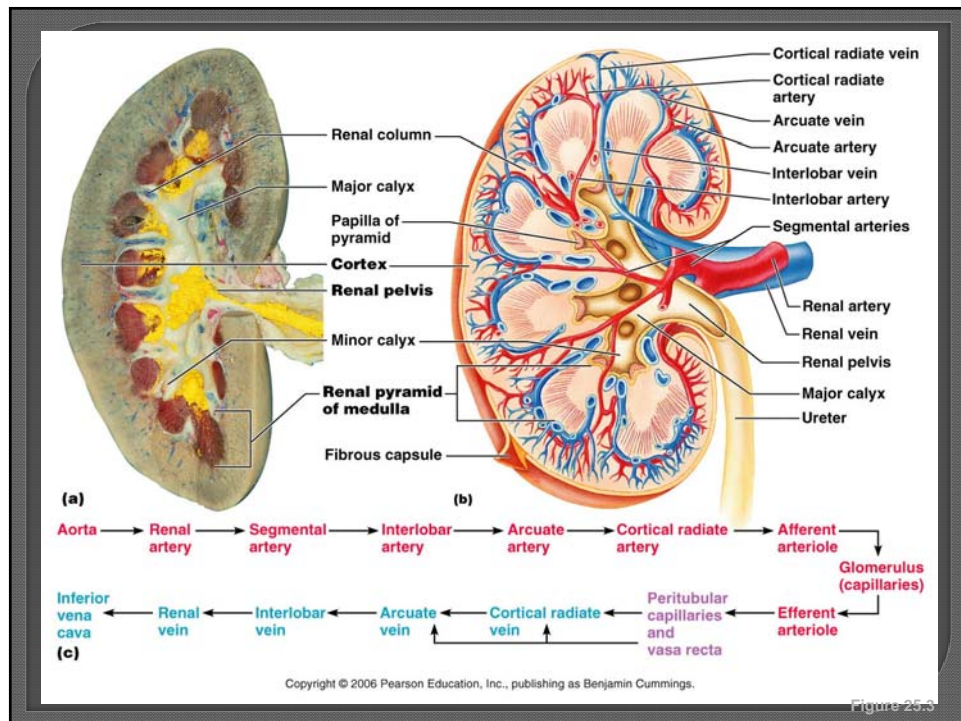
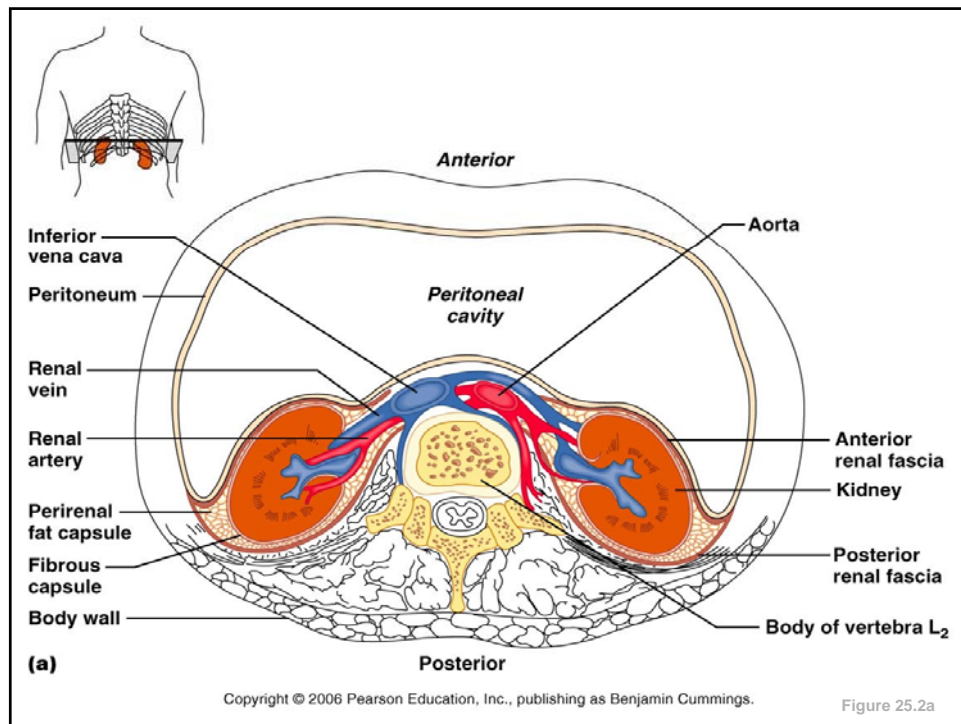


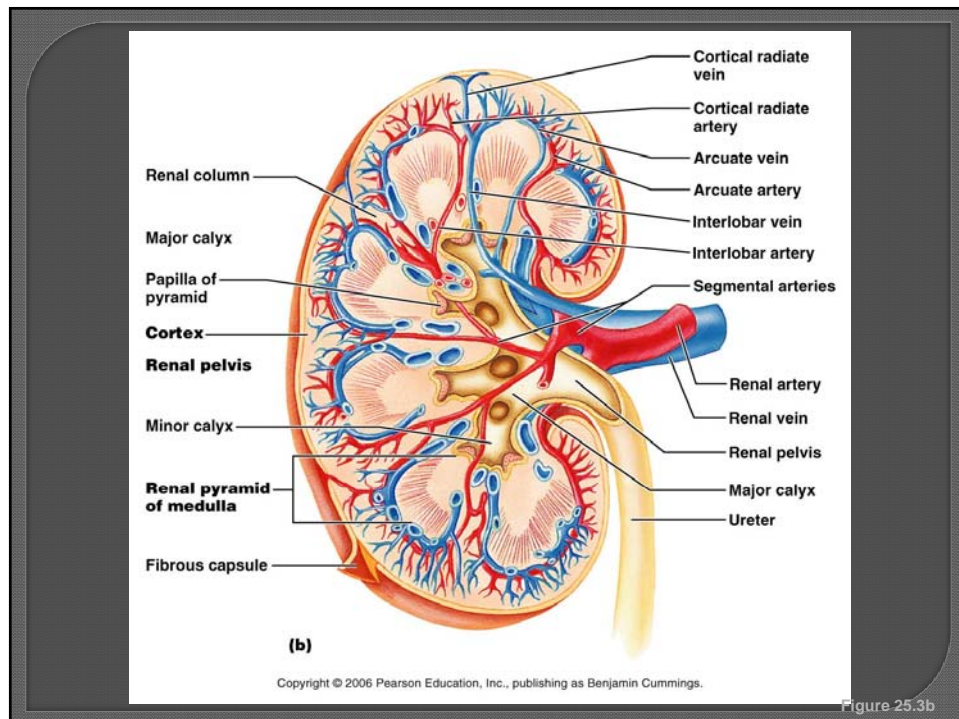
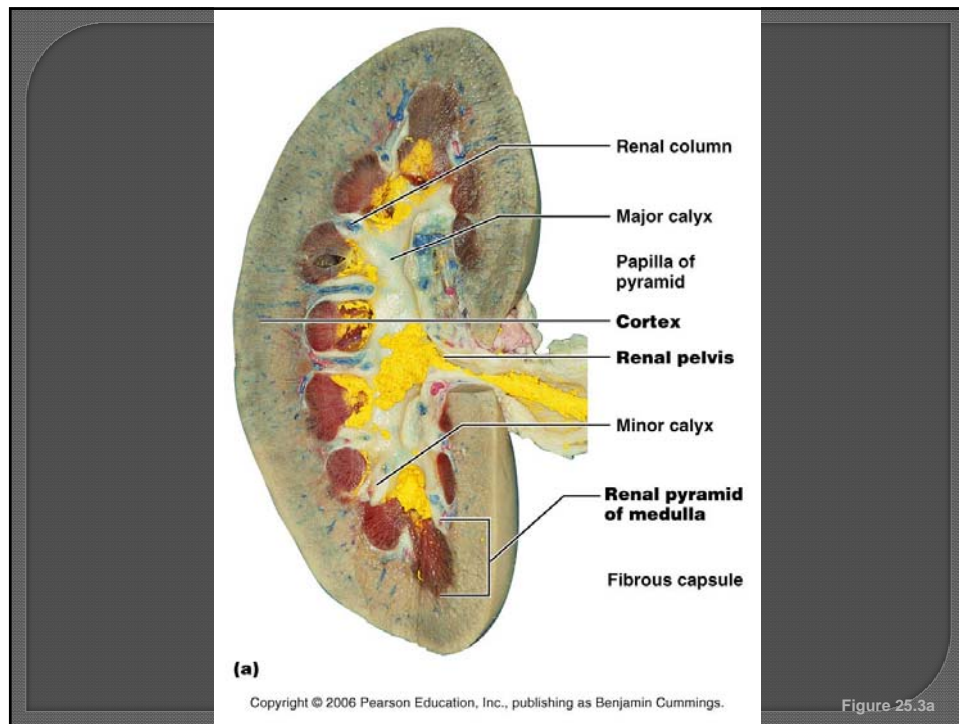
URONEPHRO ANATOMY PICTURES

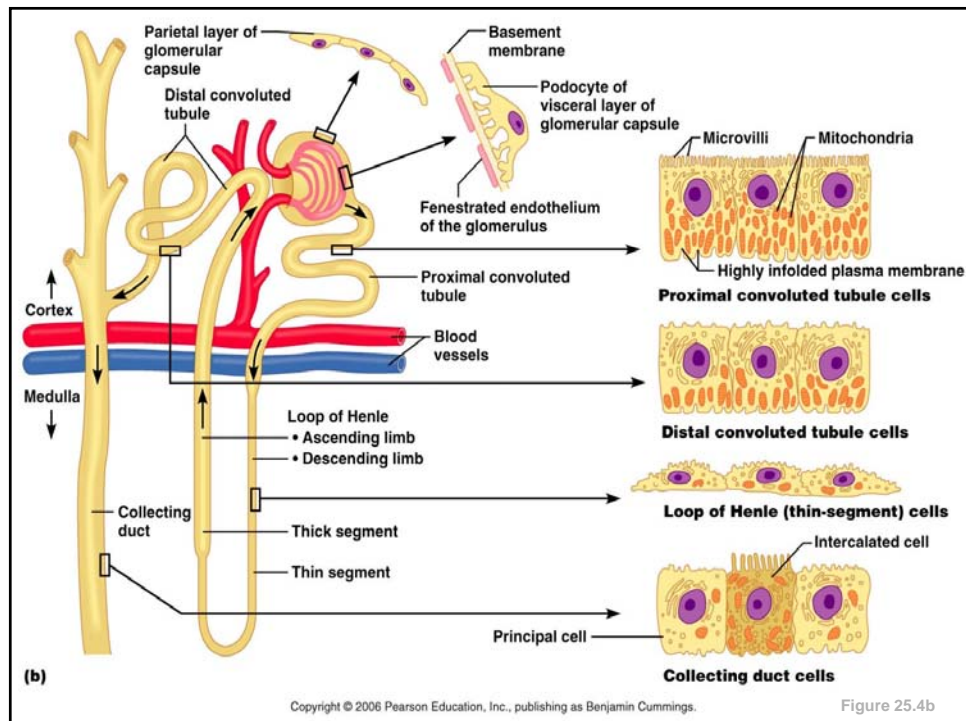
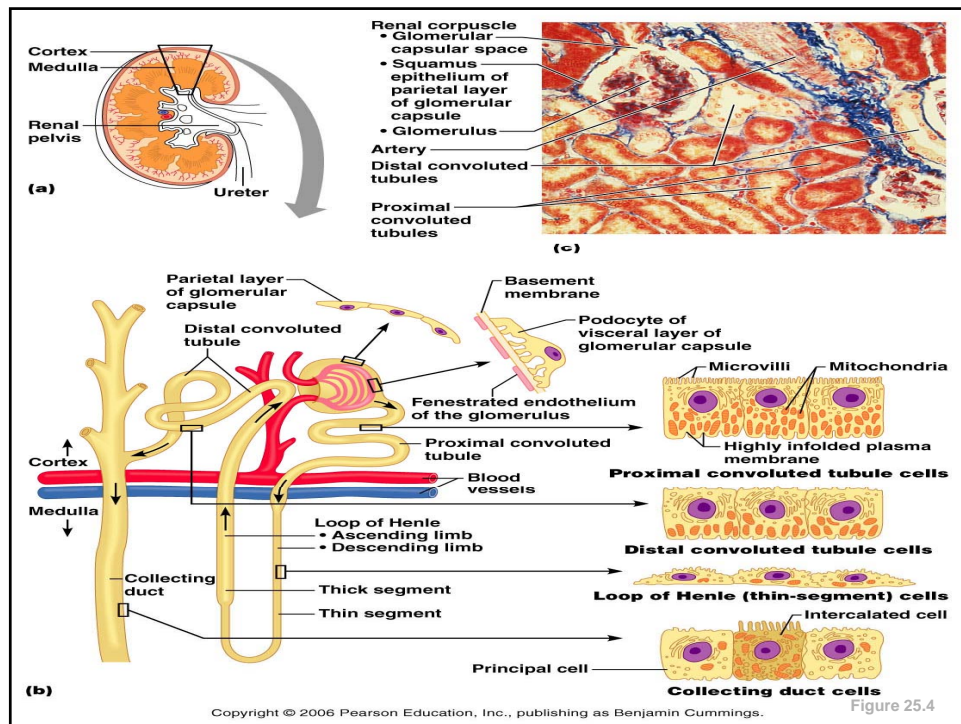


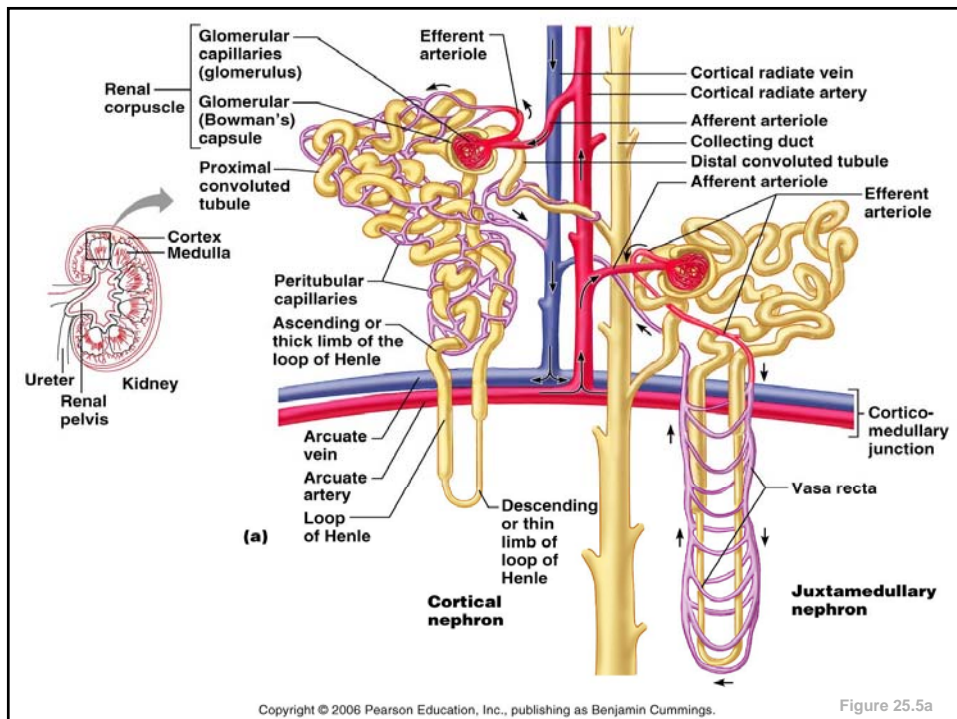
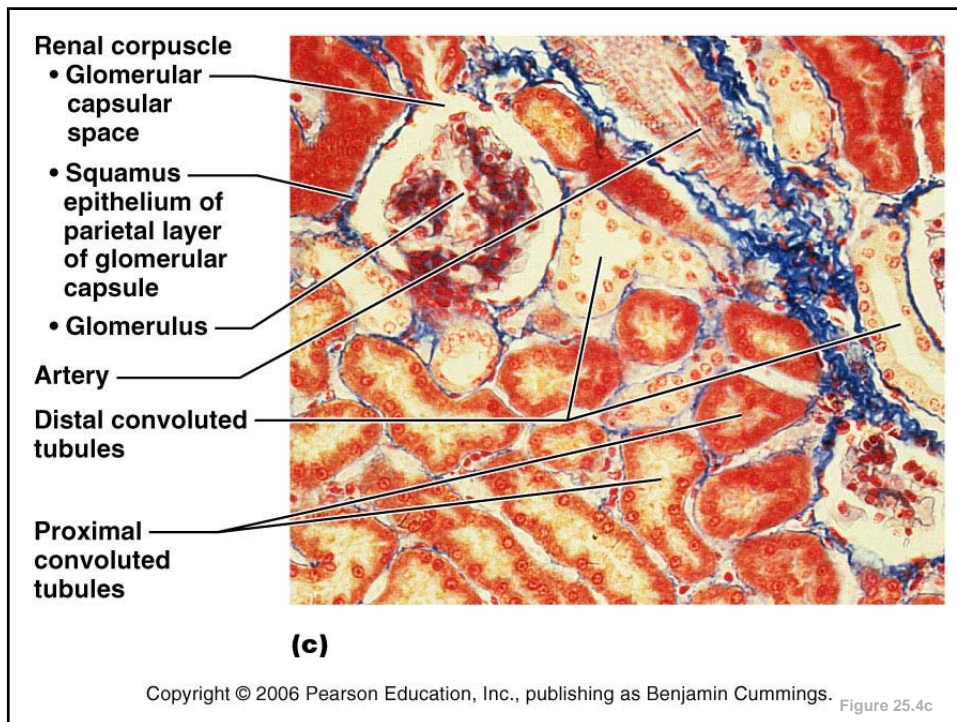


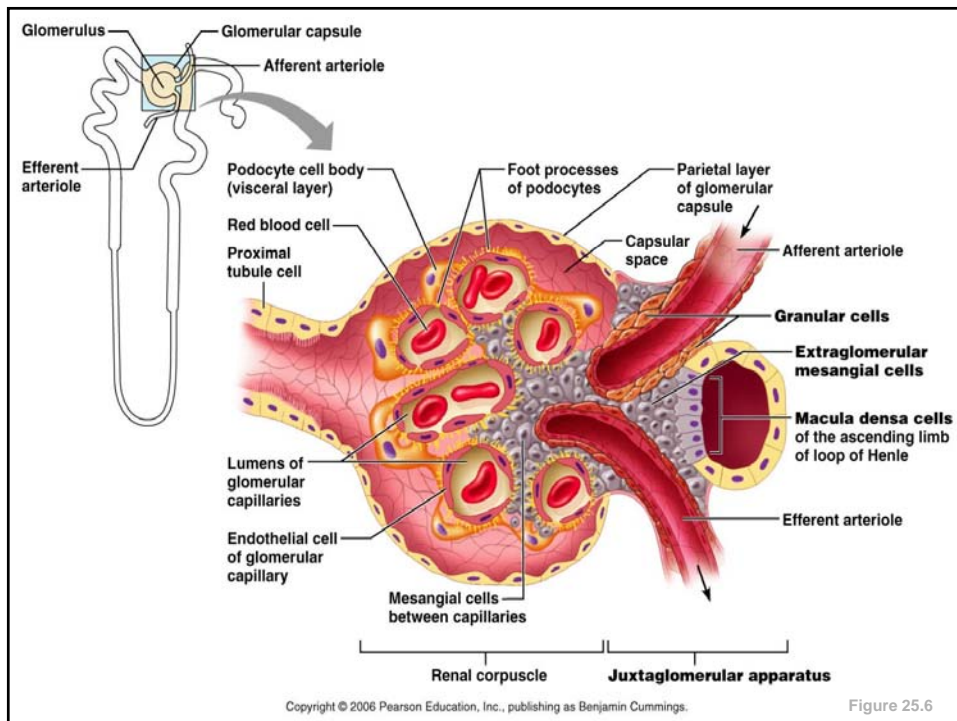
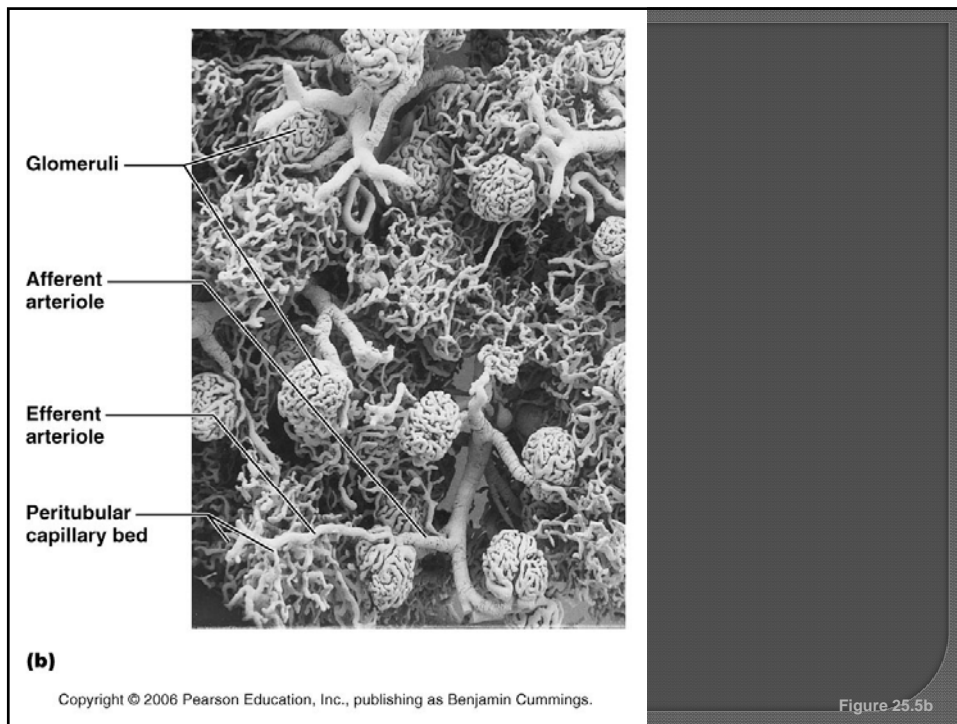


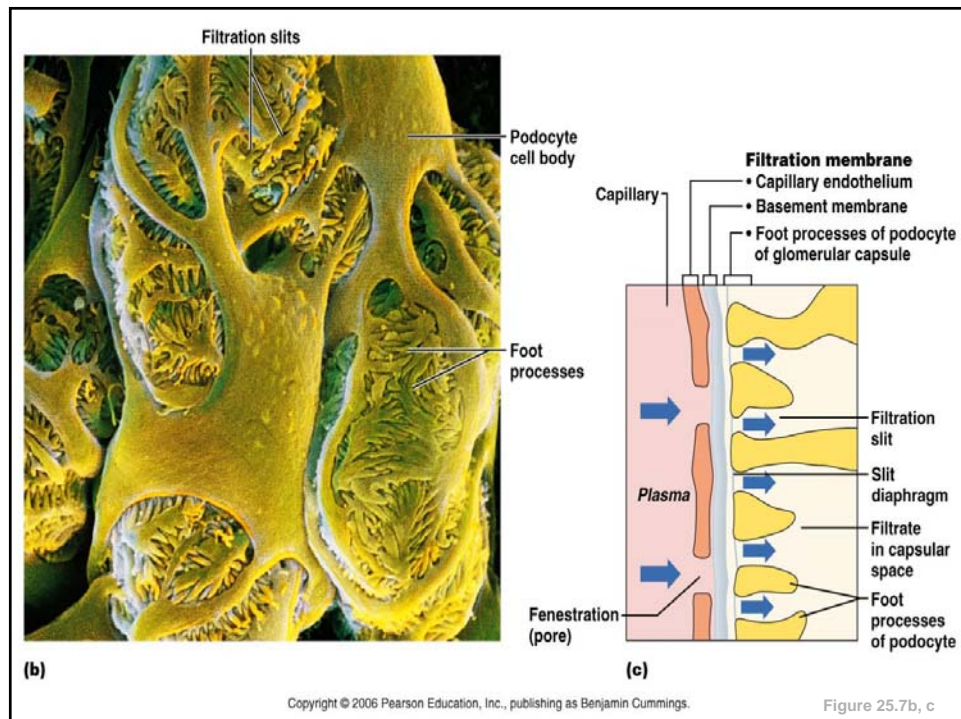
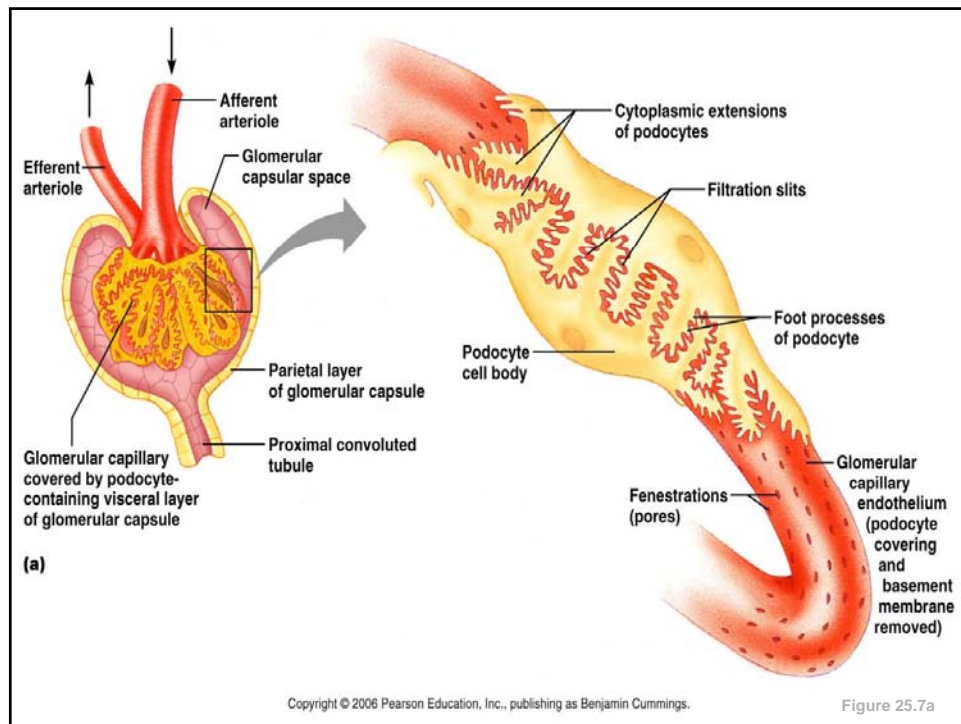


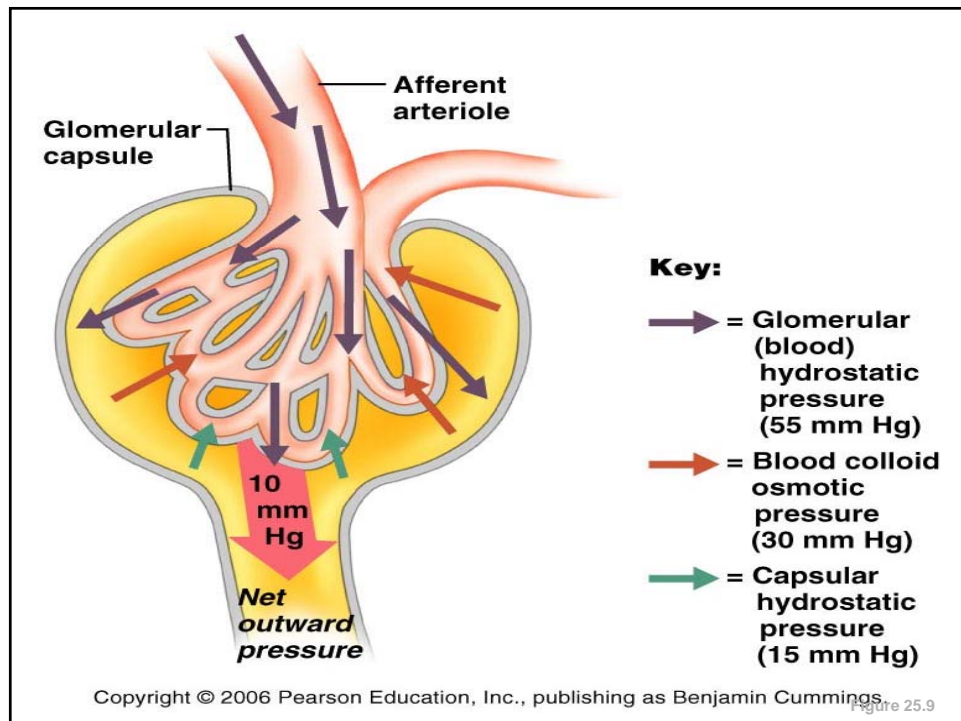
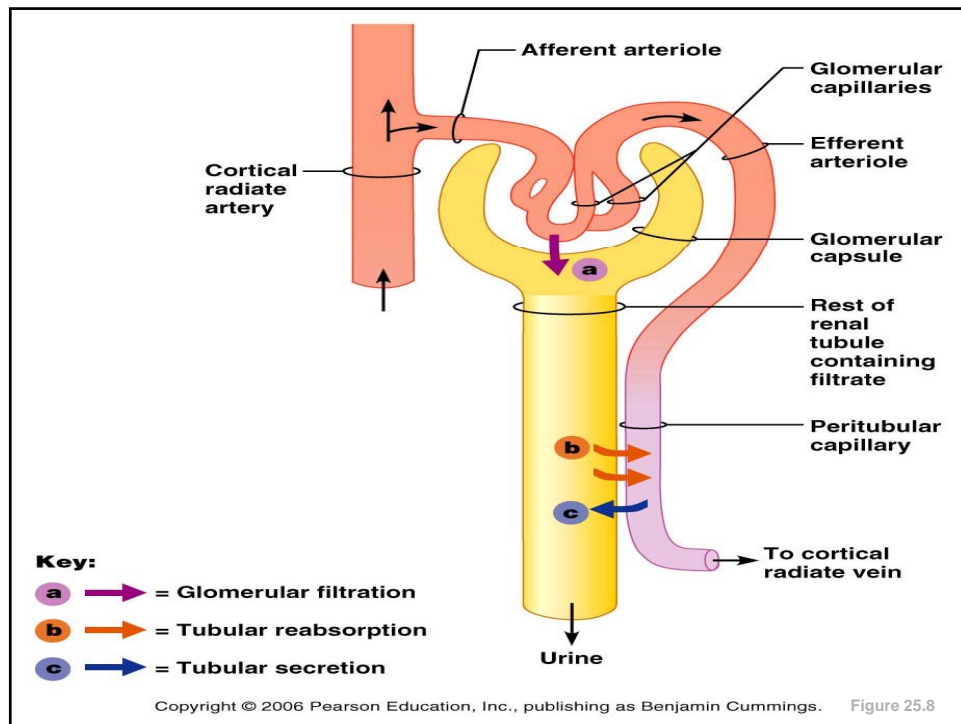












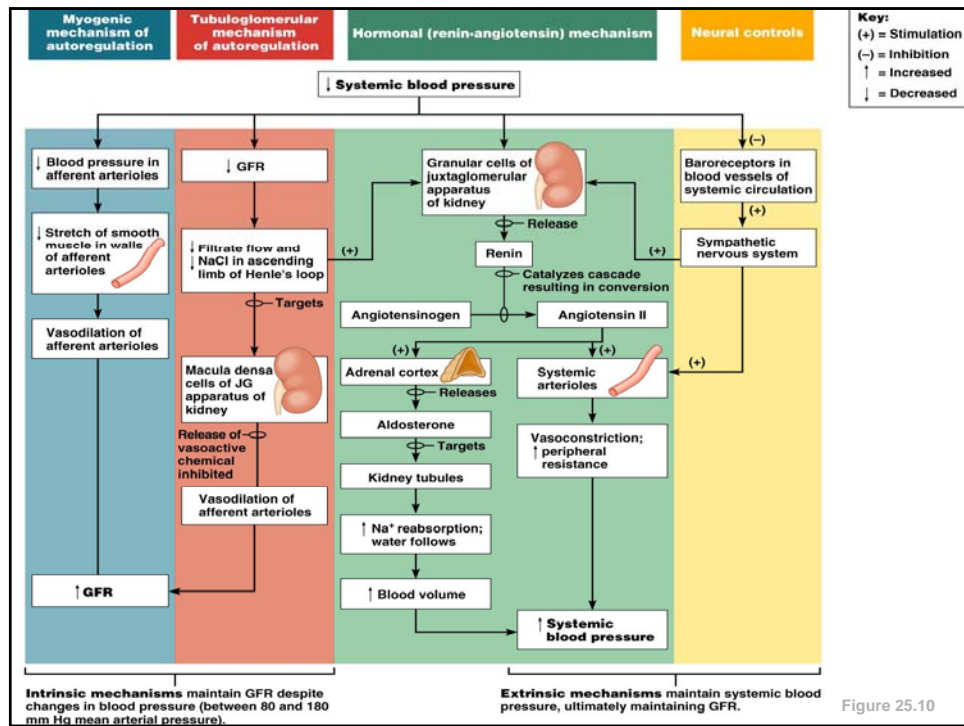


Figure 25.10

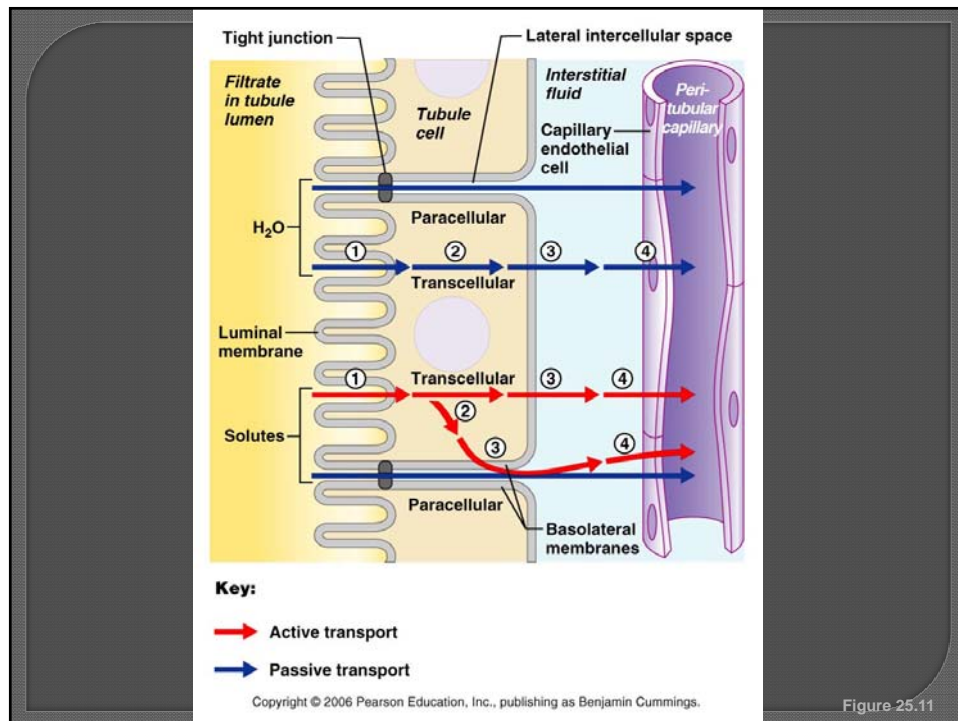
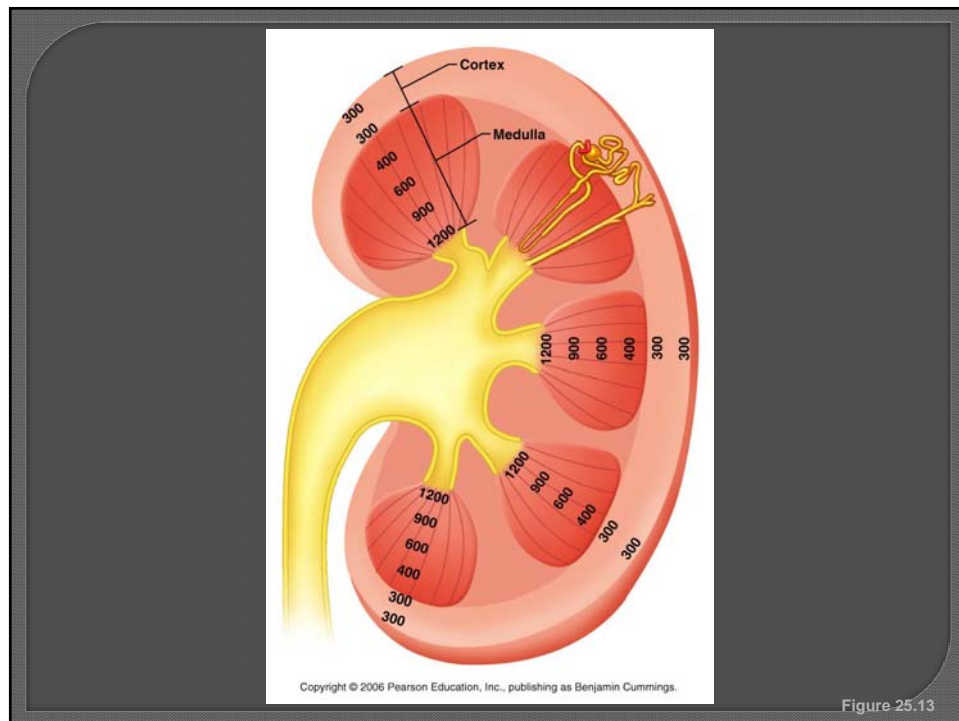
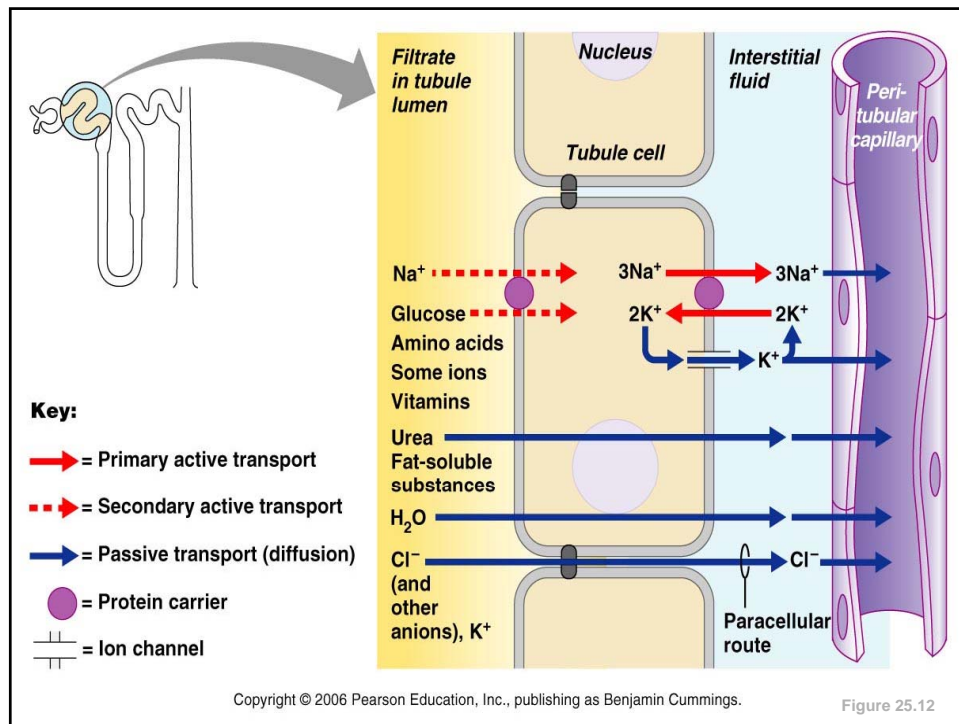


Figure 25.11



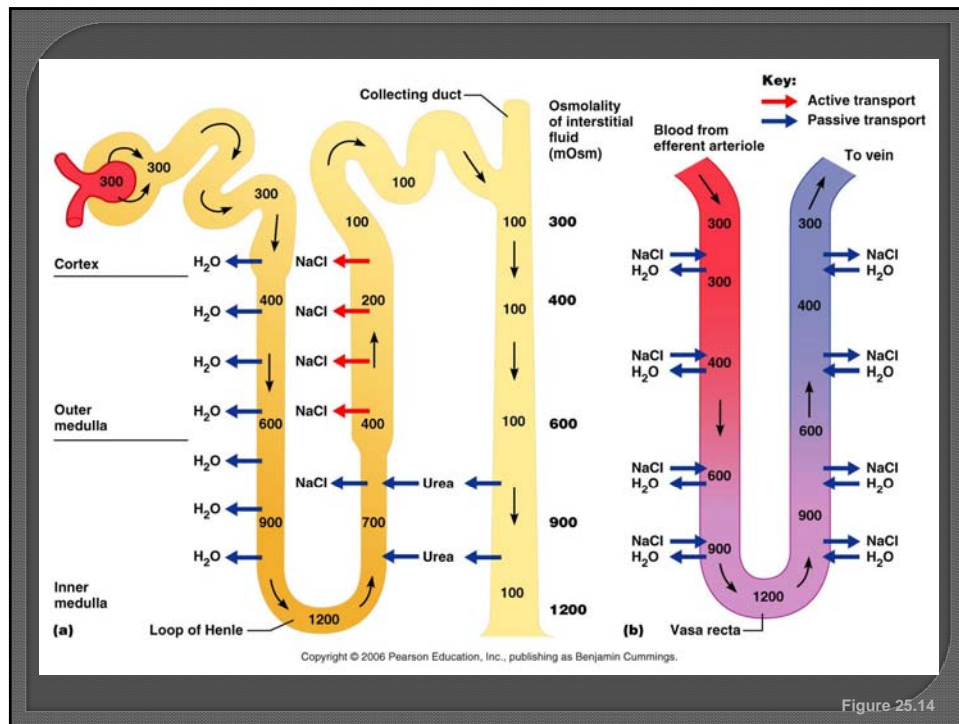


Figure 25.14

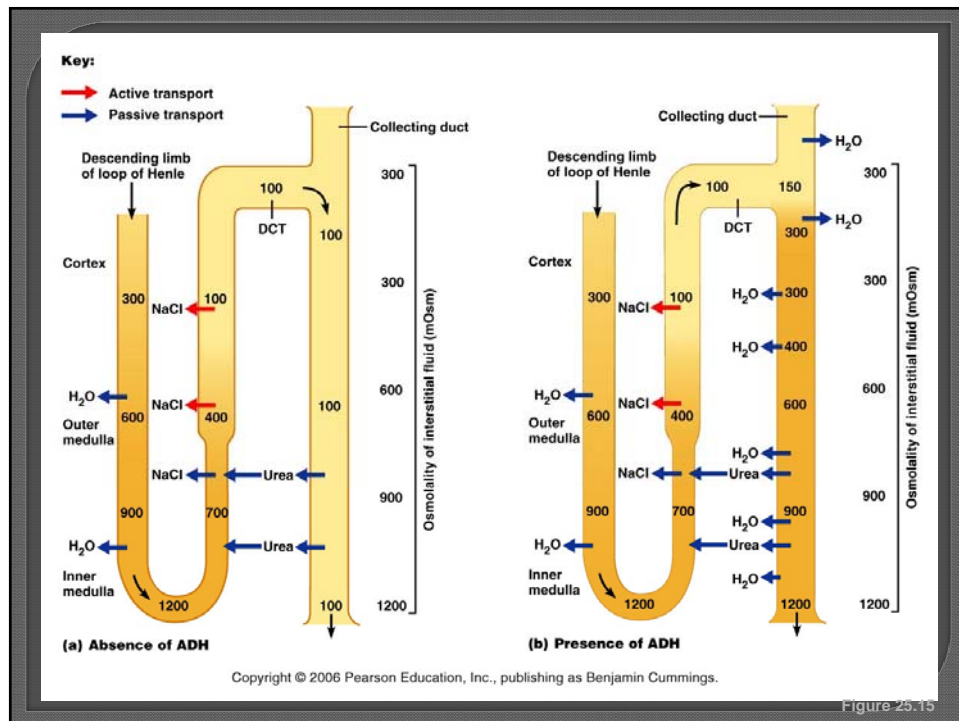
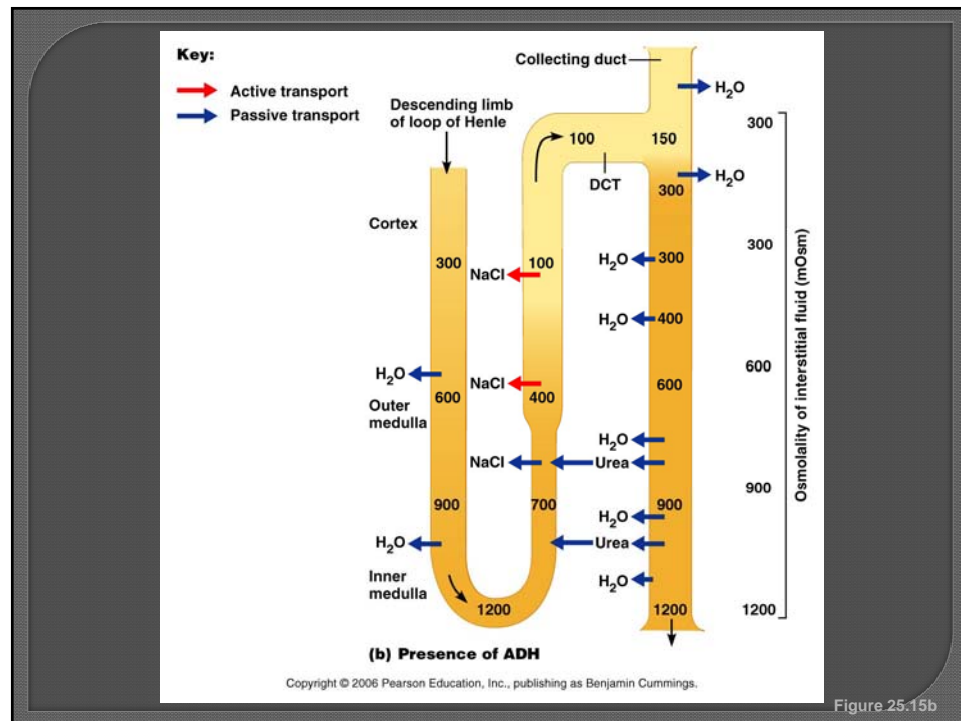
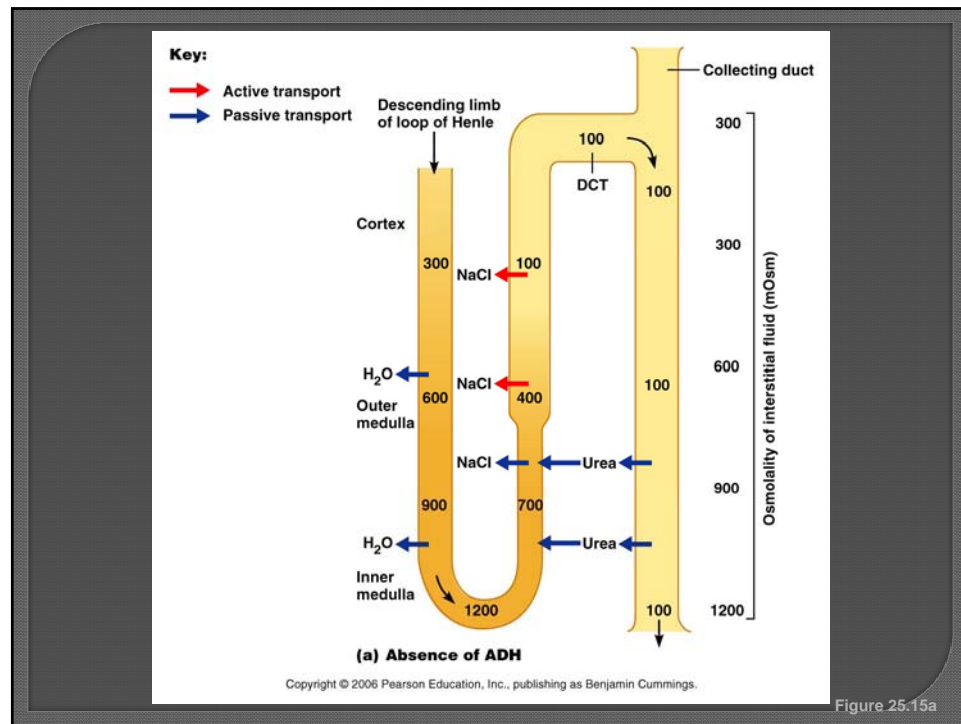


Figure 25.15



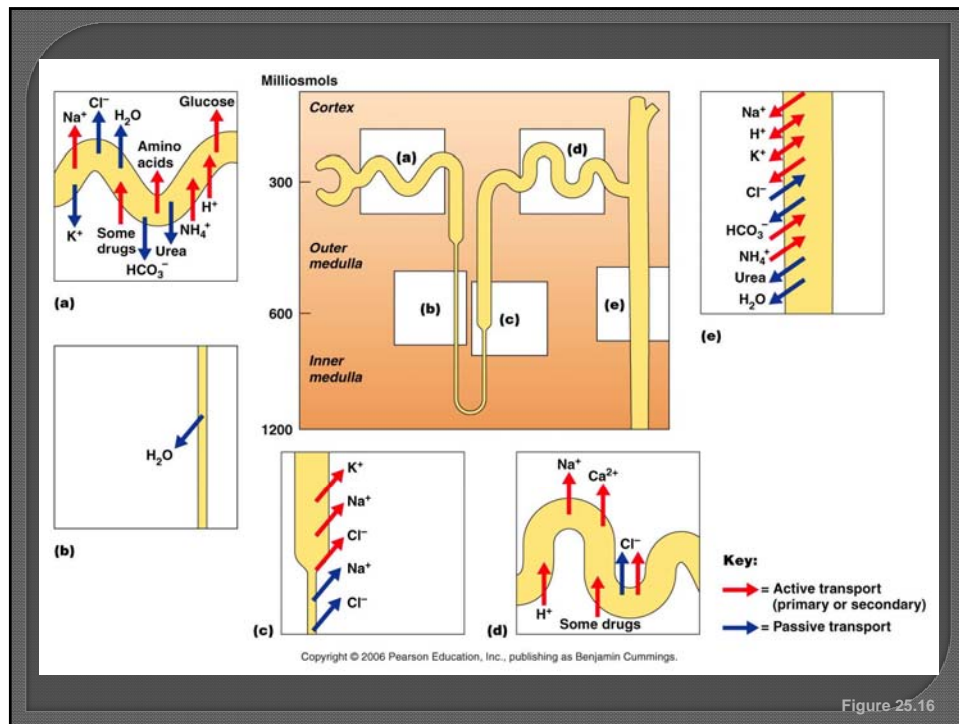


Figure 25.16

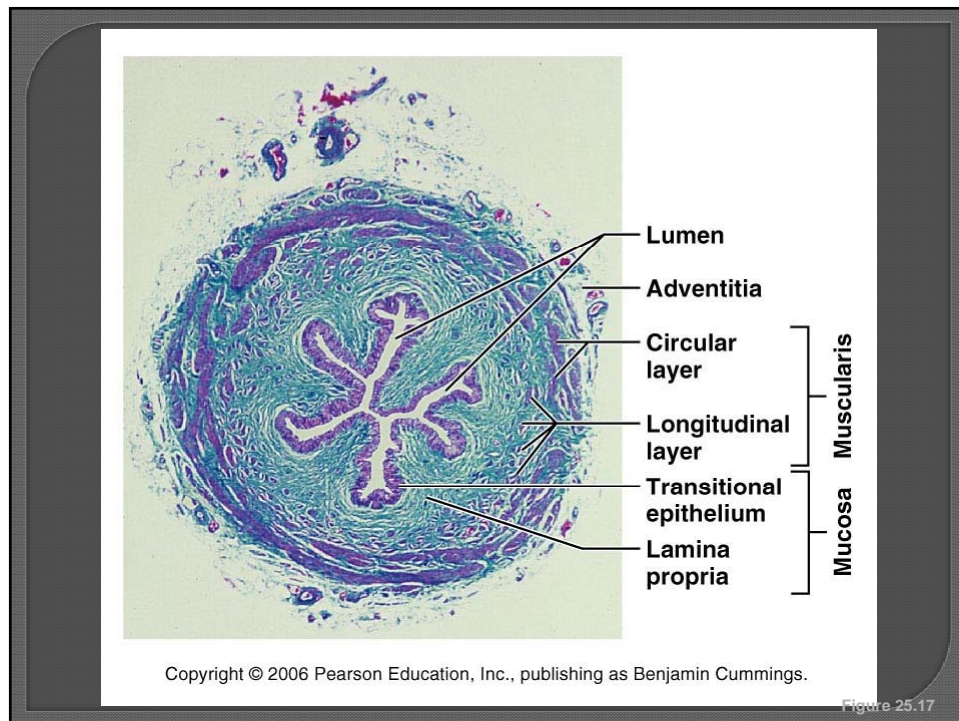
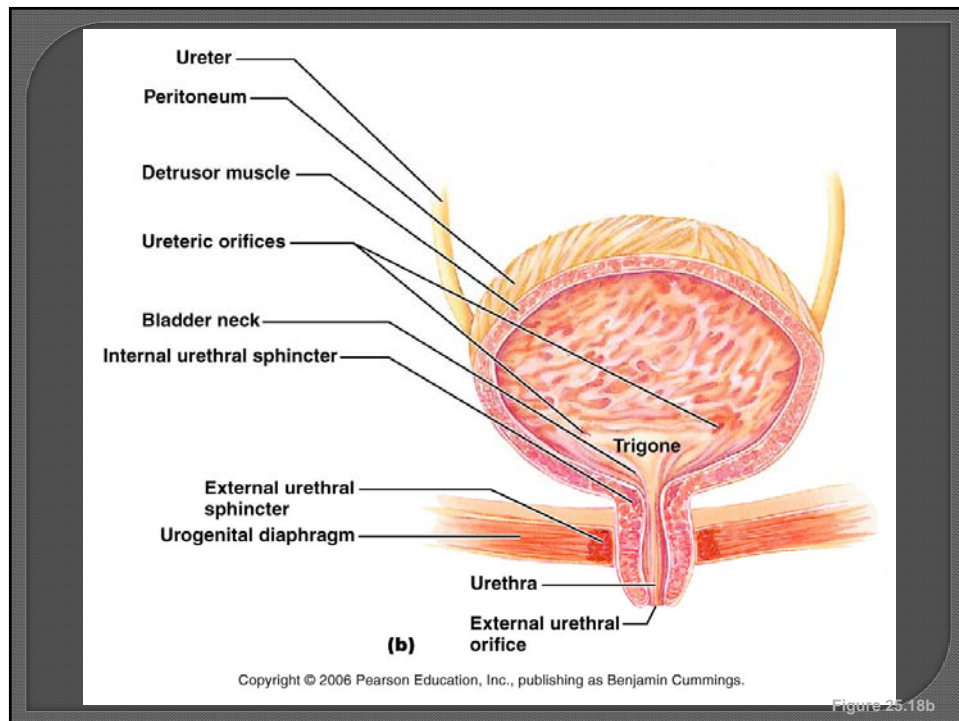
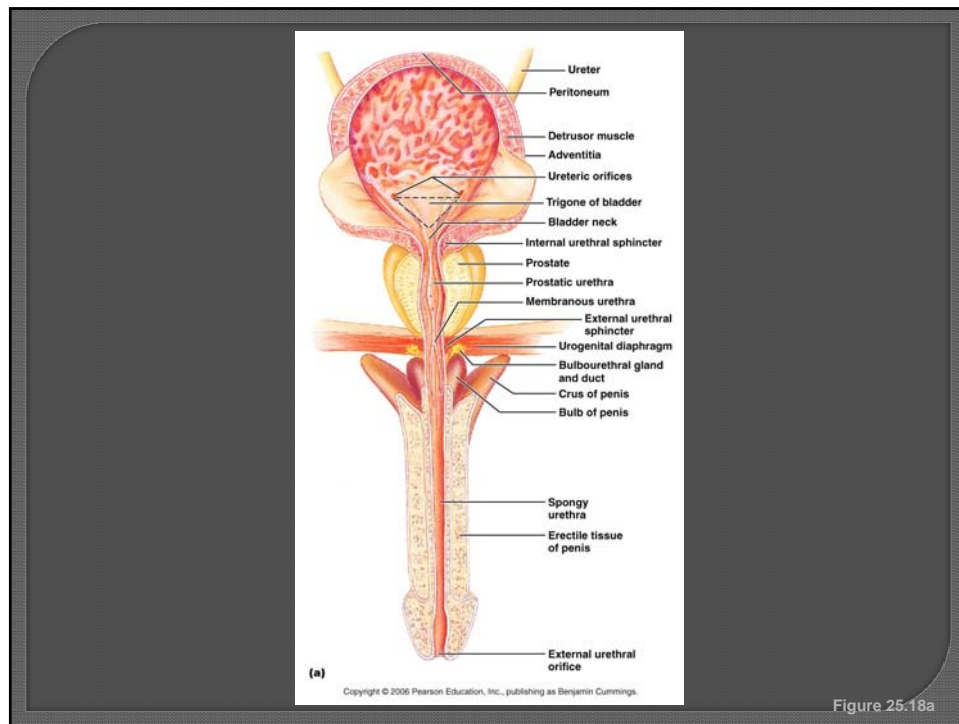


Figure 25.17



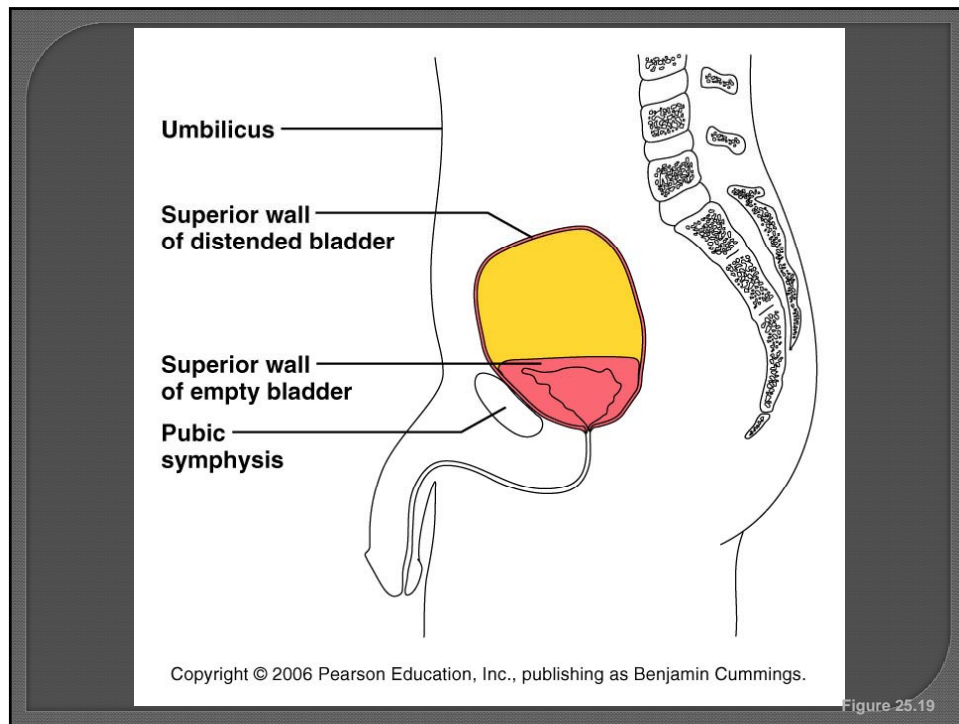


Figure 25.19

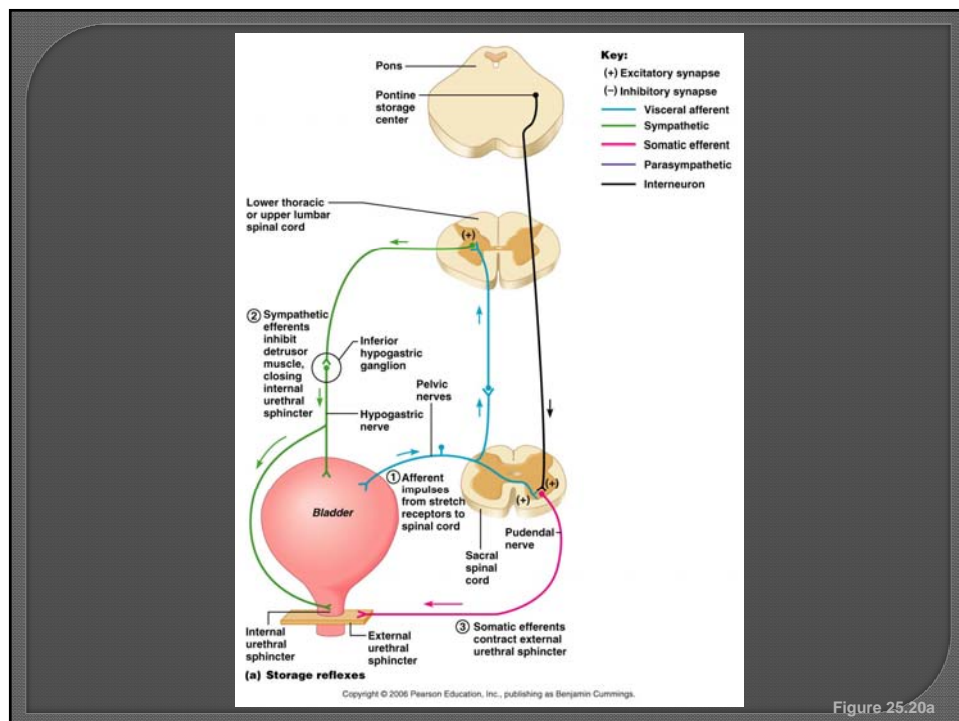


Figure 25.20a

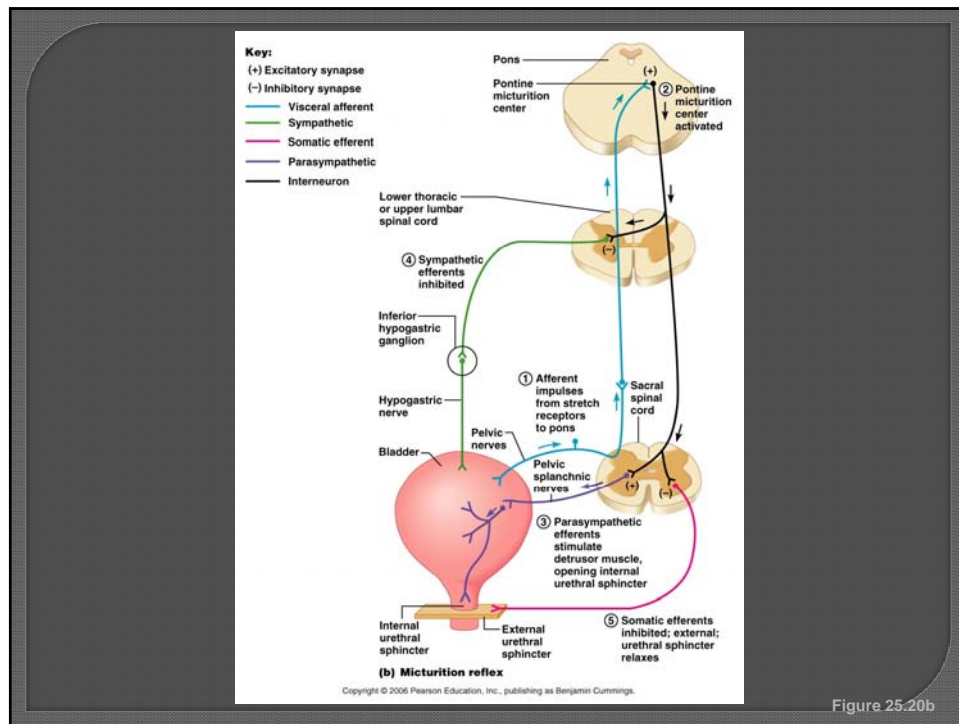


Figure 25.20b

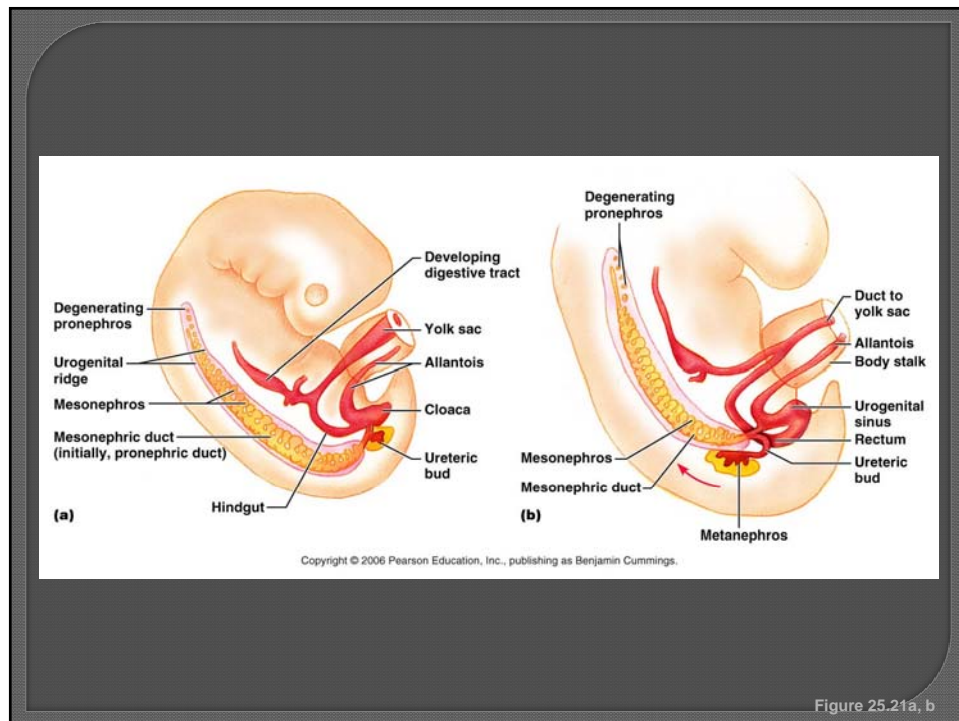


Figure 25.21a, b

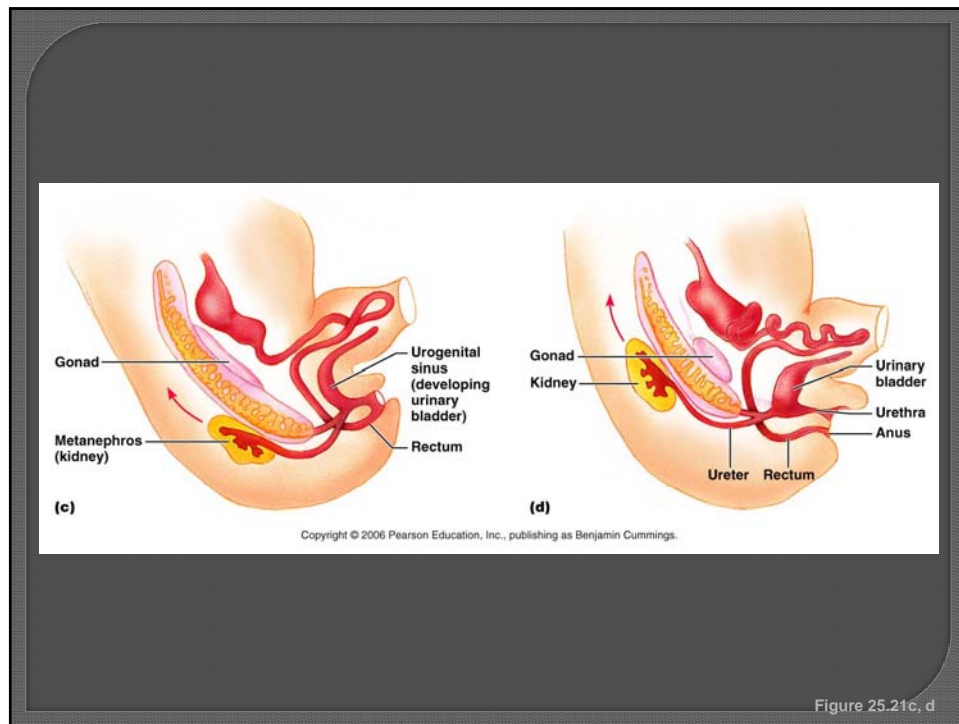


TABLE 25.1 Reabsorption Capabilities of Different Segments of the Renal Tubules and Collecting Ducts

TUBULE SEGMENT	SUBSTANCE REABSORBED	MECHANISM
PROXIMAL CONVOLUTED TUBULE		
	Sodium ions (Na^+)	Primary active transport via basolateral Na^+-K^+ pump; sets up electrochemical gradient for passive solute diffusion, osmosis, and secondary active transport (cotransport) with Na^+
	Virtually all nutrients (glucose, amino acids, vitamins)	Secondary active transport with Na^+
	Cations (K^+ , Mg^{2+} , Ca^{2+} , and others)	Passive transport driven by electrochemical gradient for most; the paracellular route is important
	Anions (Cl^- , HCO_3^-)	Passive transport; paracellular diffusion driven by electrochemical gradient for Cl^- ; secondary active transport (with Na^+) for HCO_3^-
	Water	Osmosis; driven by solute reabsorption (obligatory)
	Urea and lipid-soluble solutes	Passive diffusion driven by the concentration gradient created by reabsorption of water
	Small proteins	Endocytosed by tubule cells and digested to amino acids within tubule cells
LOOP OF HENLE		
Descending limb	Water	Osmosis
Ascending limb	Na^+ , Cl^- , K^+	Secondary active transport of Cl^- , Na^+ , and K^+ via $\text{Na}^+-\text{K}^+-2\text{Cl}^-$ cotransporter in thick portion; paracellular diffusion; Na^+-H^+ antiport
	Ca^{2+} , Mg^{2+}	Passive paracellular diffusion driven by electrochemical gradient

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Table 25.1.1

TABLE 25.1 Reabsorption Capabilities of Different Segments of the Renal Tubules and Collecting Ducts
(continued)

TUBULE SEGMENT	SUBSTANCE REABSORBED	MECHANISM
DISTAL CONVOLUTED TUBULE		
	Na^+ , Cl^-	Primary active Na^+ transport at basolateral membrane; secondary active transport at luminal membrane via Na^+ - Cl^- symporter and channels; aldosterone-regulated at distal portion
	Ca^{2+}	Passive uptake via PTH-modulated channels in luminal membrane; primary and secondary active transport (antiport with Na^+) in basolateral membrane
COLLECTING DUCT		
	Na^+ , H^+ , K^+ , HCO_3^- , Cl^-	Primary active transport of Na^+ (requires aldosterone) and the medullary gradient create the conditions for passive transport of some HCO_3^- and Cl^- and cotransport of H^+ , Cl^- , and HCO_3^- ; K^+ is both reabsorbed and secreted (aldosterone dependent), usually resulting in net K^+ secretion
	Water	Osmosis; controlled (facultative) water reabsorption; ADH required to insert aquaporins
	Urea	Facilitated diffusion in response to concentration gradient in the deep medulla region; recycles and contributes to medullary osmotic gradient

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Table 25.1.2

TABLE 25.2 Abnormal Urinary Constituents

SUBSTANCE	NAME OF CONDITION	POSSIBLE CAUSES
Glucose	Glycosuria	Nonpathological; excessive intake of sugary foods Pathological: diabetes mellitus
Proteins	Proteinuria, or albuminuria	Nonpathological; excessive physical exertion; pregnancy; high-protein diet Pathological (over 250 mg/day): heart failure, severe hypertension; glomerulonephritis; often initial sign of asymptomatic renal disease
Ketone bodies	Ketonuria	Excessive formation and accumulation of ketone bodies, as in starvation and untreated diabetes mellitus
Hemoglobin	Hemoglobinuria	Various: transfusion reaction, hemolytic anemia, severe burns, etc.
Bile pigments	Bilirubinuria	Liver disease (hepatitis, cirrhosis) or obstruction of bile ducts from liver or gallbladder
Erythrocytes	Hematuria	Bleeding urinary tract (due to trauma, kidney stones, infection, or neoplasm)
Leukocytes (pus)	Pyuria	Urinary tract infection

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Table 25.2



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Figure UN-25.1