

A&P Key Terms

25 The Urinary System

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Published 2015

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4. Chapter: A&P Key Terms 25 The Urinary System

1. A&P Key Terms 25 The Urinary System Questions

<u>anatomical sphincter</u>	smooth or skeletal muscle surrounding the lumen of a vessel or hollow organ that can restrict flow when contracted
<u>angiotensin II</u>	protein produced by the enzymatic action of ACE on inactive angiotensin I; actively causes vasoconstriction and stimulates aldosterone release by the adrenal cortex
<u>angiotensin I</u>	protein produced by the enzymatic action of renin on angiotensinogen; inactive precursor of angiotensin II
<u>angiotensin-converting enzyme</u>	(ACE) enzyme produced by the lungs that catalyzes the reaction of inactive angiotensin I into active angiotensin II
<u>angiotensinogen</u>	inactive protein in the circulation produced by the liver; precursor of angiotensin I; must be modified by the enzymes renin and ACE to be activated
<u>anuria</u>	absence of urine produced; production of 50 mL or less per day
<u>aquaporin</u>	protein-forming water channels through the lipid bilayer of the cell; allows water to cross; activation in the collecting ducts is under the control of ADH
<u>Bowman's capsule</u>	cup-shaped sack lined by a simple squamous epithelium (parietal surface) and specialized cells called podocytes (visceral surface) that participate in the filtration process; receives the filtrate which then passes on to the PCTs
<u>brush border</u>	formed by microvilli on the surface of certain cuboidal cells; in the kidney it is found in the PCT; increases surface area for absorption in the kidney
<u>calyces</u>	cup-like structures receiving urine from the collecting ducts where it passes on to the renal pelvis and ureter
<u>cortical nephrons</u>	nephrons with loops of Henle that do not extend into the renal medulla
<u>countercurrent multiplier system</u>	involves the descending and ascending loops of Henle directing forming urine in opposing directions to create a concentration gradient when combined with variable permeability and sodium pumping
<u>detrusor muscle</u>	smooth muscle in the bladder wall; fibers run in all directions to reduce the size of the organ when emptying it of urine
<u>distal convoluted tubules</u>	portions of the nephron distal to the loop of Henle that receive hyposmotic filtrate from the loop of

	receive hyposmotic filtrate from the loop of Henle and empty into collecting ducts
<u>diuretic</u>	compound that increases urine output, leading to decreased water conservation
<u>efferent arteriole</u>	arteriole carrying blood from the glomerulus to the capillary beds around the convoluted tubules and loop of Henle; portion of the portal system
<u>endothelins</u>	group of vasoconstrictive, 21-amino acid peptides; produced by endothelial cells of the renal blood vessels, mesangial cells, and cells of the DCT
<u>external urinary sphincter</u>	skeletal muscle; must be relaxed consciously to void urine
<u>fenestrations</u>	small windows through a cell, allowing rapid filtration based on size; formed in such a way as to allow substances to cross through a cell without mixing with cell contents
<u>filtration slits</u>	formed by pedicels of podocytes; substances filter between the pedicels based on size
<u>forming urine</u>	filtrate undergoing modifications through secretion and reabsorption before true urine is produced
<u>glomerular filtration rate</u>	(GFR) rate of renal filtration
<u>glomerulus</u>	tuft of capillaries surrounded by Bowman's capsule; filters the blood based on size
<u>glycosuria</u>	presence of glucose in the urine; caused by high blood glucose levels that exceed the ability of the kidneys to reabsorb the glucose; usually the result of untreated or poorly controlled diabetes mellitus
<u>incontinence</u>	loss of ability to control micturition
<u>intercalated cell</u>	specialized cell of the collecting ducts that secrete or absorb acid or bicarbonate; important in acid-base balance
<u>internal urinary sphincter</u>	smooth muscle at the juncture of the bladder and urethra; relaxes as the bladder fills to allow urine into the urethra
<u>inulin</u>	plant polysaccharide injected to determine GFR; is neither secreted nor absorbed by the kidney, so its appearance in the urine is directly proportional to its filtration rate

<u>juxtaglomerular apparatus</u>	(JGA) located at the juncture of the DCT and the afferent and efferent arterioles of the glomerulus; plays a role in the regulation of renal blood flow and GFR
<u>juxtaglomerular cell</u>	modified smooth muscle cells of the afferent arteriole; secretes renin in response to a drop in blood pressure
<u>juxtamedullary nephrons</u>	nephrons adjacent to the border of the cortex and medulla with loops of Henle that extend into the renal medulla
<u>leaky tight junctions</u>	tight junctions in which the sealing strands of proteins between the membranes of adjacent cells are fewer in number and incomplete; allows limited intercellular movement of solvent and solutes
<u>leukocyte esterase</u>	enzyme produced by leukocytes that can be detected in the urine and that serves as an indirect indicator of urinary tract infection
<u>loop of Henle</u>	descending and ascending portions between the proximal and distal convoluted tubules; those of cortical nephrons do not extend into the medulla, whereas those of juxtamedullary nephrons do extend into the medulla
<u>macula densa</u>	cells found in the part of the DCT forming the JGA; sense Na ⁺ concentration in the forming urine
<u>medulla</u>	inner region of kidney containing the renal pyramids
<u>mesangial</u>	contractile cells found in the glomerulus; can contract or relax to regulate filtration rate
<u>micturition</u>	also called urination or voiding
<u>myogenic mechanism</u>	mechanism by which smooth muscle responds to stretch by contracting; an increase in blood pressure causes vasoconstriction and a decrease in blood pressure causes vasodilation so that blood flow downstream remains steady
<u>nephrons</u>	functional units of the kidney that carry out all filtration and modification to produce urine; consist of renal corpuscles, proximal and distal convoluted tubules, and descending and ascending loops of Henle; drain into collecting ducts
<u>net filtration pressure</u>	(NFP) pressure of fluid across the glomerulus; calculated by taking the hydrostatic pressure of the capillary and subtracting the colloid osmotic pressure of the blood and the hydrostatic pressure of Bowman's capsule

oliguria	below normal urine production of 400-500 mL/day
osteomalacia	softening of bones due to a lack of mineralization with calcium and phosphate; most often due to lack of vitamin D; in children, osteomalacia is termed rickets; not to be confused with osteoporosis
pedicels	finger-like projections of podocytes surrounding glomerular capillaries; interdigitate to form a filtration membrane
peritubular capillaries	second capillary bed of the renal portal system; surround the proximal and distal convoluted tubules; associated with the vasa recta
physiological sphincter	sphincter consisting of circular smooth muscle indistinguishable from adjacent muscle but possessing differential innervations, permitting its function as a sphincter; structurally weak
podocytes	cells forming finger-like processes; form the visceral layer of Bowman's capsule; pedicels of the podocytes interdigitate to form a filtration membrane
polyuria	urine production in excess of 2.5 L/day; may be caused by diabetes insipidus, diabetes mellitus, or excessive use of diuretics
principal cell	found in collecting ducts and possess channels for the recovery or loss of sodium and potassium; under the control of aldosterone; also have aquaporin channels under ADH control to regulate recovery of water
proximal convoluted tubules	(PCTs) tortuous tubules receiving filtrate from Bowman's capsule; most active part of the nephron in reabsorption and secretion
renal columns	extensions of the renal cortex into the renal medulla; separates the renal pyramids; contains blood vessels and connective tissues
renal corpuscle	consists of the glomerulus and Bowman's capsule
renal cortex	outer part of kidney containing all of the nephrons; some nephrons have loops of Henle extending into the medulla
renal fat pad	adipose tissue between the renal fascia and the renal capsule that provides protective cushioning to the kidney
renal hilum	recessed medial area of the kidney through which the renal artery, renal vein, ureters, lymphatics, and nerves pass

	and nerves pass
<u>renal papillae</u>	medullary area of the renal pyramids where collecting ducts empty urine into the minor calyces
<u>renal pyramids</u>	six to eight cone-shaped tissues in the medulla of the kidney containing collecting ducts and the loops of Henle of juxtamedullary nephrons
<u>renin</u>	enzyme produced by juxtaglomerular cells in response to decreased blood pressure or sympathetic nervous activity; catalyzes the conversion of angiotensinogen into angiotensin I
<u>retroperitoneal</u>	outside the peritoneal cavity; in the case of the kidney and ureters, between the parietal peritoneum and the abdominal wall
<u>sacral micturition center</u>	group of neurons in the sacral region of the spinal cord that controls urination; acts reflexively unless its action is modified by higher brain centers to allow voluntary urination
<u>specific gravity</u>	weight of a liquid compared to pure water, which has a specific gravity of 1.0; any solute added to water will increase its specific gravity
<u>systemic edema</u>	increased fluid retention in the interstitial spaces and cells of the body; can be seen as swelling over large areas of the body, particularly the lower extremities
<u>trigone</u>	area at the base of the bladder marked by the two ureters in the posterior-lateral aspect and the urethral orifice in the anterior aspect oriented like points on a triangle
<u>tubuloglomerular feedback</u>	feedback mechanism involving the JGA; macula densa cells monitor Na ⁺ concentration in the terminal portion of the ascending loop of Henle and act to cause vasoconstriction or vasodilation of afferent and efferent arterioles to alter GFR
<u>urethra</u>	transports urine from the bladder to the outside environment
<u>urinalysis</u>	analysis of urine to diagnose disease
<u>urochrome</u>	heme-derived pigment that imparts the typical yellow color of urine
<u>vasa recta</u>	branches of the efferent arterioles that parallel the course of the loops of Henle and are continuous with the peritubular capillaries; with the glomerulus, form a portal system

