abdominopelvic (ab-dom-in-op-EL-vik) Pertaining to the abdomen and pelvis
abduction (ab-DUK-shun) Movement away from the midline
abortifacient (ah-bor-tih-FA-shent) Agent that induces an abortion
abortion (ah-BOR-shun) Loss of an embryo or fetus before the 20th week of pregnancy
abscess (AB-ses) Area of tissue breakdown; a localized space in the body containing pus and liquefied tissue
absorption (ah-SORP-shun) Transfer of digested nutrients from the digestive tract into the circulation
accommodation (ah-kom-o-DA-shun) Coordinated changes in the lens of the eye that enable one to focus on near and far objects
acetylcholine (as-e-til-KOH-lene) (Ach) Neurotransmitter; released at synapses within the nervous system and at the neuromuscular junction
acid (AH-sid) Substance that can donate a hydrogen ion to another substance
acid-fast stain Procedure used to color cells for viewing under the microscope
acidosis (ah-SID-oh-sis) Condition that results from a decrease in the pH of body fluids
acne (AK-ne) Disease of the sebaceous glands
acquired immunodeficiency syndrome (AIDS) Viral disease that attacks the immune system, specifically the T-helper lymphocytes with CD4 receptors
acromegaly (ak-ro-MEG-ah-lee) Condition caused by oversecretion of growth hormone in adults; there is overgrowth of some bones and involvement of multiple body systems
acro some (AK-roe-some) Caplike structure over the head of the sperm cell that helps the sperm to penetrate the ovum
ACTH See adrenocorticotropic hormone
actin (AK-tin) One of the two contractile proteins in muscle cells, the other being myosin
action potential Sudden change in the electric charge on a cell membrane, which then spreads along the membrane; nerve impulse
active transport Movement of a substance into or out of a cell in an opposite direction to the way in which it would normally flow by diffusion; active transport requires energy and transporters
acupuncture (AK-u-punk-chur) Ancient Chinese method of inserting thin needles into the body at specific points to relieve pain or promote healing
acute (ah-KUTE) Referring to a severe but short-lived disease or condition
Addison disease Condition caused by hypofunction of the adrenal cortex
adduction (ad-DUK-shun) Movement toward the midline
adenosine triphosphate (ah-DEN-o-SENE-tri-FOS-fay) (ATP) Energy-storing compound found in all cells
ADH See Antidiuretic hormone
adhesion (ad-HE-zhun) Holding together of two surfaces or parts; band of connective tissue between parts that are normally separate; molecular attraction between contacting bodies
adipose (AD-ih-pose) Referring to a type of connective tissue that stores fat or to fats
adrenal (ah-DRE-nal) gland Endocrine gland located above the kidney; suprarenal gland
adrenaline (ah-DRE-nal) Synonym for epinephrine
adrenergic (ad-ren-ER-jik) An activity or structure that responds to epinephrine (adrenaline)
adrenocorticotropic (ah-dre-no-kor-tih-ko-TRO-pik) hormone (ACTH) Hormone produced by the pituitary that stimulates the adrenal cortex
aerobic (air-O-bik) Requiring oxygen
afferent (AF-er-ent) Carrying toward a given point, such as a sensory neuron that carries nerve impulses toward the central nervous system
agglutination (ah-glu-tih-NA-shun) Clumping of cells due to an antigen–antibody reaction
agranulocyte (ah-gran-yoo-LO-sit) Leukocyte without visible granules in the cytoplasm when stained; lymphocyte or monocyte
AIDS See Acquired immunodeficiency syndrome
albinism (AL-been-izm) A hereditary disorder that affects melanin production
albumin (al-BU-min) Protein in blood plasma and other body fluids; helps maintain the osmotic pressure of the blood
albuminuria (al-BU-mee-NO-ree-ah) Presence of albumin in the urine, usually as a result of a kidney disorder
aldosterone (al-DOS-ter-one) Hormone released by the adrenal cortex that promotes the reabsorption of sodium and water in the kidneys
alkali (AHK-ah-lee) Substance that can accept a hydrogen ion (H⁺); substance that donates a hydroxide ion (OH⁻); a base
alkalosis (al-kah-LOH-sis) Condition that results from an increase in the pH of body fluids
allele (al-LELE) One member of the pair of genes that controls a given trait
allergen (AL-er-jen) Substance that causes hypersensitivity; substance that induces allergy
allergy (AL-er-jee) Tendency to react unfavorably to a certain substance that is normally harmless to most people; hypersensitivity
alopecia (ah-PE-shuh-ak) Baldness
alveolus (al-VE-o-lus) Small sac or pouch; usually a tiny air sac in the lungs through which gases are exchanged between the outside air and the blood; tooth socket; pl., alveoli
Alzheimer (ALZ-HEE-mur) Disease Unexplained degeneration of the cerebral cortex and hippocampus with intellectual impairment, mood changes and confusion
amblyopia (am-bli-O-pe-ah) Loss of vision in a healthy eye because it cannot work properly with the other eye
amino (ah-ME-no) Acid Building block of protein
amniocentesis (am-ni-o-SEN-TE-sis) Removal of fluid and cells from the amniotic sac for prenatal diagnostic tests
amniotic (am-ni-O-tik) Pertaining to the sac that surrounds and cushions the developing fetus or to the fluid that fills that sac
amphiarthrosis (amf-i-ar-THRO-sis) Slightly movable joint
amyotrophic lateral sclerosis (ah-my-oh-trof-ik) lateral sclerosis Disorder of the nervous system in which motor neurons are destroyed
anabolism (ah-NA-bizm) Metabolic building of simple compounds into more complex substances needed by the body
anaerobic (an-air-O-bik) Not requiring oxygen
analgesic (AN-al-JE-zik) Relieving pain; a pain-relieving agent that does not cause loss of consciousness
anaphase (AN-ah-faze) The third stage of mitosis in which chromosomes separate to opposite sides of the cell
anaphylaxis (an-ah-fih-LAK-sis) Severe, life-threatening allergic response
anastomosis (an-as-to-MO-sis) Communication between two structures, such as blood vessels
anatomy (an-NAT-oh-mee) Study of body structure
anemia (ah-NEE-mee-ah) Abnormally low level of hemoglobin or red cells in the blood, resulting in inadequate delivery of oxygen to the tissues
androgen (AN-dro-jen) Any male sex hormone
anesthesia (an-es-THE-ah) Loss of sensation, particularly of pain; drug with this effect is an anesthetic
aneurysm (AN-u-rizm) Bulging sac in the wall of a vessel
angiotensin (an-jee-o-TEN-sin) Substance formed in the blood by the action of the enzyme renin from the kidneys. It increases blood pressure by causing constriction of the blood vessels and stimulating the release of aldosterone from the adrenal cortex.
angina (an-JI-nah) Severe choking pain; disease or condition producing such pain. Angina pectoris is suffocating pain in the chest, usually caused by lack of oxygen supply to the heart muscle
angioplasty (AN-je-o-plas-te) Use of a balloon inserted with a catheter to open a blocked vessel
antagonist (an-TAG-o-nist) Muscle that has an action opposite that of a given movement; substance that opposes the action of another substance
anterolateral (an-TER-oh-later-AL) Toward the front or belly surface; ventral
anthelminth (an-hel-MIN-th) Agent that acts against worms; vermicide; vermiluge
antibiotic (an-te-bi-OT-ik) Substance that kills or arrests the growth of bacteria
antibody (AN-te-bi-O迪) (Ab) Substance produced in response to a specific antigen; immunoglobulin
antidiuretic (an-ti-dy-u-RET-ik) hormone (ADH) Hormone released from the posterior pituitary gland that increases the reabsorption of water in the kidneys, thus decreasing the volume of urine excreted
antigen (AN-te-jen) (Ag) Foreign substance that produces an immune response
antineoplast (an-ti-ne-o-PLAS-tik) Acting against a neoplasm (tumor)
antioxidant (an-te-OX-i-dant) Substances in the diet that protect against harmful free radicals
antipyretic (an-ti-pi-RET-ik) Drug that reduces fever
antiseptic (an-ti-se-PIK-tik) Substance that prevents pathogens from multiplying but does not necessarily kill them
antiserum (an-te-SE-rum) Serum containing antibodies that may be given to provide passive immunity; immune serum
antitoxin (an-te-TOX-i-n) Antibody that neutralizes a toxin
antivenin (an-te-VEN-in) Antibody that neutralizes a snake venom
anus (A-nus) Distal opening of the digestive tract
aorta (a-OR-tah) The largest artery; carries blood out of the left ventricle of the heart
apex (A-peks) The pointed region of a cone-shaped structure
aphasia (af-AH-zhe-ah) Loss or defect in language communication. Loss of the ability to speak or write is expressive aphasia; loss of understanding of written or spoken language is receptive aphasia
apnea (AP-ne-ah) Temporary cessation of breathing
apocrine (AP-o-krin) Referring to a gland that releases some cellular material along with its secretions
aponeurosis (ah-PON-oh-RO-sis) Broad sheet of fibrous connective tissue that attaches muscle to bone or to other muscle
appendicular (ap-en-DIK-u-lar) Pertaining to a bone or bone joint
aqueous (A-kwe-us) Pertaining to water. An aqueous solution in one in which water is the solvent
aqueous (A-kwe-us) humor Watery fluid that fills much of the eyeball anterior to the lens
arachnoid (ah-RAH-noid) Middle layer of the meninges
areolar (ah-RE-o-lar) Referring to loose connective tissue that fills much of the eyeball anterior to an areola, a circular area of marked color
arrhythmia (ah-RIT-uh-me-ah) Abnormal rhythm of the heartbeat; dysrhythmia
arterial (ar-TE-re-al) Vessel between a small artery and a capillary
arteriosclerosis (ar-te-re-o-skleh-RO-sis) Hardening of the arteries due to the deposit of yellowish, fattlike material in the lining of these vessels
aseptis (ah-SEP-sis) Condition in which no pathogens are present; adj., aseptic
asthma (AZ-mah) Allergy-induced inflammation and constriction of the air passageways
astigmatism (ah-STIG-mah-tizm) Visual defect due to an irregularity in the curvature of the cornea or the lens
ataxia (ah-TAK-se-ah) Lack of muscular coordination; irregular muscular action
atelectasis (at-e-LEK-tah-sis) Incomplete expansion of the lung; collapsed lung
atherosclerosis (at-er-o-skleh-RO-sis) Hardening of the arteries due to the deposit of yellowish, fattlike material in the lining of these vessels
atom (AT-ohm) Smallest subunit of a chemical element
atomic number The number of protons in the nucleus of an element's atom; a number characteristic of each element
atopic dermatitis (ah-TOP-ik der-mah-tih-tizm) Skin condition that may involve redness, blisters, pimples, scaling, and crusting; eczema
ATP See Adenosine triphosphate
atrial natriuretic (a-natri-u-RET-ik) peptide (ANP) Hormone produced by the atria of the heart which lowers blood pressure
atrioventricular (a-tri-o-ven-TRIK-u-lar) (AV) node Part of the conduction system of the heart
atrium (A-tri-um) One of the two upper chambers of the heart; adj., atrial
atrophy (AT-ro-fe) Wasting or decrease in size of a part
attenuated (ah-TEN-uh-ted) Weakened
autoclave Instrument used to sterilize material with steam under pressure
autoimmunity (aw-to-i-MI-nih-te) Abnormal reactivity to one's own tissues
autologous (aw-TOL-uh-gus) Related to self, such as blood or tissue taken from one's own body
autonomic (aw-to-NOM-ik) nervous system (ANS) The part of the nervous system that controls smooth muscle, cardiac muscle, and glands; the visceral or involuntary nervous system
autosomal (AW-to-som-al) One of the 44 chromosomes not involved in sex determination
AV node See Atrioventricular node
axial (AK-se-ah) skeleton The part of the skeleton that includes the skull, spinal column, ribs, and sternum
axilla (ak-SIL-ah) Hollow beneath the arm where it joins the body; armpit
axon (AK-son) Fiber of a neuron that conducts impulses away from the cell body
Glossary

bacillus (bah-SIL-us) Rod-shaped bacterium; pl., bacilli (bah-SIL-i)
bacterium (bak-TE-re-um) Type of microorganism; pl., bacteria (bak-TE-re-ah)
bacteriostasis (bak-tek-re-o-STA-sis) Condition in which bacterial growth is inhibited but the organisms are not killed
band cell Immature neutrophil
basal ganglia (BA-sal GANG-le-ah) Gray masses in the lower part of the forebrain that aid in muscle coordination
base Substance that can accept a hydrogen ion (H+); substance that donates a hydroxide ion (OH-) an alkali
basophil (BA-so-nil) Granular white blood cell that shows large, dark blue cytoplasmic granules when stained with basic stain
B cell Agranular white blood cell that gives rise to antibody-producing plasma cells in response to an antigen; B lymphocyte
Bell palsy Facial paralysis caused by damage to the facial nerve (VII), usually on one side of the face.
benign (be-NINE) Describing a tumor that does not spread; not recurrent nor becoming worse
bile Substance produced in the liver that emulsifies fats
bilirubin (BL-ih-rub-in) Pigment derived from the breakdown of hemoglobin and found in bile
biofeedback (bi-o-FEED-bak) A method for controlling involuntary responses by means of electronic devices that monitor changes and feed information back to a person
biopsy (BI-op-se) Removal of tissue or other material from the living body for examination, usually under the microscope
blood urea nitrogen (BUN) Amount of nitrogen from urea in the blood; test to evaluate kidney function
bolus (BO-lus) A concentrated mass; the portion of food that is moved to the back of the mouth and swallowed
Bowman capsule Enlarged portion of the nephron that contains the glomerulus; glomerular capsule
bone Hard connective tissue that makes up most of the skeleton, or any structure composed of this type of tissue
bradycardia (brad-e-KAR-de-ah) Heart rate of less than 60 beats per minute
brain The central controlling area of the central nervous system (CNS)
brain stem Portion of the brain that connects the cerebrum with the spinal cord; contains the midbrain,pons, and medulla oblongata
Broca (bro-KAH) area Area of the cerebral cortex concerned with motor control of speech
bronchi (BRONG-ke-ole) Microscopic terminal branch of a bronchus
bronchoscope (BRONG-ko-skope) Endoscope for examination of the bronchi and removal of small objects from the bronchi
bronchus (BRONG-kus) Large air passageway in the lung; pl., bronchi (BRONG-ki)
buffer (BUF-er) Substance that prevents sharp changes in the pH of a solution
bulbourethral (bul-oh-oo-RE-thral) Gland that secretes mucus to lubricate the urethra and tip of penis during sexual stimulation; Cowper gland
bulimia (bu-LIM-e-ah) Eating disorder also known as binge-purge syndrome
bulk transport Movement of large amounts of material through the plasma membrane of a cell
Bulla (BUL-ah) Vesicle
BUN See Blood urea nitrogen
burse (BER-sah) Small, fluid-filled sac found in an area subject to stress on bones and joints; pl., bursae (BER-se)
bursitis (ber-SI-tis) Inflammation of a bursa
calcitonin (kal-sih-TO-nin) Hormone from the thyroid gland that lowers blood calcium levels and promotes deposition of calcium in bones; thyrocalcinon
calcitriol (kal-sih-TRI-ol) The active form of vitamin D; dihydroxycholecalciferol (di-hi-drok-se-ko-le-kal-SIF-eh-rol)
calculus (KA-lih-sez) Cuplike extension of the renal pelvis that collects urine; pl., calyces (KA-lih-sez)
calyst (KAH-st) Substance that speeds the rate of a chemical reaction
cataract (KAH-tak-rect) Opacity of the eye lens or lens capsule
catheter (KATH-eh-ter) Tube that can be inserted into a vessel or cavity; may be used to remove fluid, such as urine or blood; v., catheterize
cation (KAH-ti-on) Positively charged particle (ion)
caudal (KAH-dal) Toward or nearer to the sacral region of the spinal column
cecum (SEE-kum) Small pouch at the beginning of the large intestine
cell Basic unit of life
cell membrane Outer covering of a cell; regulates what enters and leaves cell; plasma membrane
cellular respiration Series of reactions by which nutrients are oxidized for energy within the cell
central nervous system (CNS) Part of the nervous system that includes the brain and spinal cord
centrefuge (SEN-trie-fuj) An instrument that separates materials in a mixture based on density
centriole (SEN-ter-e-ole) Rod-shaped body near the nucleus of a cell; functions in cell division
cerebellum (ser-eh-BEL-um) Small section of the brain located under the cerebral hemispheres; functions in coordination, balance, and muscle tone
cerebral (SER-e-bral) cortex The very thin outer layer of gray matter on the surface of the cerebral hemispheres
cerebral palsy (PAWL-e-ze) Disorder caused by brain damage occurring before or during the birth process
cardiopulmonary resuscitation (CPR) Method to restore heartbeat and breathing by mouth-to-mouth resuscitation and closed chest cardiac massage
cardiovascular system (kar-do-o-VAS-kur-lar) The system consisting of the heart and blood vessels that transports blood throughout the body
caries (KA-ree-ehz) Tooth decay
carotenemia (kar-oh-te-NE-me-ah) Yellowish color of the skin caused by eating excessive amounts of carrots and other deeply colored vegetables
carrier Individual who has a gene that is not expressed but that can be passed to offspring
cartilage (KAH-ril) Type of hard connective tissue found at the ends of bones, the tip of the nose, larynx, trachea and the embryonic skeleton
CAT See Computed tomography
catabolism (kah-TAB-oh-lizm) Metabolic breakdown of substances into simpler substances; includes the digestion of food and the oxidation of nutrient molecules for energy
catalyst (KAH-tah-list) Substance that speeds the rate of a chemical reaction
CATABOLISM (kar-SIN-o-jen) Cancer-causing substance
carcinogen (kar-SI-nogen) A substance that may cause cancer; a malignant neoplasm
calcium (kal-SI-uhm) A hydroxide ion (OH-) an alkali; substance that donates a hydroxide ion (OH-) an alkali
blood calcium levels and promotes deposition of calcium in bones; thyrocalcinon
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cerebrospinal (ser-e-bro-SP-nal) fluid (CSF) Fluid that circulates in and around the brain and spinal cord

cerebrovascular (ser-e-bro-VAS-ku-lar) accident (CVA) Condition involving obstruction of blood flow to brain tissue or bleeding into brain tissue, usually as a result of hypertension or atherosclerosis; stroke

cerebrum (SER-e-brum) Largest part of the brain; composed of two cerebral hemispheres

cerumen (seh-RU-men) Ear wax; adj., ceruminous (seh-RU-min-us)
cervix (SER-vix) Constricted portion of an organ or part, such as the lower portion of the uterus; neck; adj., cervical

chemistry (KEM-is-tre) Study of the composition and properties of matter
chemoreceptor (ke-mo-re-SEP-tor) Receptor that responds to chemicals in body fluids

chemotherapy (ke-mo-THER-ah-pee) Treatment of a disease by administration of a chemical agent

Cheyne-Stokes (CHAN-e-stokes) respiration Rhythmic variation in the depth of respiratory movements alternating with periods of apnea due to depression of the breathing centers

chlamydia (klah-MID-ah) A type of very small bacterium that can exist only within a living cell; members of this group cause inclusion conjunctivitis, trachoma, sexually transmitted diseases, and respiratory diseases

cholceystokinin (ko-le-SYE-sto-KI-nin) (CCK) Hormone from the duodenum that stimulates release of pancreatic enzymes and bile from the gallbladder

cholelithiasis (ko-le-ih-LITH-ih-sis) Gallstones

cholesterol (ko-LES-ter-ol) An organic compound found in animal fat, bile, blood, myelin, liver, and other parts of the body

cholesterogenic (ko-LEN-er-jick) An activity or structure that responds to chemicals in body fluids

chondrocyte (KON-dro-site) Cell that produces cartilage

chordae tendineae (KOR-de ten-DIN-e-e) Fibrous threads that stabilize the AV valve flaps in the heart

choriocarcinoma (ko-re-o-kar-sih-NO-mah) Very malignant tumor made of placental tissue

choroid (KO-royd) Pigmented middle layer of the eye

choroid plexus (KO-royd PLEKS-us) Vascular network in the ventricles of the brain that forms cerebrospinal fluid

creatinine (kre-AT-in-in) A nitrogenous waste product in the blood

cromosome (KRO-mo-some) Alert-staining, threadlike body in the nucleus of a cell; contains genes that determine hereditary traits

chronic (KRON-ik) Referring to a disease that develops slowly, persists over a long time, or is recurring

dehyde (kyle) Milky-appearing fluid absorbed into the lymphatic system from the small intestine. It consists of lymph and droplets of digested fat

dehyme (kime) Mixture of partially digested food, water, and digestive juices that forms in the stomach

cicatrix (SIK-ah-trix) Scar

ciliary (SI-L-e-ar-e) Muscle of the eye that controls the shape of the lens

circumcision (sir-kum-SIJ-un) Surgery to remove the foreskin of the penis

cirrhosis (sih-RO-sis) Chronic disease, usually of the liver, in which active cells are replaced by inactive scar tissue

cisterna chyli (sis-TER-nah KI-li) First part of the thoracic lymph duct, which is enlarged to form a temporary storage area

ciliitis (KLIT-o-ris) Small organ of great sensitivity in the external genitalia of the female

CNS See Central nervous system

couagulation (ko-ah-gu-LA-shun) Clotting, as of blood

coccus (KOK-us) A round bacterium; pl. cocci (KOK-si)
cochlea (KOK-le-ah) Coiled portion of the inner ear that contains the organ of hearing

colic (KOL-ik) Spasm of visceral muscle

collagen (KOL-ah-jen) Flexible white protein that gives strength and resilience to connective tissue, such as bone and cartilage

colloid (kol-OYD) Mixture in which suspended particles do not dissolve but remain distributed in the solvent because of their small size (e.g., cytoplasm), colloidal suspension

colon (ko-LON) Main portion of the large intestine

colostrum (ko-LOS-trum) Secretion of the mammary glands prior to secretion of milk

communicable (kom-MU-nih-kabl) Describing a disease that can be transmitted from one person to another

complement (KOM-ple-ment) Group of blood proteins that helps antibodies to destroy foreign cells

compliance (kom-PLI-ans) The ease with which the lungs and thorax can be expanded

compound Substance composed of two or more chemical elements

computed tomography (to-MOG-rah-fee) (CT) Imaging method in which multiple radiographic views taken from different angles are analyzed by computer to show a cross-section of an area; used to detect tumors and other abnormalities; also called computed axial tomography (CAT)

concha (KON-ka) Shell-like bone in the nasal cavity; pl conchas (KON-ke)

concession (kon-CUSH-on) Injury resulting from a violent blow or shock

dondyle (KON-dile) Rounded projection on a bone

done Receptor cell in the retina of the eye; used for vision in bright light

congenital (kon-JEN-ih-tal) Present at birth

dconjunctiva (kon-junk-TI-vah) Membrane that lines the eyelid and covers the anterior part of the sclera (white of the eye)

constipation (kon-stih-PAH-shun) Infrequency of or difficulty with defecation

contraception (kon-trah-SEP-shun) Prevention of fertilization of an ovum or implantation of a fertilized ovum; birth control

convergence (kon-VER-jens) The centering of both eyes on the same visual field

conulsion (kon-VUL-shun) Series of muscle spasms; seizure

cornea (KOR-ne-ah) Clear portion of the sclera that covers the front of the eye

coronary (KOR-on-ah) Referring to the heart or to the arteries supplying blood to the heart

corpus callosum (kal-O-sum) Thick bundle of myelinated nerve cells fibers, deep within the brain, that carries nerve impulses from one cerebral hemisphere to the other

corpus luteum (LU-te-um) Yellow body formed from ovarian follicle after ovulation; produces progesterone

cortex (KOR-tex) Outer layer of an organ, such as the brain, kidney, or adrenal gland

coryza (ko-RL-ah) Nasal discharge; acute coryza is the common cold

countercurrent mechanism Mechanism for concentrating urine as it flows through the distal portions of the nephron

covalent (KO-vay-lent) bond Chemical bond formed by the sharing of electrons between atoms

CRP See Cardiopulmonary resuscitation

cranial (KRA-ne-al) Pertaining to the cranium, the part of the skull that encloses the brain. Toward the head or nearer to the head

creatine (KRE-ah-tine) Phosphate Compound in muscle tissue that stores energy in high energy bonds
creatinine (kre-AT-ih-nin) Nitrogenous waste product eliminated in urine
cystic fibrosis (SIS-tik fi-BRO-sis) Hered-nah-tu-RA-shun
deglutition
degeneration
deamination (de-am-ih-NA-shun) Removal of amino groups from proteins in metabolism
decubitus (de-KU-bih-tus) Lying down
defecation (def-e-KA-shun) Act of eliminating undigested waste from the digestive tract
degeneration (de-jen-er-A-shun) Breakdown, as from age, injury, or disease
deglutition (deg-luh-TISH-un) Act of swallowing
dehydration (de-hi-DRA-shun) Excessive loss of body fluid
dementia (de-MEN-she-ah) Gradual and usually irreversible loss of intellectual function
denaturation (de-nah-tu-RA-shun) Change in structure of a protein, such as an enzyme, so that it can no longer function
dendrite (DEN-drite) Fiber of a neuron that conducts impulses toward the cell body
deoxynucleobasic (de-OH-ri-se-ri-bo-nu-kle-ik) acid (DNA) Genetic material of the cell; makes up the chromosomes in the nucleus of the cell
depolarization (de-po-lar-ih-ZA-shun) A sudden reversal of the charge on a cell membrane.
dermal papillae (pah-PIL-le) Extensions of the dermis that project up into the epidermis; they contain blood vessels that supply the epidermis
dermatitis (der-mah-TI-tis) Inflammation of the skin
dermatome (DER-mah-tome) A region of the skin supplied by a single spinal nerve
dermatitis (der-mah-to-sis) Any skin disease
dermis (DER-mis) True skin; deeper part of the skin
dextrose (DEK-strose) Glucose; simple sugar
diabetes insipidus (in-SIP-i-dus) Condition due to insufficient secretion of ADH from the posterior pituitary; there is excessive loss of water
diabetes mellitus (di-ah-BE-tez mel-LIT-uss) Disease of insufficient insulin in which excess glucose is found in blood and urine; characterized by abnormal metabolism of glucose, protein, and fat
diagnosis (di-ag-NOS-i-sis) Identification of an illness
dialysis (di-AL-i-sis) Method for separating molecules in solution based on differences in their ability to pass through a semipermeable membrane; method for removing nitrogenous waste products from the body, as by hemodialysis or peritoneal dialysis
diaphragm (DI-ah-fram) Dome-shaped muscle under the lungs that flattens during inhalation; separating membrane or structure
diaphysis (di-AL-ih-sis) Shaft of a long bone
diarrea (di-ah-REE-ah) Abnormally frequent watery bowel movements
diarrhosis (di-ar-THRO-sis) Freely movable joint; synovial joint
diastole (di-AS-to-le) Relaxation phase of the cardiac cycle; adj., diastolic (di-as-TOL-ik)
diencephalon (di-en-SEF-ah-lon) Region of the brain between the cerebral hemispheres and the midbrain; contains the thalamus, hypothalamus, and pituitary gland
diffusion (dih-FU-zhen) Movement of molecules from a region where they are in higher concentration to a region where they are in lower concentration
digestion (di-JEST-yun) Process of breaking down food into absorbable particles
digestive system (di-JES-tiv) The system involved in taking in nutrients, converting them to a form the body can use and absorbing them into the circulation
Dihydroxycholecalciferol (di-ih-drok-se-ko-le-kal-SIF-eh-rol) The active form of vitamin D
dilation (di-LA-shun) Widening of a part, such as the pupil of the eye, a blood vessel, or the uterine cervix; dilatation
disaccharide (di-SAK-ah ride) Compound formed of two simple sugars linked together, such as sucrose and lactose
disease Illness; abnormal state in which part or all of the body does not function properly
disinfection (dis-in-FEK-shun) Killing of pathogens but not necessarily harmless microbes
dissect (dis-sekt) To cut apart or separate tissues for study
distal (DIS-tal) Farther from the origin of a structure or from a given reference point
DNA See Deoxyribonucleic acid
dominant (DOM-i-hant) Referring to a gene that is always expressed if present
Dopamine (DOH-pah-mem) A neurotransmitter
dorsal (DOR-sal) Toward the back; posterior
dorsiflexion (dor-sih-FLEK-shun) Bending the foot upward at the ankle
Down syndrome A congenital disorder usually due to an extra chromosome 21; trisomy 21
duct Tube or vessel
ductus deferens (DEF-er-enz) Tube that carries sperm cells from the testis to the urethra; vas deferens
duodenum (du-O-DE-num) First portion of the small intestine
dura mater (DU-ra MA-ter) Outermost layer of the meninges
dysmenorrhea (dis-men-o-RE-ah) Painful or difficult menstruation
dyspnea (disp-NE-ah) Difficult or labored breathing
eccrine (EK-trin) Referring to sweat glands that regulate body temperature and vent directly to the surface of the skin through a pore
ECG See Electrocardiograph
ehocardiograph (ek-o-KAR-de-oh-graf) Instrument to study the heart by means of ultrasound; the record produced is an echocardiogram
eclampsia (eh-CLAMP-sih-seh) Serious and sometimes fatal condition involving convulsions, liver damage, and kidney failure that can develop from pregnancy-induced hypertension
etopic (ek-TOP-ik) Out of a normal place, as a pregnancy or heartbeat
eczema (EK-ze-mah) See atopic dermatitis
edema (eh-DE-mah) Accumulation of fluid in the tissue spaces
EEG See Electroencephalograph
effector (el-FEK-tor) Muscle or gland that responds to a stimulus; effector organ
efferent (EF-fer-ent) Carrying away from a given point, such as a motor neuron that carries nerve impulses away from the central nervous system
effusion (eh-FU-zhon) Escape of fluid into a cavity or space; the fluid itself
ejaculation (e-jak-u-LA-shun) Expulsion of semen through the urethra
EKG See Electrocardiograph
electrocardiograph (e-lek-tro-KAR-de-o-graf) (ECG, EKG) Instrument to study the electrical activity of the heart; record made is an electrocardiogram
electroencephalograph (e-lek-tro-en-SEF-ah-lo-graf) (EEG) Instrument used to study electrical activity of the brain; record made is an electroencephalogram
electrolyte (e-LEK-tro-lite) Compound that separates into ions in solution; substance that conducts an electric current in solution
electron (e-LEK-tron) Negatively charged particle located in an energy level outside the nucleus of an atom
electrophoresis (e-lek-tro-fo-RE-sis) Separation of components in a mixture by passing an electrical current through it; components separate on the basis of their charge
element (EL-eh-ment) One of the substances from which all matter is made; substance that cannot be decomposed into a simpler substance
elephantiasis (el-eh-FAHN-tis) Enlargement of the extremities due to blockage of lymph flow by small filarias (f-LA-re-e) worms
embolism (EM-bo-lizm) The condition of having an embolus (obstruction) in the circulation
embolus (EM-bo-lus) Blood clot or other obstruction in the circulation
embryo (EM-bre-o) Developing offspring during the first 2 months of pregnancy
emesis (EM-eh-sis) Vomiting
emphysema (em-fih-SE-mah) Pulmonary disease characterized by dilation and destruction of the alveoli
emulsify (e-MUL-sih-fi) To break up fats into small particles; n., emulsification
endarterectomy (end-ar-ter-EK-to-me) Procedure to remove plaque associated with atherosclerosis from the lining of a vessel
endocardium (en-do-KAR-de-um) Membrane that lines the heart chambers and covers the valves
endocrine (EN-do-krin) Referring to a gland that secretes directly into the bloodstream
endocrine system The system composed of glands that secrete hormones
endocytosis (en-do-si-TO-sis) Movement of large amounts of material into a cell (e.g., phagocytosis and pinocytosis)
enolymph (EN-do-limf) Fluid that fills the membranous labyrinth of the inner ear
endomysium (en-do-MIS-e-um) Connective tissue around an individual muscle fiber
endometrium (en-do-ME-tre-um) Lining of the uterus
endoplasmic reticulum (en-do-PLAS-mik re-TIK-u-lum) (ER) Network of membranes in the cytoplasm of a cell; may be smooth or rough based on absence or presence of ribosomes
end-organ Modified ending on a dendrite that functions as a sensory receptor
endorphin (en-DOR-fin) Pain-relieving substance released naturally from the brain
endosteatosis (en-DOS-te-OS-tis) Thin membrane that lines the marrow cavity of a bone
endothelium (en-do-the-EL-ee-um) One of the four main types of tissue; forms glands, covers surfaces, and lines cavities; adj., epithelial
EPO See Erythropoietin
equilibrium (e-kwih-LIB-re-um) Sense of balance
ER See Endoplasmic reticulum
erosion (e-RUZ-shun) Raised skin lesion; rash
erythema (er-e-THAY-mah) Redness of the skin
erythrocyte (eh-RI-thruh-site) Red blood cell
erythropoietin (EPO) (eh-rith-roh-POY-eh-tin) Hormone released from the kidney that stimulates the production of red blood cells in the red bone marrow
canals (eh-SOF-ah-gus) Tube that carries food from the throat to the stomach
estrogen (ES-tro-jen) Group of female sex hormones that promotes development of the uterine lining and maintains secondary sex characteristics
etiology (e-te-OL-o-je) Study of the cause of a disease or the theory of its origin
custachian (u-STAH-shun) Tube that connects the middle ear cavity to the throat; auditory tube
eruption (eks-uh-LA-shun) Expulsion of cells from the surface of tissue, such as the skin
excitation In cells, the ability to transmit an electrical current along the plasma membrane
excoriation (eks-koh-re-A-shun) Scratch into the skin
excretion (eks-KRE-shun) Removal and elimination of metabolic waste products from the blood
exfoliation (eks-fuh-le-A-shun) Loss of cells from the surface of tissue, such as the skin
exhalation (eks-hahl-LA-shun) Expulsion of air from the lungs; expiration
exocrine (EK-so-kre-e) Referring to a gland that secretes through a duct
exocytosis (eks-o-si-TO-sis) Movement of large amounts of material out of the cell using vesicles
exophthalmos (ek-sof-THAL-mos) Protrusion (bulging) of the eyes, commonly seen in Graves disease
extension (eks-TEHN-shun) Motion that increases the angle at a joint
extracellular (EK-strah-sel-u-lar) Outside the cell
extremity (ek-STREEM-ih-te) Limb; an arm or leg
facilitated diffusion Movement of materials across the plasma membrane as they would normally flow by diffusion but using transporters to speed movement
fallopian (fah-LO-pe-an) tube See oviduct
fascia (FASH-e-ah) Band or sheet of fibrous connective tissue
fascicle (FAS ih-kl) Small bundle, as of muscle cells or nerve cell fibers
fat Type of lipid composed of glycerol and fatty acids
febrile (FEB-rih) Pertaining to fever
fetalith (FE-tal-ith) Hardened piece of fecal material that may cause obstruction
feces (FE-seez) Waste material discharged from the large intestine; excrement; stool
feedback Return of information into a system, so that it can be used to regulate that system
fertilization (fer-til-ih-ZA-shun) Union of an ovum and a spermatozoon
fetus (FE-tus) Developing offspring from the third month of pregnancy until birth
fever (FE-ver) Abnormally high body temperature
fibrillation (fih-brih-LA-shun) Very rapid, uncoordinated beating of the heart
fibrin (FI-brin) Blood protein that forms a blood clot
fibrinogen (fi-BRIN-oh-jen) Plasma protein that is converted to fibrin in blood clotting
filtration (fil-TRA-shun) Movement of material through a semipermeable membrane under mechanical force
fimbriae (FIM-bre-e) Fringelike extensions of the oviducts that sweep a released ovum into the oviduct
fissure (FISH-ure) Deep groove
flaccid (FLAK-sid) Flabby, limp, soft
flagellum (flah-JEL-lum) Long whiplike extension from a cell used for locomotion; pl., flagella
flatus (FLA-tus) Gas in the digestive tract; condition of having gas is flatulence (FLAT-u-lens)
flexion (FLEK-shun) Bending motion that decreases the angle between bones at a joint
follicle (FOL-lih-kl) Sac or cavity, such as the ovarian follicle or hair follicle
folk-stimulating hormone (FSH) Hormone produced by the anterior pituitary that stimulates development of ova in the ovary and spermatozoa in the testes
fontanel (fon-tah-NEL) Area in the infant skull where bone formation has not yet occurred; also spelled fontanelle; “soft spot”
foramen (fo-RA-men) Opening or passageway, as into or through a bone; pl., foramina (fo-RA-mihn)
foramen magnum Large opening in the occipital bone of the skull through which the spinal cord passes to join the brain
formed elements Cells and cell fragments in the blood
fornix (FOR-niks) A recess or archlike structure
fossa (FOS-sah) Hollow or depression, as in a bone; pl., fossae (FOS-se)
fovea (FO-ve-ah) Small pit or cup-shaped depression in a surface; the fovea centralis near the center of the retina is the point of sharpest vision
frontal (FRONT-AL) Describing a plane that divides a structure into anterior and posterior parts
FSH See Follicle-stimulating hormone
fulcrum (FUL-krum) Pivot point in a lever system; joint in the skeletal system
fundus (FUN-dus) The deepest portion of an organ, such as the eye or the uterus
fungus (FUN-gus) Type of plantlike microorganism; yeast or mold; pl., fungi (FUN-ji)
game (GAM-ete) Reproductive cell; ovum or spermatozoon
gamma globulin (GLOB-u-lin) Protein fraction in the blood plasma that contains antibodies
ganglion (GANG-le-on) Collection of nerve cell bodies located outside the central nervous system
gangrene (GANG-greyn) Death of tissue accompanied by bacterial invasion and putrefaction
gastric-inhibitory peptide (GIP) Hormone from the duodenum that inhibits release of gastric juice and stimulates release of insulin from the pancreas
gastrin (GAS-trin) Hormone released from the stomach that stimulates stomach activity
gastrointestinal (gas-troh-in-TES-tih-na-l) (GI) Pertaining to the stomach and intestine or the digestive tract as a whole
hereditary factor; portion of the DNA on a chromosome
genetic (jeh-NET-ik) Pertaining to the genes or heredity
genotype (JEN-o-tipe) Genetic make-up of an organism
gestation (jes-TA-shun) Period of development from conception to birth
GH See Growth hormone
GI See Gastrointestinal
gigantism (ji-GAN-tizm) Excessive growth due to oversecretion of growth hormone in childhood
gingiva (JIN-jih-vah) Tissue around the teeth; gum
glans The enlarged distal portion of the penis
glaucoma (glaw-KO-mah) Disorder involving increased fluid pressure within the eye
glial cells (GLI-al) The connective tissue cells of the nervous system; neuroglia
glioma (gli-O-mah) Tumor of neuroglial tissue
glomerular (glo-MER-uh-lar) Fluid and dissolved materials that leave the blood and enter the kidney nephron through Bowman’s capsule
glomerulonephritis (glo-mer-u-lo-nef-RI-tis) Kidney disease often resulting from antibodies to a streptococcal infection
glomerulus (glo-MER-uh-lus) Cluster of capillaries in the glomerular (Bowman) capsule of the nephron
glottis (GLOT-is) Space between the vocal cords
glucagon (GLU-kah-gon) Hormone from the pancreatic islets that raises blood glucose level
glucocorticoid (glu-ko-KOR-tih-koyd) Steroid hormone from the adrenal cortex that raises nutrients in the blood during times of stress, e.g. cortisol
glucose (GLU-kose) Simple sugar; main energy source for the cells; dextrose
glycemic (gli-SE-mik) Effect Measure of how rapidly a food raises the blood glucose level and stimulates release of insulin
glycogen (GLI-ko-jen) Compound built from glucose molecules that is stored for energy in liver and muscles
glycolysis (gli-KOL-ih-sis) First, anaerobic phase of the metabolic breakdown of glucose for energy
glycosuria (gli-ko-SU-re-ah) Presence of glucose in the urine
goblet cell A single-celled gland that secretes mucus
goiter (GOY-ter) Enlargement of the thyroid gland
Golgi (GOL-je) apparatus System of membranes in the cell that formulates special substances; also called Golgi complex
gonad (GO-na-d) Sex gland; ovary or testis
gonadotropin (gon-ah-do-TRO-pin) Hormone that acts on a reproductive gland (ovary or testis) e.g., FSH, LH
gout Type of arthritis caused by a metabolic disturbance
Graafian (GRAF-e-an) follicle See ovarian follicle
gram (g) Basic unit of weight in the metric system
gram stain Procedure used to color microorganisms for viewing under the microscope
granulocyte (GRAN-ul-o-site) Leukocyte with visible granules in the cytoplasm when stained
Graves disease Common form of hyperthyroidism
grey matter Nervous tissue composed of unmyelinated fibers and cell bodies
greater vestibular (ves-i-TIB-u-lar) gland Gland that secretes mucus into the vagina; Bartholin gland
growth hormone (GH) Hormone produced by anterior pituitary that promotes growth of tissues; somatotropin
gustatory (GUS-tah-to-re) Pertaining to the sense of taste (gustation)
gyrus (JIR-us) Raised area of the cerebral cortex; pl., gyri (JIR-i)
Haversian (ha-VERS-shan) canal Channel in the center of an osteon (haversian system), a subunit of compact bone
Haversian system See Osteon
hay fever Seasonal allergy often due to pollen
heart (hart) The organ that pumps blood through the cardiovascular system
helminth (HEL-minth) Worm
hemapheresis (hem-ah-FER-eh-sis) Removal of blood components to a donor following separation and removal of desired components
hematocrit (he-MAT-o-krit) (Hct) Volume percentage of red blood cells in whole blood; packed cell volume
hematoma (he-mah-TO-mah) Tumor or swelling filled with blood
hematuria (hem-ah-TU-re-ah) Blood in the urine
hemocytometer (he-mo-SY-to-MAY-eh-ter) A chamber for counting formaldehyde-fixed cells
hemoglobin (HEM-o-GLAB-u-lin) (Hb) Oxygen-carrying pigment in red blood cells
hemodialysis (HEM-o-day-uh-lay-sis) Procedure used to remove excess fluid and toxins from the blood
hemorrhage (HEM-uh-RAYJ) Loss of blood
hemorrhoids (HEM-o-royds) Varicose veins in the rectum
hemostasis (he-mo-STA-sis) Stoppage of bleeding
hemothorax (he-mo-THOR-aks) Accumulation of blood in the pleural space
heparin (hepa- lin) Substance that prevents blood clotting; anticoagulant
hepatitis (hep-a-TIS) Inflammation of the liver
heredity (he-RED-ih-tar-e) Transmitted genes or characteristics from parent to offspring
hereditary (he-RED-i-tar-e) Transmitted by means of the genes; the genetic makeup of the individual
hernia (HER-ne-ah) Protrusion of an organ or tissue through the wall of the cavity in which it is normally enclosed
heterozygous (het-e-r-o-ZI-gus) Having unmatched alleles for a given trait; hybrid
hilum (HI-lum) Indented region of an organ where vessels and nerves enter or leave
hippocampus (hip-o-KAM-pus) Sea horse-shaped region of the limbic system that functions in learning and formation of long-term memory
histamine (HI-stah-mayn) Substance released from tissues during an antigen–antibody reaction
histology (his-TOL-o-je) Study of tissues
hormone (HOR-mohn) Chemical messenger that has specific regulatory effects on certain other cells
host An organism in or on which a parasite lives
human chorionic gonadotropin (ko-re-OH-ne-ick gon-ah-DOH-trop-in) (hCG) Hormone produced by embryonic cells soon after implantation that maintains the corpus luteum
human immunodeficiency virus (HIV) The virus that causes AIDS
human placental lactogen (hPL) Hormone produced by the placenta that prepares the breasts for lactation and maintains nutrient levels in maternal blood
humoral (HU-mor-al) Pertaining to body fluids, such as immunity based on antibodies circulating in the blood
Huntington disease Progressive degenerative disorder carried by a dominant gene
hyaline (HI-ah-lin) Clear, glasslike; referring to a type of cartilage
hydatidiform (hi-DAH-tih-form) mole Benign overgrowth of placental tissue
hydrocephalus (hi-dro-SEF-ah-lus) Abnormal accumulation of CSF within the brain
hydrolysis (hi-DROL-ih-sis) Splitting of large molecules by the addition of water, as in digestion
hydrophilic (hi-dro-FIL-ihk) Mixing with or dissolving in water, such as salt; literally “water-loving”
hydrophobic (hi-dro-FOH-bik) Repelling and not dissolving in water, such as fats; literally “water-fearing”
hymen Fold of membrane near the opening of the vaginal canal
hypercapnia (hi-per-KAP-ne-ah) Increased level of carbon dioxide in the blood
hyperglycemia (hi-per-gli-SE-me-ah) Abnormal increase in the amount of glucose in the blood
hyperopia (hi-per-O-pe-ah) Farsightedness
hypertensive (hi-per-TEHN-ehn) High blood pressure
hypertonic (hi-per-TON-ik) Describing a solution that is more concentrated than the fluids within a cell
hypertrophy (hi-per-TRO-fe) Enlargement or overgrowth of an organ or part
hyperventilation (hi-per-VEN-eh-LAH-shun) Increased amount of air entering the alveoli of the lungs due to deep and rapid respiration
hypocapnia (hi-po-KAP-ne-ah) Decreased level of carbon dioxide in the blood
hypochondriac (hi-po-KON-dree-ahk) Pertaining to a region just inferior to the ribs
hypogastric (hi-po-GAH-strik) Pertaining to an area inferior to the stomach or the most inferior midline region of the abdomen
hypoglycemia (hi-po-gli-SAY-me-ah) Abnormal decrease in the amount of glucose in the blood
hypophysial (hi-POH-ih-sis) Pituitary gland
hypopnea (hi-POH-ne-ah) Decrease in the rate and depth of breathing
hypoplasia (hi-po-PLAS-ee-ah) Decrease in the rate and depth of breathing
hydronephrosis (hi-po-SPA-de-ahs) Opening of the urethra on the undersurface of the penis
GL - 10  * Glossary

cally, the amount of heat needed to raise 1 kg of water 1° centigrade
kinesthesia (kin-es-TH-e-ze-ah) Sense of body movement
Klinefelter (KLINE-fel-ter) syndrome Genetic disorder involving abnormal sex chromosomes, usually an extra X chromosome
Kupfer (KOOP-fer) cells Macrophages in the liver that help to fight infection
Kussmaul (KOOS-mowl) respiration Deep, rapid respiration characteristic of acidosis (overly acidic body fluids) as seen in uncontrolled diabetes.
kwashiorkor (kwash-e-OR-kor) Severe protein and energy malnutrition seen in children after weaning
kyphosis (ki-FO-sis) Exaggerated lumbar curve of the spine
labium (LA-be-um) Lip; pl labia (LA-be-ab)
labyrinth (LAB-ih-rinth) Inner ear, labium
lactation (LAK-ta-shun) Secretion of milk
lactic acid (LAK-tik) Acid
lacteal (LAK-te-al) Capillary of the lymphatic system
lactose (LAK-to-se) Sweetener
lactulose (LAK-tu-los-e) Lactic acid
lateral (LAT-er-al) Farther from the midline of the body
laryngeal (LA-ri-nal) Referring to the larynx
larynx (LAR-inks) Structure between the pharynx and trachea that contains the vocal cords; voice box
laser (LA-zer) Device that produces a very intense beam of light
lateral (LAT-er-al) Farther from the midline; toward the side
lens (LE-nz) Biconvex structure of the eye that changes in thickness to accommodate for near and far vision; crystalline lens
lesion (LE-zhen) Wound or local injury
leukemia (lu-KE-me-ah) Malignant blood disease characterized by abnormal development of white blood cells
leukocyte (LU-koe-site) White blood cell
leukocytosis (lu-koe-si-TO-sis) Increase in the number of white cells in the blood, suchas during infection
leukopenia (lu-koe-PE-ne-ah) Deficiency of leukocytes in the blood
leukoplakia (lu-koe-PLA-ke-ah) Thickened white patches on the oral mucous membranes, often due to smoking
LH See Luteinizing hormone
ligament (LIG-ah-ment) Band of connective tissue that connects a bone to another bone; thickened portion or fold of the peritoneum that supports an organ or attaches it to another organ
limbic system Area between the cerebrum and diencephalon of the brain that is involved in emotional states and behavior
lipid (LIP-id) Type of organic compound, one example of which is a fat
liter (LE-ter) (L) Basic unit of volume in the metric system
lithotripsy (LITH-o-trip-se) Use of external shock waves to shatter stones (calculi)
loop of Henle Hairpin shaped segment of the renal tubule between the proximal and distal convoluted tubules
lordosis (lor-DO-sis) Exaggerated lumbar curve of the spine
lumbar (LUM-bar) Pertaining to the region of the spine between the thoracic vertebrae and the sacrum
lumen (LU-men) Central opening of an organ or vessel
lung Organ of respiration
lumula (LU-nu-la) The pale half-moon shaped area at the proximal end of the nail
lupus erythematosus (LU-pus er-ih-the-mah-TO-sis) Chronic inflammatory autoimmune disease that involves the skin and sometimes other organs
luteinizing (LU-te-in-i-zing) hormone Hormone produced by the anterior pituitary that induces ovulation and formation of the corpus luteum in females; in males, it stimulates cells in the testes to produce testosterone and may be called interstitial cell–stimulating hormone (ICSH)
lymph (limf) Fluid in the lymphatic system
lymphadenitis (lim-fad-en-i-tis) Inflammation of the lymph nodes
lymphadenopathy (lim-fad-en-OP-ah-the) Any disorder of the lymph nodes
lymphangitis (lim-fan-i-tis) Inflammation of the lymphatic vessels
lymphatic duct (lim-FAH-tic) Vessel of the lymphatic system
lymphatic system System consisting of the lymphatic vessels and lymphoid tissue; involved in immunity, digestion, and fluid balance
lymph node Mass of lymphoid tissue along the path of a lymphatic vessel that filters lymph and harbors white blood cells active in immunity
lymphadenitis (lim-fad-en-i-tis) Inflammation of lymph nodes
lymphedema (lim-feh-DE-mah) Edema due to obstruction of lymph flow
lymphocyte (LIM-fo-site) Granular white blood cell that functions in immunity
lymphoma (lim-FO-mah) Any tumor, benign or malignant, that occurs in lymphoid tissue
lysosome (LI-so-some) Cell organelle that contains digestive enzymes
macrophage (MAK-ro-faj) Large phagocytic cell that develops from a monocyte; presents antigen to lymphocytes in immune response
macula (MAK-u-lah) Spot; flat, discolored spot on the skin, such as a freckle or measles lesion; also called macule; small yellow spot in the retina of the eye that contains the fovea, the point of sharpest vision; receptor for the sense of static equilibrium
magnetic resonance imaging (MRI) Method for studying tissue based on nuclear movement after exposure to radio waves in a powerful magnetic field
major histocompatibility complex Group of genes that codes for specific proteins (antigens) on the surface of cells. These antigens are important in cross-matching for tissue transplantation. They are also important in immune reactions.
malignant (mah-LIG-nant) Describing a tumor that spreads; describing a disorder that tends to become worse and cause death
malnutrition (mal-nu-TRISH-un) State resulting from lack of food, lack of an essential component of the diet, or faulty use of food in the diet
MALT Mucosal-associated lymphoid tissue; tissue in the mucous membranes that helps fight infection
mammary gland (MAM-er-e) Breast
mammogram (MAM-o-gram) Radiographic study of the breast
marasmus (mah-RAZ-mus) Severe malnutrition in infants
mastectomy (mas-TEK-to-me) Removal of the breast; mammary removal
mastitis (mas-TI-tis) Inflammation of the breast
mastication (mas-th-KA-shun) Act of chewing
matrix (MA-trik) The nonliving background material in a tissue; the intercellular material
meatus (me-A-tus) Short channel or passageway, as in a bone
medial (ME-de-al) Nearer the midline of the body
mediastinum (me-de-as-TI-num) Region between the lungs and the organs and vessels it contains
medulla (meh-DUL-lah) Inner region of an organ; marrow
medullary cavity (MED-u-lar-e) Channel at the center of a long bone that contains bone marrow
medulla oblongata (ob-long-GAH-tah) Part of the brain stem that connects the brain to the spinal cord
megakaryocyte (meg-ah-KAR-e-o-site) Very large cell that gives rise to blood platelets
nerve impulse  Electrical charge that spreads along the membrane of a neuron; action potential
nervous system (NER-vus) The system that transports information in the body by means of electrical impulses
neuralgia (nuh-RAL-je-ah) Pain in a nerve
neurilemma (nuh-rih-LEM-mah) Thin sheath that covers certain peripheral axons; aids in regeneration of the axon
neurogia (nuh-ROG-lee-uh) Supporting and protective cells of the central nervous system; glial cells
neuromuscular junction Point at which a nerve fiber contacts a muscle cell
neuron (NU-ron) Conducting cell of the nervous system
neurotransmitter (nuh-ROO-trans-mit-er) Chemical released from the ending of an axon that enables a nerve impulse to cross a synapse
neuron (NU-ron) Noncharged particle in the nucleus of an atom
neutrophil (nuh-TRAWF-ihl) Phagocytic granular white blood cell; polymorph; poly; PMN; seg
nevus (NE-vus) Mole or birthmark
nucleus (NU-kle-us) Largest organelle in the cell, containing the DNA, which directs all cell activities; group of neurons in the central nervous system; in chemistry, the central part of an atom
nuclear saline Isotonic or physiologic salt solution
nosocomial (nos-oh-KOH-me-al) Acquired in a hospital, as an infection
norepinephrine (nor-EP-ih-nif-рин) Neurotransmitter similar to epinephrine; noradrenaline
normal saline Isotonic or physiologic salt solution
nucleus (NU-kle-us) Small unit within the nucleus that assembles ribosomes
nucleotide (NU-kle-oh-tide) Building block of DNA and RNA
nucleus (NU-kle-us) Largest organelle in the cell, containing the DNA, which directs all cell activities; group of neurons in the central nervous system; in chemistry, the central part of an atom
obstipation (ob-sith-PA-shun) Extreme constipation
occlusion (ok-LU-zhun) Closing, as of a vessel
olfactory (ol-FAK-to-re) Pertaining to the sense of smell (olfaction)
omentum (o-MEN-tum) Portion of the peritoneum; greater omentum extends over the anterior abdomen; lesser omentum extends between the stomach and liver
oncology (on-KOL-oh-je) Study of tumors
ophthalmic (of-THAL-mik) Pertaining to the eye
ophthalmoscope (of-THAL-mo-skope) Instrument for examining the posterior (fundus) of the eye
ophthalmic (of-THAL-mik) Pertaining to the eye
opportunistic (ap-por-too-NIS-tik) Describing an infection that takes hold because a host has been compromised (weakened) by disease
organ (OR-gan) Body part containing two or more tissues functioning together for specific purposes
organelle (or-gan-EL) Specialized subdivision within a cell
organic (OR-GAN-ik) Referring to the complex compounds found in living things that contain carbon, and usually hydrogen, and oxygen
organism (OR-gan-izm) Individual plant or animal; any organized living thing
organ of Corti (KOR-tee) Receptor for hearing located in the cochlea of the internal ear
origin (OR-ih-jin) Source; beginning; muscle attachment connected to a nonmoving part
orpharynx (o-roh-FAR-inks) Middle portion of the pharynx, located behind the mouth
orthopnea (or-THOP-ne-uh) Difficulty in breathing that is relieved by sitting in an upright position
osmosis (os-MOH-sis) Movement of water through a semipermeable membrane
osmotic (os-MOH-tik) Pressure Tendency of a solution to draw water into it; is directly related to the concentration of the solution
ossus (os-us) Pertaining to bone tissue
ossicle (os-ih-kle) One of three small bones of the middle ear: malleus, incus, or stapes
ossification (os-ih-fih-KA-shun) Process of bone formation
osteoblast (OS-te-o-blast) Bone-forming cell
osteoclast (OS-te-o-clast) Cell that breaks down bone
osteocyte (OS-te-o-site) Mature bone cell; maintains bone but does not produce new bone tissue
osteon (OS-te-o-n) Subunit of compact bone, consisting of concentric rings of bone tissue around a central channel; haversian system
osteopenia (os-TE-o-PEN-ee-uh) Reduction in bone density to below average levels
osteoporosis (os-TE-o-oh-POH-rih-sis) Abnormal loss of bone tissue with tendency to fracture
otoliths (oh-toh-liths) Crystals that add weight to fluids in the inner ear and function in the sense of static equilibrium
ovarian follicle (oh-VAH-ree-uhn FOL-ih-kle) Cluster of cells in which the ovum develops within the ovary; Graafian follicle
ovary (OH-vuh-ree) Female reproductive gland
ovoid (OH-vu-oid) Tube that carries ova from the ovaries to the uterus; fallopian tube, uterine tube
ovulation (oh-oo-LA-shun) Release of a mature ovum from a follicle in the ovary
ovum (OH-vum) Female reproductive cell or gamete; pl., ova
oxidation (OK-sih-DAY-shun) Chemical breakdown of nutrients for energy
oxygen (OH-sih-jen) (O2) The gas needed to break down nutrients completely for energy within the cell
oxygen debt Amount of oxygen needed to reverse the effects produced in muscles functioning without oxygen
oxytocin (oh-seh-TOH-sin) Hormone from the posterior pituitary that causes uterine contraction and milk ejection (“letdown”) from the breasts
pacemaker Sinoatrial (SA) node of the heart; group of cells or artificial device that sets the rate of heart contractions
pallate (PAL-ate) Roof of the oral cavity; anterior portion is hard palate, posterior portion is soft palate
pallor (PAH-lor) Paleness of the skin
pancreas (Pan-kuh-reh-seez) Large, elongated gland behind the stomach; produces digestive enzymes and hormones (e.g., insulin)
pandemic (PAN-dee-mik) Disease that is prevalent throughout an entire country, continent or the world.
Papanicolau (pah-ah-nik-oh-LAH-oh) test Histologic test for cervical cancer; Pap test or smear
papilla (pah-PUL-ah) Small nodule or elevation or projection of the skin
papule (PAH-pul) Firm, raised lesion of the skin
papilloma (pah-PIH-oh-lom-ah) Premalignant lesion of the skin
parasympathetic nervous system Craniosacral division of the autonomic nervous system; generally reverses the fight-or-flight (stress) response
parathyroid (par-ah-THROYD) gland Any of four to six small glands embedded in the capsule enclosing the thyroid gland; produces parathyroid hormone, which raises the blood calcium level by causing release of calcium from bones
partial (PAH-tur) Pertaining to the wall of a space or cavity
Parkinson disease Progressive neurologic condition characterized by
tremors, rigidity of limbs and joints, slow movement, and impaired balance.

**parturition** (par-tu-RISH-un) Childbirth; labor

**pathogen** (PATH-o-jen) Disease-causing organism; adj., pathogenic (path-o-JEN-ik)

**pathology** (pah-THOL-o-o-je) Study of disease

**pathophysiology** (path-o-fiz-e-OL-o-o-je) Study of the physiologic basis of disease

**pedigree** (PED-il-gre) Family history; used in the study of heredity; family tree

**pelvic inflammatory disease (PID)** Ascending infection that involves the pelvic organs; common causes are gonorrhea and chlamydia

**pelvis** (PEL-vis) Basaline structure, such as the lower portion of the abdomen or the upper flared portion of the ureter (renal pelvis)

**pemphigus** (PEM-fih-gus) An autoimmune skin disease with blistering of the skin

**penis** (PE-nis) Male organ of urination and sexual intercourse

**perforating canal** Channel across a long bone that contains blood vessels and nerves; Volkmann canal

**pericardium** (per-ih-KAR-de-um) Fibrous sac lined with serous membrane that encloses the heart

**perichondrium** (per-ih-KON-dre-um) Cartilage of the meninges

**pericyst** (fiz-e-OL-o-je) Study of the function of living organisms

**peritonitis** (per-ih-TO-ne-um) Inflammation of the peritoneum

**peristalsis** (per-ih-STAL-sis) Wavelike slow movement in the wall of an organ or from a center or central structure

**peripheral nervous system (PNS)** System that occurs most commonly in children

**perimysium** (per-ih-NE-um) Pelvic floor; external region between the anus and the external urinary meatus

**peripheral nervous system (PNS)** All the nerves and nervous tissue outside the central nervous system

**peristalsis** (per-ih-STAL-sis) Wavelike movements in the wall of an organ or duct that propel its contents forward

**peritoneum** (per-ih-to-NE-e-um) Serous membrane that lines the abdominal cavity and forms outer layer of abdominal organs; forms supporting ligaments for some organs

**peritonitis** (per-ih-to-NI-tis) Inflammation of the peritoneum

**peroxisome** (per-OK-sih-some) Cell organelle that enzymatically destroys harmful substances produced in metabolism

**Peyer (Pl-er) patches** Clusters of lymphatic nodules in the mucous membranes lining the distal portion of the small intestine

**pH** Symbol indicating hydrogen ion (H+) concentration; scale that measures the relative acidity and alkalinity (basicity) of a solution

**phagocyte** (FAG-o-site) Cell capable of engulfing large particles, such as foreign matter or cellular debris, through the plasma membrane

**phagocytosis** (fag-o-si-TO-sis) Engulfing of large particles through the plasma membrane

**pharynx** (FA-RIHS) Throat; passageway between the mouth and esophagus

**phenotype** (FE-no-tipe) All the characteristics of an organism that can be seen or tested for

**phenylketonuria** (fen-il-ke-to-NU-re-ah) (PKU) Hereditary metabolic disorder involving inability to metabolize the amino acid phenylalanine

**phimosis** (fi-MO-sis) Tightness of the foreskin

**phlegm** (fleh-BI-tis) Inflammation of a membrane

**phospholipid** (fos-fo-LIP-id) Complex lipid containing phosphorus

**phlebitis** (fleh-BI-tis) Inflammation of a blood vessel

**phimosis** (fi-MO-sis) Tightness of the foreskin

**placenta** (plah-SEN-tah) Structure that nourishes and maintains the developing fetus during pregnancy

**plaque** (PLAK) Fatty material that deposits in vessel linings in atherosclerosis

**plasma** (PLAZ-mah) Liquid portion of the blood

**plasma cell** Cell derived from a B cell that produces antibodies

**plasma membrane** Outer covering of a cell; regulates what enters and leaves cells; cell membrane

**plasmapheresis** (plas-mah-fer-E-sis) Separation and removal of plasma from a blood donation and return of the formed elements to the donor

**pleat (PLATE-lit) Cell fragment that forms a plug to stop bleeding and acts in blood clotting; thrombocyte**

**pleura** (PLU-rah) Serous membrane that lines the chest cavity and covers the lungs

**pleurisy** (PLUR-ih-se) Inflammation of the pleura; pleuritis

**plexus** (PLEK-sus) Network of vessels or nerves

**pneumonia** (nu-MO-ne-ah) Inflammation of the lungs, commonly due to infection; pneumonia

**pneumothorax** (nu-mo-THOH-rahks) Accumulation of air in the pleural space

**PNS** See Peripheral nervous system

**poliomyelitis** (po-le-o-mi-ch-LI-tis) (polio) Viral disease of the nervous system that occurs most commonly in children

**polyarthralgia** (pol-e-ah-THER-al-jah) Inflammation of the joints

**polydipsia** (pol-e-DIP-se-ah) Excessive thirst

**polyp (POL-ip) Protruding growth, often grape-like, from a mucous membrane

**polysaccharide** Compound formed from many simple sugars linked together, such as starch and glycogen

**pons** (ponz) Area of the brain between the midbrain and medulla; connects the cerebellum with the rest of the central nervous system

**portal system** Venous system that carries blood to a second capillary bed through which it circulates before returning to the heart

**positive feedback** A substance or condition that acts within a system to promote more of the same activity

**positron emission tomography** (to-MOG-rah-fe) (PET) Imaging method that uses a radioactive substance to show activity in an organ

**posterior** (pos-TE-er-o) Toward the back; dorsal

**potential** (po-TEN-shal) An electrical charge, as on the neuron plasma membrane

**precipitation** (pre-sip-ih-TA-shun) Clumping of small particles as a result of an antigen-antibody reaction; seen as a cloudiness

**preeclampsia** (pre-e-CLAMP-se-ah) See Pregnancy induced hypertension

**pregnancy** (PREG-nan-se) The period during which an embryo or fetus is developing in the body

**pregnancy-induced hypertension (PIH)** Hypertension, proteinuria and edema associated with a hormone imbalance in the latter part of pregnancy; if untreated, may lead to eclampsia; preeclampsia, toxemia of pregnancy

**prepuce** (PRE-puse) Loose fold of skin that covers the glans penis; foreskin
preshbycysis (pres-he-KU-sis) Slowly progressive hearing loss that often accompanies aging

presbyopia (pres-be-O-pe-ah) Loss of visual accommodation that occurs with age, leading to farsightedness

prime mover Muscle that performs a given movement; agonist

prion (PRI-on) An infectious protein particle that causes progressive neurodegenerative disease

PRL see Prolactin

progeny (PROJ-ch-ne) Offspring, descendant

progesterone (pro-JES-ter-one) Hormone produced by the corpus luteum and placenta; maintains the lining of the uterus for pregnancy

prognosis (prog-NO-sis) Prediction of the probable outcome of a disease based on the condition of the patient and knowledge about the disease

prolactin (pro-LAK-tin) Hormone from the anterior pituitary that stimulates milk production in the breasts; PRL

prone Face down or palm down

prophase (PRO-faze) First stage of mitosis, during which the chromosomes become visible and the organelles disappear.

prophylaxis (pro-fih-LAK-sis) Prevention of disease

proprioceptor (pro-pre-o-SEP-tor) Sensory receptor that aids in judging body position and changes in position; located in muscles, tendons, and joints

prostaglandin (pros-tah-GLAN-din) Any of a group of hormones produced by many cells; these hormones have a variety of effects

prostate (PROS-tate) gland Gland that surrounds the urethra below the bladder and contributes secretions to the semen

protein (PRO-tene) Organic compound made of amino acids; contains nitrogen in addition to carbon, hydrogen, and oxygen (some contain sulfur or phosphorus)

prothrombin (pro-THROM-bin) Clotting factor; converted to thrombin during blood clotting

prothrombinase (pro-THROM-bih-nase) Blood clotting factor that converts prothrombin to thrombin

proton (PRO-ton) Positively charged particle in the nucleus of an atom

protozoan (pro-to-ZO-on) Animal-like microorganism; pl., protozoa

proximal (PROK-sh-mal) Nearer to point of origin or to a reference point

pruritis (pru-RI-tis) Intense itching of the skin

psoriasis (so-RI-ah-sis) Chronic skin disease with red, flat areas covered with silvery scales

ptosis (TO-sis) Dropping down of a part

puerperal (pu-ER-per-al) Related to childbirth

pulmonary circuit Pathway that carries blood from the heart to the lungs for oxygenation and then returns the blood to the heart

pulse Wave of increased pressure in the vessels produced by contraction of the heart

pupil (PU-pil) Opening in the center of the eye through which light enters

Purkinje (pur-KIN-je) fibers Part of the conduction system of the heart; conduction myofibers

pus Mixture of bacteria and leukocytes formed in response to infection

pustule (PUS-tule) Vesicle filled with pus

pylorus (pi-LOR-us) Distal region of the stomach that leads to the pyloric sphincter

pyrogen (PI-ro-jen) Substance that produces fever

pyruvic (pi-RI-vik) acid Intermediate product in the breakdown of glucose for energy

radioactivity (ra-de-o-ak-TIV-ih-t) Emission of rays of atomic particles from an element

radiography (RA-de-o-graf-e) Production of an image by passage of x-rays through the body onto sensitized film; record produced is a radiograph

rash Surface skin lesion

receptor (re-SEP-tor) Specialized cell or structure that responds to a particular stimulus, e.g., enzyme, hormone, antibody

recessive (re-SES-iv) Referring to a gene that is not expressed if a dominant gene for the same trait is present

reflex (RE-flex) Simple, rapid, automatic response involving few neurons

reflex arc (ark) A pathway through the nervous system from stimulus to response; commonly involves a receptor, sensory neuron, central neuron(s), motor neuron, and effector

refraction (re-FRAK-shun) Bending of light rays as they pass from one medium to another of a different density

relaxin (re-LAKS-in) Placental hormone that softens the cervix and relaxes the pelvic joints

renin (RE-min) Enzyme released from the juxtaglomerular apparatus of the kidneys that indirectly increases blood pressure by activating angiotensin

repolarization (re-po-lar-ih-ZA-shun) A sudden return to the original charge on a cell membrane following depolarization

resorption (re-SORP-shun) Loss of substance, such as that of bone or a tooth

respiration (res-pih-RA-shun) Process by which oxygen is obtained from the environment and delivered to the cells

respiratory system The system consisting of the lungs and breathing passages involved in exchange of oxygen and carbon dioxide between the outside air and the blood

reticular (re-TIK-u-lar) formation Network in the limbic system that governs wakefulness and sleep

reticuloendothelial (reh-tik-u-lo-en-do-THE-le-al) system Protective system consisting of highly phagocytic cells in body fluids and tissues, such as the spleen, lymph nodes, bone marrow, and liver

retina (RET-ih-nah) Innermost layer of the eye; contains light-sensitive cells (rods and cones)

rhabdomyoma (reh-bah-DOM-ih-oh-mah) Abnormal muscle mass

rhizone (rih-ZON-ih-zeh) A root

Rh factor Red cell antigen; D antigen

rheumatoid arthritis (RU-mah-toyd) Disease of connective tissue that affects the joints

rhodopsin (ro-DOP-sin) Light-sensitive pigment in the rods of the eye; visual purple

rib One of the slender curved bones that make up most of the thorax; costa; adj. costal

ribonucleic acid (RI-bo-nu-kle-ik) Substance needed for protein manufacture

ribosome (RI-bo-some) Small body in the cytoplasm of a cell that is a site of protein manufacture

rickets (RIK-ets) Softening of bone (osteamalacia) in children, usually caused by a deficiency of vitamin D

Rickettsia (rih-KET-se-ah) Extremely small oval to rod-shaped bacteria that can grow only within a living cell

RNA See Ribonucleic acid

rod Receptor cell in the retina of the eye; used for vision in dim light

roentgenogram (ren-TEN-oh-grom) Image produced by means of x-rays; radiograph

rotation (ro-TA-shun) Twisting or turning of a bone on its own axis

rugae (RU-jeh) Folds in the lining of an organ, such as the stomach or urinary bladder; sing., ruga (RU-gah)

rule of nines Method for estimating the extent of a burn based on multiples of nine

SA node See Sinoatrial node

saliva (sa-LI-vah) Secretion of the salivary glands; moistens food and contains an enzyme that digests starch

salt Compound formed by reaction between an acid and a base (e.g. NaCl, table salt)
sagittal (ṣaj-ih-tal) Describing a plane that divides a structure into right and left portions
sarcoma (sah-KO-mah) Malignant tumor of connective tissue; a form of cancer
saturated fat That has more hydrogen atoms and fewer double bonds between carbons than do unsaturated fats
scar Fibrous connective tissue that replaces normal tissues destroyed by injury or disease; cicatrix
Schwann cell (shvahn) Cell in the nervous system that produces the myelin sheath around peripheral axons
sclera (SKLE-ra) Outermost layer of the eye; made of tough connective tissue; ‘white’ of the eye
scleroderma (skle-oh-DER-mah) An autoimmune disease associated with overproduction of collagen
scrotum (SKRO-tum) Sac in which testes are suspended
sebum (SE-bum) Oily secretion that lubricates the skin; adj., sebaceous (se-BA-shus)
secretin (se-KRE-tin) Hormone from the duodenum that stimulates pancreatic release of water and bicarbonate
seizure (SE-zhur) Series of muscle spasms; convulsion
selectively permeable Describing a membrane that regulates what can pass through (e.g. the plasma membrane of a cell)
sella turcica (SEL-ah TUR-sih-ka) Saddlelike depression in the floor of the skull that holds the pituitary gland
semen (SE-men) Mixture of sperm cells and secretions from several glands of the male reproductive tract
semicircular canal Bony canal in the internal ear that contains receptors for the sense of dynamic equilibrium; there are three semicircular canals in each ear
semilunar (sem-ə-LU-nar) Shaped like a half-moon, such as the flaps of the pulmonary and aortic valves
seminal vesicle (VES-ih-VEL) Gland that contributes secretions to the semen
semiferous (seh-MIH-nuh-FER-uh-suz) Tubules in which sperm cells develop in the testis
semipermeable (sem-e-PER-me-ah-blu) Capable of being penetrated by some substances and not others
sensory (SEN-so-ree) Describing cells or activities involved in transmitting impulses toward the central nervous system; afferent
sensory adaptation Gradual loss of sensation when sensory receptors are exposed to continuous stimulation
sepsis (SEP-sis) Presence of pathogenic microorganisms or their toxins in the bloodstream or other tissues; adj., septic
septicemia (sep-tic-EM-ee-ah) Presence of pathogenic organisms or their toxins in the bloodstream; blood poisoning
septum (SEP-tum) Dividing wall, as between the chambers of the heart or the nasal cavities
serosa (se-RO-sah) Serous membrane; epithelial membrane that secretes a thin, watery fluid
Sertoli cells See Sustentacular cells
serum (SE-rum) Liquid portion of blood without clotting factors; thin, watery fluid; adj., serous (SE-rus)
sex-linked Referring to a gene carried on a sex chromosome, usually the X chromosome
sexually transmitted disease (STD) Disease acquired through sexual relations; venereal disease (VD)
shingles Viral infection that follows the nerve pathways; caused by the same virus that causes chicken pox; herpes zoster
shock Pertaining to the circulation: inadequate output of blood by the heart
sickle cell disease Hereditary disease in which abnormal hemoglobin causes red blood cells to change shape (sickle) when they release oxygen
sign Manifestation of a disease as noted by an observer
sinoatrial (si-no-A-tre-al) (SA) node Tissue in the upper wall of the right atrium that sets the rate of heart contractions; pacemaker of the heart
sine qua non Cavity or channel, such as the paraanal sinuses in the skull bones
sine re non A normal heart rhythm originating at the SA node
sinusoid (SE-nus-oid) Enlarged capillary that serves as a blood channel
skeletal (SKEL-eht) system The body system that includes the bones and joint
skull bone framework of the body; adj., skeletal
solute (SO-lute) Substance that is dissolved in another substance (the solvent)
solution (SO-lu-shun) Homogeneous mixture of one substance dissolved in another; the components in a mixture are evenly distributed and cannot be distinguished from each other
solvent (SO-lvent) Substance in which another substance (the solute) is dissolved
somatomedine (soh-mah-TOH-muh-DIN) Growth hormone
spasm Sudden and involuntary muscular contraction
specific gravity The weight of a substance as compared to the weight of an equal volume of pure water
spermatic (spur-MAT-ik) cord Cord that extends through the inguinal canal and suspends the testes; contains blood vessels, nerves and ductus deferens
spermatozoon (SPER-mah-toh-ZOH-nu) Male reproductive cell or gamete; pl., spermatozoa
sphincter (SPHK-ter) Muscle ring that regulates the size of an opening
sphygmomanometer (SPHK-gm-oh-MA-num-ter) Device used to measure blood pressure; blood pressure apparatus or cuff
spina bifida (SPI-nah BIF-ih-dah) Incomplete closure of the spine
spinal cord Nervous tissue contained in the spinal column; major relay area between the brain and the peripheral nervous system
spirillum (SPIRIL-um) Corkscrew or spiral-shaped bacterium; pl., spirilla
spirochete (SPI-ro-keet) Spiral-shaped microorganism that moves in a waving and twisting motion
spirometer (SPI-roh-MET-er) Instrument for recording lung volumes; tracing is a spirogram
spleen Lymphoid organ in the upper left region of the abdomen
spore Resistant form of bacterium; reproductive cell in lower plants
squamous (SKWA-mus) Flat and irregular, as in squamous epithelium
staging A procedure for evaluating the extent of tumor spread
stain (stane) Dye that aids in viewing structures under the microscope
staphylococcus (staf-ih-LO-kok-us) Round bacterium found in a cluster resembling a bunch of grapes; pl., staphylococci (staf-ih-loh-KOK-si)
stasis (STA-sis) Stagnation in the normal flow of fluids, such as blood, lymph, urine, or contents of the digestive tract
STD See Sexually transmitted disease
stem cell Cell that has the potential to develop into different types of cells
stenosis (sten-O-sis) Narrowing of a duct or canal
stenosis (sten-O-sis) Narrowing of a duct or canal
stent Small tube inserted into a vessel to keep it open
sterility Complete inability to reproduce
sterilization (ster-il-LAY-zhun) Process of killing every living microorganism on or in an object; procedure that makes an individual incapable of reproduction
steroid (STEH-royd) Category of lipids that includes the hormones of the sex glands and the adrenal cortex

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stethoscope (STETH-o-skope) Instrument for conveying sounds from the patient’s body to the examiner’s ears

stimulus (STIM-u-lus) Change in the external or internal environment that produces a response

stomach (STUM-ak) Organ of the digestive tract that stores food, mixes it with digestive juices and moves it into the small intestine

strabismus (stra-BIZ-mus) Deviation of the eye resulting from lack of eyeball muscle coordination

stratified In multiple layers (strata)

stratum (STRA-tum) A layer; pl. strata

stratum basale (bas-A-le) Deepest layer of the epidermis; layer that produces new epidermal cells; stratum germinativum

stratum corneum (KOR-ne-um) The thick uppermost layer of the epidermis

stratified In multiple layers (strata)

stricture (STRICK-ture) Narrowing of a stricture

stroke Damage to the brain due to lack of oxygen; usually caused by a blood clot in a vessel (thrombus) or rupture of a vessel; cerebrovascular accident (CVA)

subacute Not as severe as an acute infection nor a long-lasting as a chronic disorder

subcutaneous (sub-ku-TA-ne-us) Under the skin

submucosa (sub-mu-KO-sah) Layer of connective tissue beneath the mucosa

substrate Substance on which an enzyme works

sudoriferous (su-do-RIF-er-us) Producing sweat; referring to the sweat glands

sulcus (SUL-kus) Shallow groove, as between convolutions of the cerebral cortex; pl., sulci (SUL-si)

superior (su-PER-i-or) Above; in a higher position

superior vena cava (VE-nah KA-vah) Large vein that drains the upper part of the body and empties into the right atrium of the heart

supine (SU-pine) Face up or palm up

surfactant (sur-FAK-tant) Substance in the alveoli that prevents their collapse by reducing surface tension of the contained fluids

suspension (sus-PEN-shun) Heterogeneous mixture that will separate unless shaken

suspensory ligaments Filaments attached to the ciliary muscle of the eye that hold the lens in place

sustentacular (sus-ten-TAK-u-lar) Cells in the seminiferous tubules that aid in development of spermatozoa; Sertoli cells

suture (SU-chur) Type of joint in which bone surfaces are closely united, as in the skull; stitch used in surgery to bring parts together or to stitch parts together in surgery

sympathetic nervous system Thoracolumbar division of the autonomic nervous system; stimulates a fight-or-flight (stress) response

symptom (SIMP-tom) Evidence of disease noted by the patient; such evidence noted by an examiner is called a sign or an objective symptom

synapse (SIN-aps) Junction between two neurons or between a neuron and an effector

synarthrosis (sin-ar-THRO-sis) Immovable joint

syndrome (SIN-drome) Group of symptoms characteristic of a disorder

synergist (SIN-er-jist) A substance or structure that enhances the work of another. A muscle that works with a prime mover to produce a given movement

tachycardia (tak-e-KAR-de-ah) Heart rate more than 100 beats per minute

tachypnea (tak-IP-nee-ah) Excessive rate of respiration

tactile Pertaining to the sense of touch

target tissue Tissue that is capable of responding to a specific hormone

T cell Lymphocyte active in immunity that matures in the thymus gland; destroys foreign cells directly; T lymphocyte

tectorial (tek-TO-re-ah) membrane Part of the hearing apparatus; generates nerve impulses as cilia move against it in response to sound waves

telophase (TEL-o-faze) Final stage of mitosis, during which new nuclei form and the cell contents usually divide

tendinitis (ten-din-l-tis) Inflammation of a tendon

tendon (TEN-don) Cord of fibrous connective tissue that attaches a muscle to a bone

teniae (TEN-e-e) Cols Bands of smooth muscle in the wall of the large intestine

testis (TES-tis) Male reproductive gland; pl., testes (TES-teez)

testosterone (tes-TO-ser-one) Male sex hormone produced in the testes; promotes the development of sperm cells and maintains secondary sex characteristics

tetanus (TET-an-us) Constant contraction of a muscle; infectious disease caused by a bacterium (Clostridium tetani); lockjaw

tetany (TET-an-e) Muscle spasms due to low blood calcium, as in parathyroid deficiency

thalamus (THAL-ah-mus) Region of the brain located in the diencephalon; chief relay center for sensory impulses traveling to the cerebral cortex

therapy (THER-ah-pe) Treatment

thoracentesis (thor-a-sen-TE-sis) Puncture of the chest for aspiration of fluid in the pleural space

thorax (THO-rahks) Chest; adj., thoracic (tho-RAS-ik)

thrombocyte (THROM-bo-site) Blood platelet; cell fragment that participates in clotting

thrombocytopenia (throm-bo-si-to-PE-ne-ah) Deficiency of platelets in the blood

thrombolytic (throm-bo-LIT-ik) Dissolving blood clots

thrombosis (throm-BO-sis) Condition of having a thrombus (blood clot in a vessel)

thrombus (THROM-bus) Blood clot within a vessel

thymosin (THI-mo-sin) Hormone produced by the thymus gland

thymus (THI-mus) Endocrine gland in the upper portion of the chest; stimulates development of T cells

thyroid (THI-royd) Endocrine gland in the neck

thyroiditis (thi-royd-l-tis) Inflammation of the thyroid gland

thyroid-stimulating hormone (TSH) Hormone produced by the anterior pituitary that stimulates the thyroid gland: thyrotropin

thyroxine (thi-ROK-sin) Hormone produced by the thyroid gland; increases metabolic rate and needed for normal growth; T₄

tinea (TIN-e-ah) Common term for fungal infection of the skin

tissue Group of similar cells that performs a specialized function

tonicity (to-NIS-ih-te) The osmotic concentration or osmotic pressure of a solution. The effect that a solution will have on osmosis

tonsil (TON-sil) Mass of lymphoid tissue in the region of the pharynx

tonus (TO-nus) Partially contracted state of muscle; also, tone
toxemia (tok-SE-me-ah) General toxic condition in which poisonous bacterial substances are absorbed into the bloodstream; presence of harmful substances in the blood as a result of abnormal metabolism

toxin (TOK-sin) Poison

toxoid (TOK-soyd) Altered toxin used to produce active immunity

traachea (TRA-keh-ah) Tube that extends from the larynx to the bronchi; windpipe

tracheostomy (tra-ke-OS-to-me) Surgical opening into the trachea for the introduction of a tube through which a person may breathe

trachoma (trah-KOH-mah) Acute eye infection caused by chlamydia

tract Bundle of neuron fibers within the central nervous system

trait Characteristic

transplantation (trans-plan-TA-shun) The grafting to a recipient of an organ or tissue from an animal or other human to replace an injured or incompetent part of the body

transverse Describing a plane that divides a structure into superior and inferior parts

trauma (TRAW-mah) Injury or wound

tricuspid (tri-KUS-pid) Valve between the right atrium and right ventricle of the heart

trigeminal neuralgia (tri-JEM-ih-nal nu-trigeminal neuralgia) Severe spasmodic pain affecting the fifth cranial nerve; tic douloureux (tik du-lu-RU).

triglyceride (tri-GLIS-er-ide) Simple fat composed of glycerol and three fatty acids

trigone (TRI-gone) Triangular shaped region in the floor of the bladder that remains stable as the bladder fills

triodothyronine (tri-o-do-THI-ro-nin) Thyroid hormone that functions with thyroxine to raise cellular metabolism; T₃

troponin (tro-PO-nin) A protein that works with tropomyosin to regulate contraction in skeletal muscle

troponin (tro-PO-nin) A protein that works with tropomyosin to regulate contraction in skeletal muscle

TSH See Thyroid-stimulating hormone

tuberculosis (tu-ber-ku-LO-sis) (TB) Infectious disease, often of the lung, caused by the bacillus Mycobacterium tuberculosis

tumor (TU-mor) Abnormal growth or neoplasm

tympanic (tim-PAN-ik) membrane Membrane between the external and middle ear that transmits sound waves to the bones of the middle ear; eardrum

ulcer (UL-ser) Sore or lesion associated with death and disintegration of tissue

ultrasound (UL-trah-sound) Very high frequency sound waves

umbilical (um-BIL-i-kal) cord Structure that connects the fetus with the placenta; contains vessels that carry blood between the fetus and placenta

umbilicus (um-BIL-i-kus) Small scar on the abdomen that marks the former attachment of the umbilical cord to the fetus; navel

universal solvent Term used for water because it dissolves more substances than any other solvent

unsaturated fat Fat that has fewer hydrogen atoms and more double bonds between carbons than do saturated fats

urea (u-RE-ah) Nitrogenous waste product excreted in the urine; end product of protein metabolism

uremia (u-RE-me-ah) Accumulation of nitrogenous waste products in the blood

ureter (u-RE-te-er) Tube that carries urine from the kidney to the urinary bladder

urethra (u-RE-thrah) Tube that carries urine from the urinary bladder to the outside of the body

urinalysis (u-ri-nAL-i-sis) Laboratory examination of the physical and chemical properties of urine

urinary bladder Hollow organ that stores urine until it is eliminated

urinary system (U-ri-nar-e) The system involved in elimination of soluble waste, water balance and regulation of body fluids

urination (u-ri-nA-shun) Voiding of urine; micturition

urine (U-rin) Liquid waste excreted by the kidneys

urticaria (ur-tih-KA-re-ah) Hives; allergic skin reaction with elevated red patches (wheels)

uterus (U-ter-us) Muscular, pear-shaped organ in the female pelvis within which the fetus develops during pregnancy

urea (u-RE-me-ah) Accumulation of nitrogenous waste products in the blood

uremia (u-RE-me-ah) Accumulation of nitrogenous waste products in the blood

valence (VA-lens) The combining power of an atom. The number of electrons lost or gained by atoms of an element in chemical reactions

valve Structure that prevents fluid from flowing backward, as in the heart, veins, and lymphatic vessels

varicose (VAR-ih-kose) Pertaining to an enlarged and twisted vessel, as in varicose vein

vas deferens (DEF-er-enz) Tube that carries sperm cells from the testis to the urethra; ductus deferens

vasectomy (vah-SEK-to-me) Surgical removal of part or all of the ductus (vas) deferens; usually done on both sides to produce sterility

vasoconstriction (vas-o-kon-STRIK-shun) Decrease in the diameter of a blood vessel

vasodilation (vahs-o-di-LA-shun) Increase in the diameter of a blood vessel

VD Venereal disease; see Sexually transmitted disease

vector (VEK-tor) An insect or other animal that transmits a disease-causing organism from one host to another

vein (vane) Vessel that carries blood toward the heart

vena cava (VE-nah KA-vah) A large vein that carries blood into the right atrium of the heart; superior vena cava or inferior vena cava

venereal (ve-NE-re-al) disease (VD) Disease acquired through sexual activity; sexually transmitted disease (STD)

venous sinus (VE-nus SI-nus) Large channel that drains deoxygenated blood

ventilation (ven-ih-LA-shun) Movement of air into and out of the lungs

ventral (VEN-tral) Toward the front or belly surface; anterior

ventricle (VEN-trih-kl) Cavity or chamber; one of the two lower chambers of the heart; one of the four chambers in the brain in which cerebrospinal fluid is produced; adj., ventricular (ven-TRI-kul-ar)

venule (VEN-ule) Vessel between a capillary and a vein

vernix caseosa (Ver-niks Ka-se-O-sah) Cheeselike sebaceous secretion that covers a newborn

vertebra (VER-teh-brah) A bone of the spinal column; pl., vertebrae (VER-teh-bre)

verruca (veh-RU-kah) Wart

vesicle (VES-i-kle) Small sac or blister filled with fluid

vesicular transport Use of vesicles to move large amounts of material through the plasma membrane of a cell

vestibule (VES-ih-bule) Part of the internal ear that contains receptors for the sense of static equilibrium; any space at the entrance to a canal or organ
**vibrio** (VIB-re-o) Slight curved or comma-shaped bacterium; pl., vibrios

**villi** (VIL-li) Small fingerlike projections from the surface of a membrane; projections in the lining of the small intestine through which digested food is absorbed; sing., villus

**viroid** (VI-royd) Infectious agent composed of RNA with no protein. Viroids are intracellular parasites linked so far only to diseases in plants.

**virulence** (VIR-u-lens) Power of an organism to overcome defenses of a host

**virus** (VI-rus) Extremely small infectious agent that can reproduce only within a living cell

**viscera** (VIS-er-ah) Organs in the ventral body cavities, especially the abdominal organs; adj. visceral

**viscosity** (vis-KOS-i-te) Thickness, as of the blood or other fluid

**vitamin** (VI-tah-min) Organic compound needed in small amounts for health

**vitreous** (VIT-re-us) body Soft, jellylike substance that fills the eyeball and holds the shape of the eye; vitreous humor

**vocal cords** Folds of mucous membrane in the larynx used in producing speech

**Völkmann canal** See perforating canal

**volvulus** (VOL-vu-lus) Twisting of the intestine

**von Willebrand disease** Hereditary blood clotting disorder in which there is a shortage of von Willebrand factor

**Wernicke** (VER-nih-ke) area Portion of the cerebral cortex concerned with speech recognition and the meaning of words

**white matter** Nervous tissue composed of myelinated fibers

**X-ray** Ray or radiation of extremely short wavelength that can penetrate opaque substances and affect photographic plates and fluorescent screens

**zygote** (ZI-gote) Fertilized ovum; cell formed by the union of a sperm and an egg
Glossary of Word Parts

Use of Word Parts in Medical Terminology

Medical terminology, the special language of the health occupations, is based on an understanding of a relatively few basic elements. These elements—roots, prefixes, and suffixes—form the foundation of almost all medical terms. A useful way to familiarize yourself with each term is to learn to pronounce it correctly and say it aloud several times. Soon it will become an integral part of your vocabulary.

The foundation of a word is the word root. Examples of word roots are abdomin-, referring to the belly region; and aden-, pertaining to a gland. A word root is often followed by a vowel to facilitate pronunciation, as in abdomino- and adeno-. We then refer to it as a “combining form.” The hyphen appended to a combining form indicates that it is not a complete word; if the hyphen precedes the combining form, then it commonly appears as the word ending, as in -algia, meaning “a painful condition.”

A prefix is a part of a word that precedes the word root and changes its meaning. For example, the prefix mal- in malnutrition means “abnormal.” A suffix, or word ending, is a part that follows the word root and adds to or changes its meaning. The suffix -rhea means “profuse flow” or “discharge,” as in diarrhea, a condition characterized by excessive discharge of liquid stools.

Many medical words are compound words; that is, they are made up of more than one root or combining form. Examples of such compound words are erythrocyte (red blood cell) and hydrocele (fluid-containing sac), and many more difficult words, such as sternoclavicular (indicating relations to both the sternum and the clavicle).

A general knowledge of language structure and spelling rules is also helpful in mastering medical terminology. For example, adjectives include words that end in -al, as in sternal (the noun is sternum), and words that end in -ous, as in mucous (the noun is mucus).

The following list includes some of the most commonly used word roots, combining forms, prefixes, and suffixes, as well as examples of their use. Prefixes are followed by a hyphen; suffixes are preceded by a hyphen; and word roots have no hyphen. Commonly used combining vowels are added following a slash.

Word Parts

- a-, an-: absent, deficient, lack of: atrophy, anemia, anuria
- ab-: away from: abdication, aboral
- abdomin/o: belly or abdominal area: abdominoscopy
- acous-, acus: hearing, sound: auditory
- abdomino-/adeno-: pertaining to a gland: abdominopathy
- actino-/actin/i: extreme end of a part, especially of the extremities: actiniform, actinodermatitis
- ad: (sometimes converted to ac-, af-, ag-, ap-, as-, at-) toward, added to, near: adrenal, accretion, agglomerated,afferent
- aden/o: gland: adenectomy, adenitis, adenocarcinoma
- aer/o: air, gas: aerobic, aereate
- -agoge: inducing, leading, stimulating: chologogue, galactagogue
- -al: pertaining to, resembling: skeletal, surgical, ileal
- alb/o: white: albinism, albiduria
- alg/o: pain: algetic, algophobiac, analgesic
- -algia: pain, painful condition: myalgia, neuralgia
- amb/bi-: both, on two sides: ambidexterity, ambivalent
- ambly-: dimness, dullness: amblyopia
- audi/o: sound, hearing: audiogenic, audiometry, audiovisual
- aut/o: self: autogenic, autodigestion, autonomic
- bas/o-: basic, basophilic
- bi-: two: bifurcate, bisexual
- bil/i: bile: bililiary, bilirubin
- bio-: life, living organism: biopsy, antibiotic
- blast/o-: early stage of a cell, immature cell: blastula, blastophore, erythoblast
- bleph/o: eyelid, eyelash: blepharitis, blepharospasm
- brachi/o: arm: brachial, brachiocephalic, brachiotomy
- brachy-: short: brachydactylia, brachycephalic
- brady-: slow: bradycardia
- bronch/o-/bronch/i: windpipe or other air tubes: bronchiectasis, bronchoscope
- bucc/o: cheek: buccal
- capn/o: carbon dioxide: hypocapnia, hypercapnia
- carcino/o: cancer: carcinogenic, carcinoma
- cardi/o-: heart: carditis, cardiac, cardiologist
- cata-: down: catabolism, catalyst
- -cele: swelling; enlarged space or cavity: cystocele, meningocele, rectocele
GLOSSARY OF WORD PARTS

kary/o nucleus: karyotype, karyoplasm
kerat/o cornea of the eye, certain horny tissues: keratin, keratitis, keratoplasty
kine movement: kinetic, kinesiology, kinesithesia
lacr- tear: lacrimal
lact/o milk: lactation, lactogenic
laryng/o larynx: laryngeal, laryngectomy, laryngitis
later/o-side: lateral
-lemma sheath: neurilemma, sarcolemma
leuko/- (also written as leuc-, leuco-) white, colorless: leukocyte, leukoplakia
lip/o lipid, fat: lipase, lipoma
lig- ligament, ligature
lipo/- lip: lipase, lipoma
lith/o stone (calcus): lithotomy, lithotripsy
lithiasis, litho-/lysis, lytic
mamm/o, -malacia softening:
mammal: mammalogy
macrophage, macroblast.
mammary gland: mammary, mammoplasty, mammal
man/o pressure: manometer, sphygmo-manometer
mast/o breast: mastectomy, mastitis
meg/a, -megal/o unusually or excessively large: megacolon, megaloblast, splenomegaly, megakaryocyte
melan/o melanin, melanocyte,
melanoma
men/o physiologic uterine bleeding, menses: menses, menstruation, menopause
mening/o membranes covering the brain and spinal cord: meningitis, meningocoele
mes/a, mese/o-middle, midline: mesencephalon, mesoderm
meta-change, beyond, after, over, near: metabolism, metacarpal, metaplasia
-meter, met/o-measure: hemometer, sphygmonanometer, spirometer, isometric
metr/o uterus: endometrium, metropostis, metrorrhagia
micro-very small: microscope, microbiology, microsurgery, micrometer
mon/o-single, one: monocyte, mononucleosis
morph/o shape, form: morphogenesis, morphology
multi-many: multiple, multifactorial, multipara
my/o muscle: myenteron, myocardium, myometrium
myco/mycet fungi: mycid, mycete, mycology, mycosis, mycelium
myel/o marrow (often used in reference to the spinal cord): myeloid, myeloblast, osteomyelitis, myeloproliferitis
myring/o tympanic membrane: myringotomy, myringitis
myx/o mucus: myxoma, myxovirus
narc/o stupor: narcosis, narcolepsy, narcotic
nas/o nose: nasopharynx, paranasal
natri/sodium: hyponatremia, natriuretic
necr/o death, corpse: necrosis
neu-/ new: neoplasm, neurotome, nephron
neur/o, neur/i nerve, nervous tissue: neuron, neuralgia, neurona
neur/oneural: neuromyelitis, poliomyelitis
neur/o neutral: neutrophil, neutropenia
noc/o/toe night: noctum, nocturnia, nociphobia
ophthalm/o eye: oculist, oculomotor, ocumycosis
odont/o tooth, teeth: odontalgia, orthodontics
-oid like, resembling: lymphoid, myeloid
olig/o few, a deficiency: oligospermia, oliguria
-onc tumor, swelling: hematoma, sarcoma
-one ending for steroid hormone: testosterone, progesterone
ophthalm/o eye: ophthalmia, ophthalmology. See also ophthalmologist
ophthalm/o eye: ophthalmia, ophthalmologist, ophthalmoscopy.
-opia disorder of the eye or vision: xerocoria, myopia, hyperopia
or/o mouth: oropharynx, oral
orchi/o, orchid/o testis: orchitis, cryptorchidism
orth/o, -orthia straight, normal: orthopedics, orthopaedia, orthosis
-ory pertaining to, resembling: respirator, circulatory
oscill/o to swing to and fro: oscillography
osmo-/osmosis: osmoreceptor; osmotic
ossi/o, osse/o bone, bone tissue: osseus, osicle, osteocyte, osteomyelitis
ot/o ear: otalgia, otitis, otomycosis
ous pertaining to, resembling: fibrous, venous, androgynous
ov/o egg, ovum: oviduct, ovulation
ovari/o, ovar/o ovariectomy. See also oophor
ox/o, -oxia pertaining to oxygen: hypoxemia, hypoxia, anoxia
oxy sharp, acute: oxygen, oxytocia
pan-all: pandemic, panacea
paraplejia, paraplegia
parapara near, beyond, apart from, beside:
paramedical, parametrium, parapyridy, parasagittal
pariet/o wall: parietal path/o, -pathy disease, abnormal condition: pathogen, pathognomonic, pathology, neuropathy
ped/o, pedia child, foot: pedialgia, pedophobia, pediatrician
penia lack of: leukopenia, thrombocytopenia
per-through, excessively: percutaneous, perfusion
peri-around: pericardium, perichondrium
-pexy fixation: nephropexy, proctopexy
phag/o to eat, to ingest: phage, phagocyte
-phagia, -phagy eating, swallowing: aphagia, dysphagia
phasia speech, ability to talk: phasia, dysphasia
phen/o to show: phenotype
phil, -philic to like, have an affinity for: cosinophilia, homophilia, hydrophilic
plebe/o vein: phlebitis, phlebotomy
phobia fear, dread, abnormal aversion: phobic, acrophobia, hydrophobia
phot/o light: photoreceptor, photophobia
phren/o diaphragm: phrenic, phrenicotomy
physio/o natural, physical: physiology, physician
pil/e, pil/i, pil/o hair, resembling hair: pileus, pilation, pilonidal
pin/o to drink: pinocytosis
-plasty molding, surgical formation: cystoplasty, gastroplasty, kineplasty
plegia stroke, paralysis: paraplegia, hemiplegia
pleur/o side, rib, pleura: pleurisy, pleurotomy
-pnea air, breathing: dyspnea, eupnea
pneum/o, pneumat/o air, gas, respiration: pneumothorax, pneumograph, pneumotocle
pneumon/o lung: pneumonia, pneumonectomy
pod/o foot: podiatry, pododynia
-poiesis making, forming: erythropoiesis, hematopoesis
polio-gray: polioencephalitis, poliomyelitis
poly-many: polyarthritis, polycystic, polycythemia
post-behind, after, following: postinatal, postocular, postpartum
pre-before, ahead of: precancerous, preclinical, prenatal
presby- old age: presbycusis, presbyopia
pro-before, in front of, in favor of: prodr mal, proencephal, prolapse, prothrombin
proct/o rectum: proctitis, proctectomy, proctologist
propri/o own: proprioeception
pseud/o false: pseudoarthrosis, pseudo- tritified, pseudopod
psych/o mind: psychosomatic, psychoter apy
-ptosis downward displacement, falling, prolapse: blepharoptosis, entropotis, neophytosis
pulmo, pulmon/o lung: pulmonic, pulmonology
py/o pus: pyuria, pyogenic, pyorrhea
pyel/o renal pelvis: pyelitis, pyelogram, pyelonephrosis
pyr/o fire, fever: pyroantitic, antipyretic, pyromania
quadr/- four: quadriceps, quadriplegic
rachi/o spine: rachiscentesis, rachischisis
radio- emission of rays or radiation: radiactive, radiography, radiology
re- again, back: reabsorption, reaction, regenerate
rect/o rectum: rectal, rectotome
ren/o kidney: renal, renopathy
reticul/o network: reticulum, reticular
rhin/o nose: rhinitis, rhinoplasty
sacchar/o sugar: monosaccharide, polysaccharide
salping/o tube: salpingitis, salpingoscopy
sarc/o flesh: sarcolemna, sarcoplasm, sarcocomere
scler/o hard, hardness; scleroderma, sclerosis
scoli/o twisted, crooked: scoliosis, scoliosometer
-scope instrument used to look into or examine a part: bronchoscope, endoscope, arthroscope
semi- partial, half: semipermeable, semicomma
sem/o semen, seed: seminiferous, seminal
sep, septic poison, rot, decay: sepsis, septicemia
*When a suffix beginning with rh is added to a word root, the r is doubled.
sin/o sinus: sinusitis, sinusoid, sinoatrial
-sis condition or process, usually abnormal: dermatosis, osteoporosis
soma-, somat/o-, some body: somatic, somatotype, somatotropin
son/o sound: sonogram, sonography
sphygm/o pulse: sphygmomanometer
spir/o = breathing: spirometer, inspiration, expiration
splanch-, splanchno- internal organs: splanchnic, splanchnitis
stat, -stasis stand, stopwatch, remain at rest: hemostasis, static, homeostasis
sten/o- contracted, narrowed: stenosis
sthen/o- strength: sthenia, sthenic
stom/o- stomach: stomatitis
strept/o chain: streptococcus, streptobacillus
sub- under, below, near, almost: subclavian, subcutaneous, subluxation
super- over, above, excessive: superego, supernatant, superficial
supra- above, over, superior: supranasal, suprarenal
sym- syn- with, together: symphysis, synapse
syring/o fistula, tube, cavity: sryngectomy, syringomyelia
tach/o-, tachy- rapid: tachycardia, tachynea
tars/o eyelid, foot: tarsitis, tarsoplasty, tarsotaxis
tel/o end: telophase, telomere
tens- stretch, pull: extension, tensor
test/o testis: testosterone, testicular
tetra- four: tetracyclor, tetraplegia
therm-, thermo-, -thermy heat: thermalgia, thermocautery, diathermy, thermometer
thromb/o blood clot: thrombosis, thrombocyte
toco- labor: cutoxia, dystocia, oxytocin
tom/o-, tomy incision of, cutting: anatomy, phlebotomy, laparotomy	on/o tone, tension: tonicity, tonic
tox, toxic/o poison: toxin, cytotoxic, toxicemia, toxicology
trache/o trachea, windpipe: tracheal, tracheitis, tracheotomy
trans- across, through: beyond: transbital, transpiration, transplant, transport
tri- three: triad, triceps
trich/o hair: trichiasis, trichosis, trichology
trophy/o, -trophi- trophic nutrition, nurture: atrophy, hypertrophy
trop/o- tropic- tropic turning toward, acting on, influencing, changing: thyrrotropin, adrenocorticotropic, gonadotropic
tympan/o drum: tympanic, tympanum
ultra- beyond or excessive: ultrasound, ultraviolet, ultrastructure
uni- one: unilateral, uniovular, unicellular
-uria urine: glycosuria, hematuria, pyuria
ur/o urine, urinary tract: urology, urogenital
vas/o vessel, duct: vascular, vasectomy, vasodilation
viscero/o internal organs, viscera: visceral, visceroplasty
vitre/o glasslike: vitreous
xer/o dryness: xeroderma, xerophthalmia, xerosis
-y condition of: tetany, atony, dysentery
zyg/o = joined: zygote, heterozygous, monozygotic
## Appendix 1: Metric Measurements

<table>
<thead>
<tr>
<th>UNIT of length</th>
<th>ABBREVIATION</th>
<th>METRIC EQUIVALENT</th>
<th>U.S. EQUIVALENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kilometer</td>
<td>km</td>
<td>1000 meters</td>
<td>0.62 miles; 1.6 km/mile</td>
</tr>
<tr>
<td>Meter*</td>
<td>m</td>
<td>100 cm; 1000 mm</td>
<td>39.4 inches; 1.1 yards</td>
</tr>
<tr>
<td>Centimeter</td>
<td>cm</td>
<td>1/100 m; 0.01 m</td>
<td>0.39 inches; 2.5 cm/inch</td>
</tr>
<tr>
<td>Millimeter</td>
<td>mm</td>
<td>1/1000 m; 0.001 m</td>
<td>0.039 inches; 25 mm/inch</td>
</tr>
<tr>
<td>Micrometer</td>
<td>µm</td>
<td>1/1000 mm; 0.001 mm</td>
<td></td>
</tr>
</tbody>
</table>

**Units of Weight**

<table>
<thead>
<tr>
<th>UNIT of Weight</th>
<th>ABBREVIATION</th>
<th>METRIC EQUIVALENT</th>
<th>U.S. EQUIVALENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kilogram</td>
<td>kg</td>
<td>1000 g</td>
<td>2.2 lb</td>
</tr>
<tr>
<td>Gram*</td>
<td>g</td>
<td>1000 mg</td>
<td>0.035 oz.; 28.5 g/oz</td>
</tr>
<tr>
<td>Milligram</td>
<td>mg</td>
<td>1/1000 g; 0.001 g</td>
<td></td>
</tr>
<tr>
<td>Microgram</td>
<td>µg</td>
<td>1/1000 mg; 0.001 mg</td>
<td></td>
</tr>
</tbody>
</table>

**Units of volume**

<table>
<thead>
<tr>
<th>UNIT of volume</th>
<th>ABBREVIATION</th>
<th>METRIC EQUIVALENT</th>
<th>U.S. EQUIVALENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liter*</td>
<td>L</td>
<td>1000 mL</td>
<td>1.06 qt</td>
</tr>
<tr>
<td>Deciliter</td>
<td>dL</td>
<td>1/10 L; 0.1 L</td>
<td></td>
</tr>
<tr>
<td>Milliliter</td>
<td>mL</td>
<td>1/1000 L; 0.001 L</td>
<td>0.034 oz.; 29.4 mL/oz</td>
</tr>
<tr>
<td>Microliter</td>
<td>µL</td>
<td>1/1000 mL; 0.001 mL</td>
<td></td>
</tr>
</tbody>
</table>

*Basic unit.
CELSIUS TO FAHRENHEIT
Use the following formula to convert Celsius readings to Fahrenheit readings:
°F = 9/5°C + 32
For example, if the Celsius reading is 37°
°F = (9/5 x 37) + 32
= 6.6 + 32
= 98.6°F (normal body temperature)

FAHRENHEIT TO CELSIUS
Use the following formula to convert Fahrenheit readings to Celsius readings:
°C = 5/9 (°F - 32)
For example, if the Fahrenheit reading is 68°:
°C = 5/9 (68 - 32)
= 5/9 x 36
= 20°C (a nice spring day)
The periodic table lists the chemical elements according to their atomic numbers. The boxes in the table have information about the elements, as shown by the example at the top of the next page. The upper number in each box is the atomic number, which represents the number of protons in the nucleus of the atom. Under the name of the element is its chemical symbol, an abbreviation of its modern or Latin name. The Latin names of four common elements are shown on the next page. The bottom number gives the atomic weight (mass) of each atom of that element as compared to the weight of carbon. Atomic weight is the sum of the weights of the protons and neutrons in the nucleus of an atom.

All the elements in a column share similar chemical properties based on the number of electrons in their outermost energy levels. Those in column VIII are non-reactive (inert) and are referred to as the noble gases. The 26 elements found in the body are color coded according to quantity (see legend). Carbon, hydrogen, oxygen and nitrogen make up 96% of body weight. The first three of these are present in all carbohydrates, lipids, proteins and nucleic acids. Nitrogen is an additional component of all proteins. Nine other elements make up almost all the rest of body weight. The remaining 13 elements are present in very small amounts and are referred to as trace elements. Although needed in very small quantities, they are essential for good health, as they are parts of enzymes and other compounds used in metabolism.

### PERIODIC TABLE OF THE ELEMENTS

<table>
<thead>
<tr>
<th>Period</th>
<th>Group</th>
<th>Symbol</th>
<th>Name</th>
<th>Atomic Number</th>
<th>Atomic Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td>H</td>
<td>Hydrogen</td>
<td>1</td>
<td>1.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Li</td>
<td>Lithium</td>
<td>3</td>
<td>6.94</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Be</td>
<td>Beryllium</td>
<td>4</td>
<td>9.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mg</td>
<td>Magnesium</td>
<td>12</td>
<td>24.31</td>
</tr>
<tr>
<td>II</td>
<td></td>
<td>Na</td>
<td>Sodium</td>
<td>11</td>
<td>22.99</td>
</tr>
<tr>
<td></td>
<td></td>
<td>K</td>
<td>Potassium</td>
<td>19</td>
<td>39.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ca</td>
<td>Calcium</td>
<td>20</td>
<td>40.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sc</td>
<td>Scandium</td>
<td>21</td>
<td>44.96</td>
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### Lanthanides

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# Routine Urinalysis

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<th><strong>TEST</strong></th>
<th><strong>NORMAL VALUE</strong></th>
<th><strong>CLINICAL SIGNIFICANCE</strong></th>
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<tr>
<td>General characteristics</td>
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<tr>
<td>and measurements</td>
<td></td>
<td>Colour change can be due to concentration or dilution, drugs, metabolic or inflammatory disorders</td>
</tr>
<tr>
<td><strong>Color</strong></td>
<td>Pale yellow to amber</td>
<td></td>
</tr>
<tr>
<td><strong>Odor</strong></td>
<td>Slightly aromatic</td>
<td>Foul odor typical of urinary tract infection, fruity odor in uncontrolled diabetes mellitus</td>
</tr>
<tr>
<td><strong>Appearance (clarity)</strong></td>
<td>Clear to slightly hazy</td>
<td>Cloudy urine occurs with infection or after refrigeration; may indicate presence of bacteria, cells, mucus, or crystals</td>
</tr>
<tr>
<td><strong>Specific gravity</strong></td>
<td>1.003–1.030 (first morning catch; routine is random)</td>
<td>Decreased in diabetes insipidus, acute renal failure, water intoxication; increased in liver disorders, heart failure, dehydration</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>4.5–8.0</td>
<td>Acid urine accompanies acidosis, fever, high protein diet; alkaline urine in urinary tract infection, metabolic alkalosis, vegetarian diet</td>
</tr>
<tr>
<td><strong>Chemical determinations</strong></td>
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<tr>
<td><strong>Glucose</strong></td>
<td>Negative</td>
<td>Glucose present in uncontrolled diabetes mellitus, steroid excess</td>
</tr>
<tr>
<td><strong>Ketones</strong></td>
<td>Negative</td>
<td>Present in diabetes mellitus and in starvation</td>
</tr>
<tr>
<td><strong>Protein</strong></td>
<td>Negative</td>
<td>Present in kidney disorders, such as glomerulonephritis, acute kidney failure</td>
</tr>
<tr>
<td><strong>Bilirubin</strong></td>
<td>Negative</td>
<td>Breakdown product of hemoglobin; present in liver disease or in bile blockage</td>
</tr>
<tr>
<td><strong>Urobilinogen</strong></td>
<td>0.2–1.0 Ehrlich units /dL</td>
<td>Breakdown product of bilirubin; increased in hemolytic anemias and in liver disease; remains negative in bile obstruction</td>
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<tr>
<td><strong>Blood (occult)</strong></td>
<td>Negative</td>
<td>Detects small amounts of blood cells, hemoglobin, or myoglobin; present in severe trauma, metabolic disorders, bladder infections</td>
</tr>
<tr>
<td><strong>Nitrite</strong></td>
<td>Negative</td>
<td>Product of bacterial breakdown of urine; positive result suggests urinary tract infection and needs to be followed up with a culture of the urine</td>
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<tr>
<td><strong>Microscopic</strong></td>
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<tr>
<td><strong>Red blood cells</strong></td>
<td>0–3 per high-power field</td>
<td>Increased because of bleeding within the urinary tract from trauma, tumors, inflammation, or damage within the kidney</td>
</tr>
<tr>
<td><strong>White blood cells</strong></td>
<td>0–4 per high-power field</td>
<td>Increased in infection of the kidney or bladder</td>
</tr>
<tr>
<td><strong>Renal epithelial cells</strong></td>
<td>Occasional</td>
<td>Increased number indicates damage to kidney tubules</td>
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<tr>
<td><strong>Casts</strong></td>
<td>None</td>
<td>Hyaline casts normal; large number of abnormal casts indicates inflammation or a systemic disorder</td>
</tr>
<tr>
<td><strong>Crystals</strong></td>
<td>Present</td>
<td>Most are normal; may be acid or alkaline</td>
</tr>
<tr>
<td><strong>Bacteria</strong></td>
<td>Few</td>
<td>Increased in infection of urinary tract or contamination from infected genitalia</td>
</tr>
<tr>
<td><strong>Others</strong></td>
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<td>Any yeasts, parasites, mucus, spermatozoa, or other microscopic findings would be reported here</td>
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## Complete Blood Count (CBC)

<table>
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<tr>
<th>TEST</th>
<th>NORMAL VALUE*</th>
<th>CLINICAL SIGNIFICANCE</th>
</tr>
</thead>
</table>
| Red blood cell (RBC) count                | Men: 4.2–5.4 million/µL  
Women: 3.6–5.0 million/µL | Decreased in anemia; increased in dehydration, polycythemia                          |
| Hemoglobin (Hb)                           | Men: 13.5–17.5 g/dL  
Women: 12–16 g/dL         | Decreased in anemia, hemorrhage, and hemolytic reactions; increased in dehydration, heart and lung disease |
| Hematocrit (Hct) or packed cell volume(PCV)| Men: 40%–50%  
Women: 37%–47%          | Decreased in anemia; increased in polycythemia, dehydration                           |
| Red blood cell (RBC) indices (examples)   |               | These values, calculated from the RBC count, HGB, and HCT, give information valuable in the diagnosis and classification of anemia |
| Mean corpuscular volume (MCV)             | 87–103 µL/red cell | Measures the average size or volume of each RBC: small size (microcytic) in iron-deficiency anemia; large size (macrocytic) typical of pernicious anemia |
| Mean corpuscular hemoglobin (MCH)         | 26–34 pg/red cell  | Measures the weight of hemoglobin per RBC; useful in differentiating types of anemia in a severely anemic patient |
| Mean corpuscular hemoglobin concentration (MCHC) | 31–37 g/dL | Defines the volume of hemoglobin per RBC; used to determine the color or concentration of hemoglobin per RBC |
| White blood cell (WBC) count              | 5,000–10,000 µL | Increased in leukemia and in response to infection, inflammation, and dehydration; decreased in bone marrow suppression |
| Platelets                                 | 150,000–350,000/µL  | Increased in many malignant disorders; decreased in disseminated intravascular coagulation (DIC) or toxic drug effects; spontaneous bleeding may occur at platelet counts below 20,000 µL |
| Differential (Peripheral blood smear)      |               | A stained slide of the blood is needed to perform the differential. The percentages of the different WBCs are estimated, and the slide is microscopically checked for abnormal characteristics in WBCs, RBCs, and platelets. |

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<th>WBCs</th>
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<td>Segmented neutrophils (SEGs, POLYs)</td>
<td>40%–74%</td>
<td>Increased in bacterial infections; low numbers leave person very susceptible to infection</td>
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<tr>
<td>Immature neutrophils (BANDs)</td>
<td>0%–3%</td>
<td>Increased when neutrophil count increases</td>
</tr>
<tr>
<td>Lymphocytes (LYMPHs)</td>
<td>20%–40%</td>
<td>Increased in viral infections; low numbers leave person dangerously susceptible to infection</td>
</tr>
<tr>
<td>Monocytes (MONOs)</td>
<td>2%–6%</td>
<td>Increased in specific infections</td>
</tr>
<tr>
<td>Eosinophils (EOS)</td>
<td>1%–4%</td>
<td>Increased in allergic disorders</td>
</tr>
<tr>
<td>Basophils (BASOs)</td>
<td>0.5%–1%</td>
<td>Increased in allergic disorders</td>
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*Values vary depending on instrumentation and type of test.
### Blood Chemistry Tests

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<td><strong>Basic panel:</strong> An overview of electrolytes, waste product management, and metabolism</td>
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<tr>
<td>Blood urea nitrogen (BUN)</td>
<td>7–18 mg/dL</td>
<td>Increased in renal disease and dehydration; decreased in liver damage and malnutrition</td>
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<td>Carbon dioxide (CO₂) (includes bicarbonate)</td>
<td>23–30 mmol/L</td>
<td>Useful to evaluate acid-base balance by measuring total carbon dioxide in the blood: Elevated in vomiting and pulmonary disease; decreased in diabetic acidosis, acute renal failure, and hyperventilation</td>
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<td>Chloride (Cl)</td>
<td>98–106 mEq/L</td>
<td>Increased in dehydration, hyperventilation, and congestive heart failure; decreased in vomiting, diarrhea, and fever</td>
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<tr>
<td>Creatinine</td>
<td>0.6–1.2 mg/dL</td>
<td>Produced at a constant rate and excreted by the kidney; increased in kidney disease</td>
</tr>
<tr>
<td>Glucose</td>
<td>Fasting: 70–110 mg/dL Random: 85–125 mg/dL</td>
<td>Increased in diabetes and severe illness; decreased in insulin overdose or hypoglycemia</td>
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<tr>
<td>Potassium (K)</td>
<td>3.5–5 mEq/L</td>
<td>Increased in renal failure, extensive cell damage, and acidosis; decreased in vomiting, diarrhea, and excess administration of diuretics or IV fluids</td>
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<tr>
<td>Sodium (Na)</td>
<td>101–111 mEq/L or 135–148 mEq/L (depending on test)</td>
<td>Increased in dehydration and diabetes insipidus; decreased in overload of IV fluids, burns, diarrhea, or vomiting</td>
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<tr>
<td><strong>Additional blood chemistry tests</strong></td>
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<tr>
<td>Alanine aminotransferase (ALT)</td>
<td>10–40 U/L</td>
<td>Used to diagnose and monitor treatment of liver disease and to monitor the effects of drugs on the liver; increased in myocardial infarction</td>
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<tr>
<td>Albumin</td>
<td>3.8–5.0 g/dL</td>
<td>Albumin holds water in blood; decreased in liver disease and kidney disease</td>
</tr>
<tr>
<td>Albumin-globulin ratio (A/G ratio)</td>
<td>Greater than 1</td>
<td>Low A/G ratio signifies a tendency for edema because globulin is less effective than albumin at holding water in the blood</td>
</tr>
<tr>
<td>Alkaline phosphatase (ALP)</td>
<td>20–70 U/L (varies by method)</td>
<td>Enzyme of bone metabolism; increased in liver disease and metastatic bone disease</td>
</tr>
<tr>
<td>Amylase</td>
<td>21–160 U/L</td>
<td>Used to diagnose and monitor treatment of acute pancreatitis and to detect inflammation of the salivary glands</td>
</tr>
<tr>
<td>Aspartate aminotransferase (AST)</td>
<td>0–41 U/L (varies)</td>
<td>Enzyme present in tissues with high metabolic activity; increased in myocardial infarction and liver disease</td>
</tr>
<tr>
<td>Bilirubin, total</td>
<td>0.2–1.0 mg/dL</td>
<td>Breakdown product of hemoglobin from red blood cells; increased when excessive red blood cells are being destroyed or in liver disease</td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>8.8–10.0 mg/dL</td>
<td>Increased in excess parathyroid hormone production and in cancer; decreased in alkalosis, elevated phosphate in renal failure, and excess IV fluids</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>120–220 mg/dL desirable range</td>
<td>Screening test used to evaluate risk of heart disease; levels of 200 mg/dL or above indicate increased risk of heart disease and warrant further investigation</td>
</tr>
<tr>
<td>Creatine phosphokinase (CPK or CK)</td>
<td>Men: 38–174 U/L Women: 96–140 U/L</td>
<td>Elevated enzyme level indicates myocardial infarction or damage to skeletal muscle. When elevated, specific fractions (isoenzymes) are tested for</td>
</tr>
<tr>
<td>Gamma-glutamyl transferase (GGT) Globulins</td>
<td>Men: 6–26 U/L Women: 4–18 U/L 2.3–3.5 g/dL</td>
<td>Used to diagnose liver disease and to test for chronic alcoholism Proteins active in immunity; help albumin keep water in blood</td>
</tr>
<tr>
<td>Iron, serum (Fe)</td>
<td>Men: 75–175 µg/dL Women: 65–165 µg/dL</td>
<td>Decreased in iron deficiency and anemia; increased in hemolytic conditions</td>
</tr>
<tr>
<td>High-density lipoproteins (HDLs)</td>
<td>Men: 30–70 mg/dL Women: 30–85 mg/dL</td>
<td>Used to evaluate the risk of heart disease</td>
</tr>
<tr>
<td>Lactic dehydrogenase (LDH or LD)</td>
<td>95–200 U/L (Normal ranges vary greatly)</td>
<td>Enzyme released in many kinds of tissue damage, including myocardial infarction, pulmonary infarction, and liver disease</td>
</tr>
<tr>
<td>Lipase</td>
<td>4–24 U/L (varies with test)</td>
<td>Enzyme used to diagnose pancreatitis</td>
</tr>
</tbody>
</table>

*Continued*
<table>
<thead>
<tr>
<th>TEST</th>
<th>NORMAL VALUE</th>
<th>CLINICAL SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-density lipoproteins (LDLs)</td>
<td>80–140 mg/dL</td>
<td>Used to evaluate the risk of heart disease</td>
</tr>
<tr>
<td>Magnesium (Mg)</td>
<td>1.3–2.1 mEq/L</td>
<td>Vital in neuromuscular function; decreased levels may occur in malnutrition, alcoholism, pancreatitis, diarrhea</td>
</tr>
<tr>
<td>Phosphorus ((Page*)) (inorganic)</td>
<td>2.7–4.5 mg/dL</td>
<td>Evaluated in response to calcium; main store is in bone: elevated in kidney disease; decreased in excess parathyroid hormone</td>
</tr>
<tr>
<td>Protein, total</td>
<td>6–8 g/dL</td>
<td>Increased in dehydration, multiple myeloma; decreased in kidney disease, liver disease, poor nutrition, severe burns, excessive bleeding</td>
</tr>
<tr>
<td>Serum glutamic oxalacetic transaminase (SGOT)</td>
<td></td>
<td>See Aspartate aminotransferase (AST)</td>
</tr>
<tr>
<td>Serum glutamic pyruvic transaminase (SGPT)</td>
<td></td>
<td>See Alanine aminotransferase (ALT)</td>
</tr>
<tr>
<td>Thyroxin (T4)</td>
<td>5–12.5 µg/dL (varies)</td>
<td>Screening test of thyroid function; increased in hyperthyroidism; decreased in myxedema and hypothyroidism</td>
</tr>
<tr>
<td>Thyroid-stimulating hormone (TSH)</td>
<td>0.5–6 mIU/L</td>
<td>Produced by pituitary to promote thyroid gland function; elevated when thyroid gland is not functioning</td>
</tr>
<tr>
<td>Triiodothyronine (T3)</td>
<td>120–195 mg/dL</td>
<td>Elevated in specific types of hyperthyroidism</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>Men: 40–160 mg/dL</td>
<td>An indication of ability to metabolize fats; increased triglycerides and cholesterol indicate high risk of atherosclerosis</td>
</tr>
<tr>
<td></td>
<td>Women: 35–135 mg/dL</td>
<td></td>
</tr>
<tr>
<td>Uric acid</td>
<td>Men: 3.5–7.2 mg/dL</td>
<td>Produced by breakdown of ingested purines in food and nucleic acids; elevated in kidney disease, gout, and leukemia</td>
</tr>
<tr>
<td></td>
<td>Women: 2.6–6.0 mg/dL</td>
<td></td>
</tr>
<tr>
<td>ORGANISM</td>
<td>DISEASE AND DESCRIPTION</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Cocci</strong></td>
<td><strong>Neisseria gonorrhoeae</strong> (gonococcus)</td>
<td>Gonorrhea. Acute inflammation of mucous membranes of the reproductive and urinary tracts (with possible spread to the peritoneum in the female). Systemic infection may cause gonococcal arthritis and endocarditis. Organism also causes ophthalmia neonatorum, an eye inflammation of the newborn.</td>
</tr>
<tr>
<td></td>
<td><strong>Neisseria meningitidis</strong> (meningococcus)</td>
<td>Epidemic meningitis. Inflammation of the membranes covering brain and spinal cord. A vaccine is available for use in high-risk populations.</td>
</tr>
<tr>
<td></td>
<td><strong>Staphylococcus aureus</strong> and other staphylococci</td>
<td>Boils, carbuncles, impetigo, osteomyelitis, staphylococcal pneumonia, cystitis, pyelonephritis, empyema, septicemia, toxic shock, and food poisoning. Strains resistant to antibiotics are a cause of infections originating in the hospital, such as wound infections.</td>
</tr>
<tr>
<td></td>
<td><strong>Streptococcus pneumoniae</strong></td>
<td>Pneumonia; inflammation of the alveoli, bronchioles, and bronchi; middle ear infections; meningitis. May be prevented by use of polyvalent pneumococcal vaccine.</td>
</tr>
<tr>
<td></td>
<td><strong>Streptococcus pyogenes</strong>, <strong>Streptococcus hemolyticus</strong>, and other streptococci</td>
<td>Septicemia, septic sore throat, scarlet fever, puerperal sepsis, erysipelas, streptococcal pneumonia, rheumatic fever, subacute bacterial endocarditis, acute glomerulonephritis</td>
</tr>
<tr>
<td><strong>Bacilli</strong></td>
<td><strong>Bordetella pertussis</strong></td>
<td>Pertussis (whooping cough). Severe infection of the trachea and bronchi. The “whoop” is caused by the effort to recover breath after coughing. All children should be immunized against pertussis.</td>
</tr>
<tr>
<td></td>
<td><strong>Brucella abortus</strong> (and others)</td>
<td>Brucellosis, or undulant fever. Disease of animals such as cattle and goats transmitted to humans through unpasteurized dairy products or undercooked meat. Acute phase of fever and weight loss; chronic disease with abscess formation and depression.</td>
</tr>
<tr>
<td></td>
<td><strong>Clostridium botulinum</strong></td>
<td>Botulism. Very severe poisoning caused by eating food in which the organism has been allowed to grow and excrete its toxin. Causes muscle paralysis and may result in death from sphyxiation. Infant botulism results from ingestion of spores. It causes respiratory problems and flaccid paralysis, which usually respond to treatment.</td>
</tr>
<tr>
<td></td>
<td><strong>Clostridium perfringens</strong></td>
<td>Gas gangrene. Acute wound infection. Organisms cause death of tissues accompanied by the generation of gas within them.</td>
</tr>
<tr>
<td></td>
<td><strong>Clostridium tetani</strong></td>
<td>Tetanus. Acute, often fatal poisoning caused by introduction of the organism into deep wounds. Characterized by severe muscular spasms. Also called lockjaw.</td>
</tr>
<tr>
<td></td>
<td><strong>Corynebacterium diphtheriae</strong></td>
<td>Diphtheria. Acute inflammation of the throat with the formation of a leathery membranelike growth (pseudomembrane) that can obstruct air passages and cause death by asphyxiation. Toxin produced by this organism can damage heart, nerves, kidneys, and other organs. Disease preventable by appropriate vaccination.</td>
</tr>
<tr>
<td></td>
<td><strong>Escherichia coli</strong>, <strong>Proteus spp.</strong>, and other colon bacilli</td>
<td>Normal inhabitants of the colon, and usually harmless there. Cause of local and systemic infections, food poisoning, diarrhea (especially in children), septicemia, and septic shock. E. coli is a common hospital-acquired infection.</td>
</tr>
<tr>
<td></td>
<td><strong>Francisella tularensis</strong></td>
<td>Tularemia, or deer fly fever. Transmitted by contact with an infected animal or bite of a tick or fly. Symptoms are fever, ulceration of the skin, and enlarged lymph nodes.</td>
</tr>
<tr>
<td></td>
<td><strong>Haemophilus influenzae</strong> type b (Hib)</td>
<td>Severe infections in children under 3 years of age. Causes meningitis, also epiglottitis, septicemia, pneumonia, pericarditis, and septic arthritis. Preschool vaccinations are routine.</td>
</tr>
<tr>
<td></td>
<td><strong>Helicobacter pylori</strong></td>
<td>Acute inflammation of the stomach (gastritis), ulcers of the pyloric area of the stomach and of the duodenum.</td>
</tr>
<tr>
<td></td>
<td><strong>Legionella pneumophila</strong></td>
<td>Legionnaires disease (pneumonia). Seen in localized epidemics, may be transmitted by air conditioning towers and by contaminated soil at excavation sites. Not spread person to person. Characterized by high fever, vomiting, diarrhea, cough, and bradycardia. Mild form of the disease called Pontiac fever.</td>
</tr>
<tr>
<td></td>
<td><strong>Mycobacterium leprae</strong> (Hansen bacillus)</td>
<td>Leprosy. Chronic illness in which hard swellings occur under the skin, particularly of the face, causing a distorted appearance. In one form of leprosy, the nerves are affected, resulting in loss of sensation in the extremities.</td>
</tr>
<tr>
<td></td>
<td><strong>Mycobacterium tuberculosis</strong> (tubercle bacillus)</td>
<td>Tuberculosis. Infectious disease in which the organism causes primary lesions called <strong>tubercles</strong>. These break down into cheeselike masses of tissue, a process known as <strong>caseation</strong>. Any body organ can be infected, but in adults, the usual site is the lungs. Still one of the most widespread diseases in the world, tuberculosis is treated with chemotherapy; strains of the bacillus have developed resistance to drugs.</td>
</tr>
<tr>
<td></td>
<td><strong>Pseudomonas aeruginosa</strong></td>
<td>Ubiquitous organism is a frequent cause of wound and urinary infections in debilitated hospitalized patients. Often found in solutions that have been standing for long periods.</td>
</tr>
</tbody>
</table>

(Continued)
### Appendix 5.1 Bacterial Diseases Continued

<table>
<thead>
<tr>
<th>ORGANISM</th>
<th>DISEASE AND DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Salmonella typhi</em> (and others)</td>
<td>Salmonellosis occurs as enterocolitis, bacteremia, localized infection, or typhoid. Depending on type, presenting symptoms may be fever, diarrhea, or abscesses; complications include intestinal perforation and endocarditis. Carried in water, milk, meat, and other food.</td>
</tr>
<tr>
<td><em>Shigella dysenteriae</em> (and others)</td>
<td>A serious bacillary dysentery. Acute intestinal infection with diarrhea (sometimes bloody); may cause dehydration with electrolyte imbalance or septicemia. Transmitted through fecal-oral route or other poor sanitation.</td>
</tr>
<tr>
<td><em>Yersinia pestis</em></td>
<td>Plague, the “black death” of the Middle Ages. Transmitted by fleas from infected rodents to humans. Symptoms of the most common form are swollen, infected lymph nodes, or buboes. Another form may cause pneumonia. All forms may lead to a rapidly fatal septicemia.</td>
</tr>
<tr>
<td>Curved rods</td>
<td></td>
</tr>
<tr>
<td><em>Vibrio</em></td>
<td></td>
</tr>
<tr>
<td><em>Vibrio cholerae</em></td>
<td></td>
</tr>
<tr>
<td><em>Spirochetes</em></td>
<td></td>
</tr>
<tr>
<td><em>Borrelia burgdorferi</em></td>
<td>Lyme disease, transmitted by the extremely small deer tick. Usually starts with a bulls-eye rash followed by flulike symptoms, at which time antibiotics are effective. May progress to neurologic problems and joint inflammation.</td>
</tr>
<tr>
<td><em>Borrelia recurrentis</em> (and others)</td>
<td>Relapsing fever. Generalized infection in which attacks of fever alternate with periods of apparent recovery. Organisms spread by lice, ticks, and other insects.</td>
</tr>
<tr>
<td><em>Treponema pallidum</em></td>
<td>Syphilis. Infectious disease transmitted mainly by sexual intercourse. Untreated syphilis is seen in the following three stages: primary—formation of primary lesion (chancre); secondary—skin eruptions and infectious patches on mucous membranes; tertiary—development of generalized lesions (gummas) and destruction of tissues resulting in aneurysm, heart disease, and degenerative changes in brain, spinal cord, ganglia, and meninges. Also a cause of intrauterine fetal death or stillbirth.</td>
</tr>
<tr>
<td><em>Treponema vincentii</em></td>
<td>Vincent disease (trench mouth). Infection of the mouth and throat accompanied by formation of a pseudomembrane, with ulceration.</td>
</tr>
<tr>
<td><strong>Note:</strong> the following organisms are smaller than other bacteria and vary in shape. Like viruses, they grow within cells, but they differ from viruses in that they are affected by antibiotics.</td>
<td></td>
</tr>
<tr>
<td><em>Chlamydia oculogenitalis</em></td>
<td>Inclusion conjunctivitis, acute eye infection. Carried in genital organs, transmitted during birth or through water in inadequately chlorinated swimming pools.</td>
</tr>
<tr>
<td><em>Chlamydia psittaci</em></td>
<td>Psittacosis, also called <em>ornithosis</em>. Disease transmitted by various birds, including parrots, ducks, geese, and turkeys. Primary symptoms are chills, headache, and fever, more severe in older people. The duration may be from 2 to 3 weeks, often with a long convalescence. Antibiotic drugs are effective remedies.</td>
</tr>
<tr>
<td><em>Chlamydia trachomatis</em></td>
<td>A sexually transmitted infection causing pelvic inflammatory disease and other infections of the reproductive tract. Also causes inclusion conjunctivitis, an acute eye infection, and trachoma, a chronic infection that is a common cause of blindness in underdeveloped areas of the world. Infection of the conjunctiva and cornea characterized by redness, pain, and lachrimation. Antibiotic therapy is effective if begun before there is scarring. The same organism causes lymphogranuloma venereum (LGV), a sexually transmitted infection characterized by swelling of inguinal lymph nodes and accompanied by signs of general infection.</td>
</tr>
<tr>
<td><em>Coxiella burnetti</em></td>
<td>Q fever. Infection transmitted from cattle, sheep, and goats to humans by contaminated dust and also carried by arthropods. Symptoms are fever, headache, chills, and pneumonitis. This disorder is almost never fatal.</td>
</tr>
<tr>
<td><em>Rickettsia prowazekii</em></td>
<td>Epidemic typhus. Transmitted to humans by lice; associated with poor hygiene and war. Main symptoms are headache, hypotension, delirium, and a red rash. Frequently fatal in older people.</td>
</tr>
<tr>
<td><em>Rickettsia rickettsii</em></td>
<td>Rocky Mountain spotted fever. Tick-borne disease occurring throughout the United States. Symptoms are fever, muscle aches, and a rash that may progress to gangrene over bony prominences. The disease is rarely fatal.</td>
</tr>
<tr>
<td><em>Rickettsia typhi</em></td>
<td>Endemic or murine typhus. A milder disease transmitted to humans from rats by fleas. Symptoms are fever, rash, headache, and cough. The disease is rarely fatal.</td>
</tr>
<tr>
<td>ORGANISM</td>
<td>DISEASE AND DESCRIPTION</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Common cold viruses</td>
<td>Common cold (coryza). Viral infection of the upper respiratory tract. A wide variety of organisms may be involved. May lead to complications, such as pneumonia and influenza.</td>
</tr>
<tr>
<td>Cytomegalovirus (CMV)</td>
<td>Common mild infection of the salivary glands. In an immunosuppressed person may cause infection of the retina, lung, and liver, ulceration of GI tract, and inflammation of the brain. Causes severe fetal or neonatal damage.</td>
</tr>
<tr>
<td>Encephalitis viruses</td>
<td>Encephalitis, which usually refers to any brain inflammation accompanied by degenerative tissue changes. Encephalitis has many causes besides viruses. Viral forms of encephalitis include Western and Eastern epidemic, equine, St. Louis, Japanese B, and others. Some are known to be transmitted from birds and other animals to humans by insects, principally mosquitoes.</td>
</tr>
<tr>
<td>Epstein-Barr virus (EBV)</td>
<td>Mononucleosis, a highly infectious disease spread by saliva. Common among teenagers and young adults. There is fever, sore throat, marked fatigue, and enlargement of the spleen and lymph nodes. Infects B lymphocytes (mononuclear leukocytes) causing them to multiply. Virus remains latent for life after infection. EBV also causes Burkitt lymphoma, a malignant B lymphocyte tumor common in parts of Africa.</td>
</tr>
<tr>
<td>Hantavirus</td>
<td>Pulmonary syndrome with high mortality rate. Spread by inhalation of rodent droppings.</td>
</tr>
<tr>
<td>Hepatitis viruses</td>
<td>Liver inflammation. Varieties A through E are recognized.</td>
</tr>
<tr>
<td>Hepatitis A virus (HAV)</td>
<td>Transmitted by fecal contamination. Does not become chronic or produce carrier state. Infection provides lifelong immunity. Vaccine is available.</td>
</tr>
<tr>
<td>Hepatitis B virus (HBV)</td>
<td>Transmitted by direct exchange of blood and body fluids. Can cause rapidly fatal disease or develop into chronic disease and carrier state. Risk of progress to liver cancer. Vaccine is available.</td>
</tr>
<tr>
<td>Hepatitis C virus (HCV)</td>
<td>Spread through blood exchange (usually transfusions before 1992 when screening began) or shared needles. May become chronic and lead to cirrhosis, liver failure, liver cancer. Antiviral drugs may limit infection.</td>
</tr>
<tr>
<td>Hepatitis D virus (HDV)</td>
<td>Spread by blood exchange and occurs as coinfection with hepatitis B. Responsible for half of rapidly fatal liver failure cases and also a high rate of chronic disease that progresses to death.</td>
</tr>
<tr>
<td>Hepatitis E virus (HEV)</td>
<td>Transmitted by fecal contamination and occurs in epidemics in Middle East and Asia. Resembles hepatitis A. Can be fatal in pregnant women.</td>
</tr>
<tr>
<td>Herpes simplex virus type 1</td>
<td>Cold sores or fever blisters that appear around the mouth and nose of people with colds or other illnesses accompanied by fever.</td>
</tr>
<tr>
<td>Herpes simplex virus type 2</td>
<td>Genital herpes. Acute inflammatory disease of the genitalia, often recurring. A very common sexually transmitted infection.</td>
</tr>
<tr>
<td>Human immunodeficiency virus (HIV)</td>
<td>Acquired immunodeficiency syndrome (AIDS). Fatal disease that infects T lymphocytes of the immune system. Diagnosed by antibody tests, decline in specific (CD4) cells, and presenting disease, including Candida albicans infection, Pneumocystis carinii pneumonia, Kaposi sarcoma, persistent swelling of lymph nodes (lymphadenopathy), chronic diarrhea, and wasting. Spread by contact with contaminated body fluids and by transplacental route.</td>
</tr>
<tr>
<td>Influenza virus</td>
<td>An epidemic viral infection, marked by chills, fever, muscular pains, and prostration. The most serious complication is bronchopneumonia caused by Haemophilus influenzae (a bacillus) or streptococci.</td>
</tr>
<tr>
<td>Mumps virus</td>
<td>Epidemic parotitis. Acute inflammation with swelling of the parotid salivary glands. Mumps can have many complications, such as orchitis (inflammation of the testes) in young men and meningitis in young children.</td>
</tr>
<tr>
<td>Pneumonia viruses</td>
<td>Lung infections caused by a number of different viruses, such as the influenza and parainfluenza viruses, adenoviruses, and varicella viruses.</td>
</tr>
<tr>
<td>Poliovirus</td>
<td>Poliomyelitis (polio). Acute viral infection that may attack the anterior horns of the spinal cord, resulting in paralysis of certain voluntary muscles. Most countries have eliminated polio through vaccination programs.</td>
</tr>
<tr>
<td>Rhabdovirus</td>
<td>Rabies. An acute, fatal disease transmitted to humans through the saliva of an infected animal. Rabies is characterized by violent muscular spasms induced by the slightest sensations. Because the swallowing of water causes spasms of the throat, the disease is also called hydrophobia (“fear of water”). The final stage of paralysis ends in death. Rabies vaccines are available for humans and animals.</td>
</tr>
<tr>
<td>Rotavirus</td>
<td>Attacks lining of small intestine causing severe diarrhea in children.</td>
</tr>
</tbody>
</table>
### Appendix 5-2 Viral Diseases Continued

<table>
<thead>
<tr>
<th>ORGANISM</th>
<th>DISEASE AND DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubella virus</td>
<td>Rubella or German measles. A less severe form of measles, but especially dangerous during the first 3 months of pregnancy because the disease organism can cause heart defects, deafness, mental deficiency, and other permanent damage in the fetus.</td>
</tr>
<tr>
<td>Rubella virus</td>
<td>Measles. An acute respiratory inflammation followed by fever and a generalized skin rash. Patients are prone to the development of dangerous complications, such as bronchopneumonia and other secondary infections caused by staphylococci and streptococci.</td>
</tr>
<tr>
<td>SARS virus</td>
<td>Highly infectious respiratory disease called severe acute respiratory syndrome (SARS). Emerged in China early in 2003 and spread to other countries before it was isolated and identified as a viral infection. Believed to have spread from small mammals to humans.</td>
</tr>
<tr>
<td>Varicella zoster</td>
<td>Chickenpox (varicella). A usually mild infection, almost completely confined to children, characterized by blisterlike skin eruptions. Vaccine now available.</td>
</tr>
<tr>
<td>Varicella zoster</td>
<td>Shingles (herpes zoster). A very painful eruption of skin blisters that follows the course of certain peripheral nerves. These blisters eventually dry up and form scabs that resemble shingles.</td>
</tr>
</tbody>
</table>

### Appendix 5-3 Prion Diseases

Prions are infectious agents that contain protein but no nucleic acid. They cause slow, spongy degeneration of brain tissue (spongiform encephalitis) in humans and animals.

<table>
<thead>
<tr>
<th>AGENT</th>
<th>DISEASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic wasting disease agent</td>
<td>Chronic wasting disease in deer and elk</td>
</tr>
<tr>
<td>Creuzfeldt-Jakob agent</td>
<td>Creutzfeldt-Jacob disease (CJD), a spongiform encephalopathy in humans</td>
</tr>
<tr>
<td>Kuru agent</td>
<td>Kuru spongiform encephalopathy in humans</td>
</tr>
<tr>
<td>Mad cow agent</td>
<td>Mad cow spongiform encephalopathy, or bovine spongiform encephalopathy (BSE) in cows and humans</td>
</tr>
<tr>
<td>Scrapie agent</td>
<td>Scrapie spongiform encephalopathy in sheep</td>
</tr>
</tbody>
</table>

### Appendix 5-4 Fungal Diseases

<table>
<thead>
<tr>
<th>DISEASE/ORGANISM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actinomycosis</td>
<td>“Lumpy jaw in cattle and humans. The organisms cause the formation of large tissue masses, which are often accompanied by abscesses. The lungs and liver may be involved.</td>
</tr>
<tr>
<td>Blastomycosis (Blastomyces dermatitidis)</td>
<td>A general term for any infection caused by a yeastlike organism. There may be skin tumors and lesions in the lungs, bones, liver, spleen, and kidneys.</td>
</tr>
<tr>
<td>Candidiasis (Candida albicans)</td>
<td>An infection that can involve the skin and mucous membranes. May cause diaper rash, infection of the nail beds, and infection of the mucous membranes of the mouth (thrush), throat, and vagina.</td>
</tr>
<tr>
<td>Coccidioidomycosis (Coccidioides immitis)</td>
<td>A systemic fungal disease also called San Joaquin Valley fever. Because it often attacks the lungs, it may be mistaken for tuberculosis.</td>
</tr>
<tr>
<td>Histoplasmosis (Histoplasma capsulatum)</td>
<td>A variety of disorders, ranging from mild respiratory symptoms or enlargement of liver, spleen, and lymph nodes to cavities in the lungs with symptoms similar to those of tuberculosis.</td>
</tr>
<tr>
<td>Pneumocystis jiroveci (formerly carinii)</td>
<td>Pneumonia (PCP). Opportunistic infection in people with a depressed immune system. Invades lungs and causes a foamy exudate to collect in alveoli.</td>
</tr>
<tr>
<td>Ringworm</td>
<td>Common fungal infections of the skin, many of which cause blisters and scaling with discoloration of the affected areas. All are caused by similar organisms from a group of fungi called dermatophytes. They are easily transmitted by person to person contact or by contaminated articles.</td>
</tr>
</tbody>
</table>
## Appendix 5-5 Protozoal Diseases

<table>
<thead>
<tr>
<th>ORGANISM</th>
<th>DISEASE AND DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ameba</td>
<td>Amoebic dysentery. Severe ulceration of the wall of the large intestine caused by amebae. Acute diarrhea may be an important symptom. This organism also may cause liver abscesses.</td>
</tr>
<tr>
<td>Entamoeba histolytica</td>
<td></td>
</tr>
<tr>
<td>Ciliates</td>
<td>Gastrointestinal disturbances and ulcers of the colon.</td>
</tr>
<tr>
<td>Balantidium coli</td>
<td></td>
</tr>
<tr>
<td>Flagellates</td>
<td>Gastrointestinal disturbances.</td>
</tr>
<tr>
<td>Giardia lamblia</td>
<td>Kala-azar. In this disease, there is enlargement of the liver and spleen as well as skin lesions.</td>
</tr>
<tr>
<td>Leishmania donovani (and others)</td>
<td></td>
</tr>
<tr>
<td>Trichomonas vaginalis</td>
<td>Inflammation and discharge from the vagina. In males, it involves the urethra and causes painful urination.</td>
</tr>
<tr>
<td>Trypanosoma</td>
<td>African sleeping sickness. Disease begins with a high fever, followed by invasion of the brain and spinal cord by the organisms. Usually, the disease ends with continued drowsiness, coma, and death.</td>
</tr>
<tr>
<td>Sporozoa (apicomplexans)</td>
<td>Cramps and diarrhea that can be long term and severe in people with a weakened immune system, such as those with AIDS. Spread in water and by personal contact in close quarters.</td>
</tr>
<tr>
<td>Cryptosporidium</td>
<td></td>
</tr>
<tr>
<td>Plasmodium; varieties include</td>
<td>Malaria. Characterized by recurrent attacks of chills followed by high fever. Severe attacks of malaria can be fatal because of kidney failure, cerebral disorders, and other complications.</td>
</tr>
<tr>
<td>vivax, falciparum, malariae</td>
<td></td>
</tr>
<tr>
<td>Toxoplasma gondii</td>
<td>Toxoplasmosis. Common infectious disease transmitted by cats and raw meat. Mild forms cause fever and enlargement of lymph nodes. May cause fatal encephalitis in immunosuppressed patients. Infection of a pregnant woman is a cause of fetal stillbirth or congenital damage.</td>
</tr>
</tbody>
</table>
Answers to Chapter Checkpoint and “Zooming In” Questions

CHAPTER 1

Answers to Checkpoint Questions
1-1 Study of body structure is anatomy; study of body function is physiology.
1-2 The breakdown phase of metabolism is catabolism; the building phase of metabolism is anabolism.
1-3 Negative feedback systems are primarily used to maintain homeostasis.
1-4 The three planes in which the body can be cut are sagittal, frontal (coronal), and transverse (horizontal). The midsagittal plane divides the body into two equal halves.
1-5 The posterior cavity is the dorsal cavity; the anterior cavity is the ventral cavity.
1-6 The three central regions of the abdomen are the epigastric, umbilical, and hypogastric regions; the three left and right lateral regions of the abdomen are the hypochondriac, lumbar, and iliac (inguinal) regions.
1-7 The basic unit of length in the metric system is the meter; of weight, the gram; of volume, the liter.

Answers to Zooming In Questions
1-7 The small figure is standing in the anatomical position.
1-8 The transverse (horizontal) plane divides the body into superior and inferior parts. The frontal (coronal) plane divides the body into anterior and posterior parts.
1-11 The ventral cavity contains the diaphragm.

CHAPTER 2

Answers to Checkpoint Questions
2-1 Atoms are subunits of elements.
2-2 Three types of particles found in atoms are protons, neutrons, and electrons.
2-3 Molecules are units composed of two or more atoms. They are the subunits of compounds.
2-4 Water is the most abundant compound in the body.
2-5 In a solution, the components dissolve and remain evenly distributed (the mixture is homogeneous); in a suspension, the particles settle out unless the mixture is shaken (the mixture is heterogeneous).
2-6 When an electrolyte goes into solution, it separates into charged particles called ions (cations and anions).
2-7 A covalent bond is formed by the sharing of electrons.
2-8 A value of 7.0 is neutral on the pH scale. An acid measures lower than 7.0; a base measures higher than 7.0.
2-9 A buffer is a substance that maintains a steady pH of a solution.
2-10 Isotopes that break down to give off radiation are termed radioactive.
2-11 Organic compounds are found in living things.
2-12 The element carbon is the basis of organic chemistry.
2-13 The three main categories of organic compounds are carbohydrates, lipids, and proteins.
2-14 A catalyst is a compound that speeds up the rate of a chemical reaction.

Answers to Zooming In Questions
2-1 The number of protons is equal to the number of electrons. There are eight protons and eight electrons.
2-2 Two hydrogen atoms bond with an oxygen atom to form water.
2-4 Two electrons are needed to complete the energy level of each hydrogen atom.
2-5 The amount of hydroxide ion (OH-) in a solution decreases when the amount of hydrogen ion (H+) increases.
2-7 Monosaccharides are the building blocks of disaccharides and polysaccharides.
2-8 There are three carbon atoms in glycerol.
2-9 The amino group of an amino acid contains nitrogen.
2-10 The shape of the enzyme after the reaction is the same as it was before the reaction.

CHAPTER 3

Answers to Checkpoint Questions
3-1 The cell shows organization, metabolism, responsiveness, homeostasis, growth, and reproduction.
3-2 Three types of microscopes are the compound light microscope, transmission electron microscope (TEM), and scanning electron microscope (SEM).
3-3 The main substance of the plasma membrane is a bilayer of phospholipids. Three types of materials found within the membrane are cholesterol, proteins, and carbohydrates (glycoproteins and glycolipids).
3-4 The cell organelles are specialized structures that perform different tasks.
3-5 The nucleus is called the control center of the cell because it contains the chromosomes, hereditary units that control all cellular activities.
3-6 The two types of organelles used for movement are the cilia, which are small and hairlike, and the flagellum, which is long and whiplike.
3-7 Nucleotides are the building blocks of nucleic acids.
3-8 DNA codes for proteins in the cell.
3-9 The three types of RNA are messenger RNA (mRNA), ribosomal RNA (rRNA) and transfer RNA (tRNA).
3-10 Before mitosis can occur, the DNA must double (duplicate). The doubling occurs during interphase.
3-11 The four stages of mitosis are prophase, metaphase, anaphase, and telophase.
3-12 Diffusion, osmosis, filtration, and facilitated diffusion do not require cellular energy; active transport, endocytosis (phagocytosis and pinocytosis), and exocytosis require cellular energy.
3-13 An isotonic solution is the same concentration as the fluid within the cell; a hypotonic solution is less concentrated; a hypertonic solution is more concentrated.

**Answers to Zooming In Questions**

3-1 The transmission electron microscope (TEM) shows the most internal structure (B). The scanning electron microscope (SEM) shows the cilia in three dimensions (C).

3-2 Ribosomes attached to the ER make it look rough. Cytosol is the liquid part of the cytoplasm.

3-3 Two layers make up the main substance of the plasma membrane.

3-4 Epithelial cells (B) would best cover a large surface area because they are flat.

3-6 The nucleotides pair up so that there is one large nucleotide and one smaller nucleotide in each pair.

3-9 If the original cell has 46 chromosomes, each daughter cell will have 46 chromosomes after mitosis.

**CHAPTER 4**

**Answers to Checkpoint Questions**

4-1 The three basic shapes of epithelium are squamous (flat and irregular), cuboidal (square), and columnar (long and narrow).

4-2 Exocrine glands secrete through ducts; endocrine glands do not have ducts and secrete directly into the bloodstream.

4-3 The intercellular material in connective tissue is the matrix.

4-4 Liquid connective tissues are blood and lymph. Examples of soft connective tissue are areolar (loose) and adipose tissue; fibrous connective tissue makes up capsules, tendons, and ligaments; hard connective tissue is cartilage and bone.

4-5 The three types of muscle tissue are skeletal (voluntary), cardiac, and smooth (visceral) muscle.

4-6 The basic cellular unit of the nervous system is the neuron and it carries nerve impulses.

4-7 The nonconducting support cells of the nervous system are neuroglia (glial cells).

4-8 The three types of epithelial membranes are the cutaneous membrane (skin), serous membranes, and mucous membranes.

4-9 A benign tumor does not spread; a malignant tumor spreads (metastasizes) to other tissues.

4-10 The three standard approaches to treatment of cancer are surgery, radiation, and chemotherapy.

**Answers to Zooming In Questions**

4-1 The epithelial cells are in a single layer.

4-5 Areolar (loose) connective tissue has the most fibers; adipose tissue is modified for storage.

**CHAPTER 5**

**Answers to Checkpoint Questions**

5-1 Disease is an abnormality of the structure or function of a part, organ, or system.

5-2 A predisposing cause of disease is a factor that may not in itself give rise to a disease but that increases the probability of a person's becoming ill.

5-3 The two medical sciences that are involved in study of disease are pathology (study of disease) and physiology (study of function).

5-4 A communicable disease is one that can be transmitted from one person to another.

5-5 A diagnosis is the identification of an illness based on signs and symptoms.

5-6 A parasite is an organism that lives on or within a host and at the host's expense.

5-7 A pathogen is any disease-causing organism.

5-8 The skin, respiratory tract, digestive, urinary and reproductive systems are portals of entry and exit for microorganisms.

5-9 Microbiology includes the study of bacteria, viruses, fungi, protozoa, and algae.

5-10 The term normal flora refers to the microorganisms that normally live in or on the body.

5-11 Resistant forms of bacteria are called endospores.

5-12 The three basic shapes of bacteria are cocci (round), bacilli (rod-shaped), and curved rods, including vibrios, spirilla, and spirochetes.

5-13 Viruses are smaller than bacteria, are not cellular and have no enzyme system. They contain only DNA or RNA, not both.

5-14 The protozoa are most animal-like.

5-15 Helminthology is the study of worms.

5-16 Three levels of asepsis are sterilization, disinfection, and antisepsis.

5-17 Handwashing is the single most important measure for preventing the spread of infection.

5-18 An antibiotic is a substance produced by living cells that has the power to kill or arrest the growth of bacteria.
5-19 Stains are used to color cells so that they can be examined under the microscope.

Answers to Zooming In Questions
5-3 Streptococci are the cells shown in Figure 5-3D.
5-5 Flagella indicate that the cells in A are capable of movement.

CHAPTER 6

Answers to Checkpoint Questions
6-1 The skin and all its associated structures make up the integumentary system.
6-2 The superficial layer of the skin is the epidermis; the deeper layer is the dermis.
6-3 The subcutaneous layer is composed of loose connective tissue and adipose (fat) tissue.
6-4 The sebaceous glands produce an oily secretion called sebum.
6-5 The sweat glands are the sudoriferous glands.
6-6 Each hair develops within a sheath called the hair follicle.
6-7 Temperature is regulated through the skin by dilation (widening) and constriction (narrowing) of blood vessels and by evaporation of perspiration from the surface of the body.
6-8 Melanin, hemoglobin, and carotene impart color to the skin.
6-9 A lesion is any wound or local damage to tissue.

Answers to Zooming In Questions
6-4 The sebaceous glands and apocrine sweat glands secrete to the outside through the hair follicles. The sweat glands are made of simple cuboidal epithelium.
6-6 Blue color is associated with cyanosis. Yellow color is associated with jaundice.

CHAPTER 7

Answers to Checkpoint Questions
7-1 The shaft of the long bone is the diaphysis; the end of a long bone is the epiphysis.
7-2 Compact bone makes up the main shaft of long bones and the outer layer of other bones; spongy (cancellous) bone makes up the ends of the long bones and the center of other bones.
7-3 The cells found in bone are osteoblasts, which build bone tissue, osteocytes, which maintain bone, and osteoclasts, which break down (resorb) bone.
7-4 Calcium compounds are deposited in the matrix of bone to harden it.
7-5 The epiphyseal plates are the secondary growth centers of a long bone.
7-6 The markings on bones help to form joints, serve as points for muscle attachments, and allow passage of nerves and blood vessels.
7-7 The skeleton of the trunk consists of the vertebral column and the bones of the thorax, which are the ribs and the sternum.
7-8 The five regions of the vertebral column are the cervical vertebrae, thoracic vertebrae, lumbar vertebrae, sacrum and coccyx.
7-9 The appendicular skeleton consists of bones of the shoulder girdle, hip, and extremities.

Answers to Zooming In Questions
7-5 Sutures are the types of joints between bones of the skull.
7-6 The maxilla and palatine bones make up each side of the hard palate.
7-7 A foramen is a hole.
7-9 The anterior fontanel is the largest fontanel.
7-10 The three types of joints classified according to the material between the adjoining bones are fibrous, cartilaginous, and synovial.
7-11 A synovial joint or diarthrosis is the most freely movable type of joint.
7-12 Arthritis is the most common type of joint disorder.
7-14 The costal cartilages attach to the ribs.
7-15 The prefix supra means above; the prefix infra means below.
7-17 The radius is the lateral bone of the forearm.
7-19 The olecranon of the ulna forms the bony prominence of the elbow.
7-21 The ischium is nicknamed the “sit bone.”
7-24 The tibia is the medial bone of the leg.
7-25 The calcaneus is the heel bone.
CHAPTER 8

Answers to Checkpoint Questions
8-1 The three types of muscle are smooth muscle, cardiac muscle, and skeletal muscle.
8-2 The three main functions of skeletal muscle are movement of the skeleton, maintenance of posture, and generation of heat.
8-3 The neuromuscular junction is the special synapse where a nerve cell makes contact with a muscle cell.
8-4 Acetylcholine (ACh) is the neurotransmitter involved in the stimulation of skeletal muscle cells.
8-5 Excitability and contractility are the two properties of muscle cells that are needed for response to a stimulus.
8-6 Actin and myosin are the filaments that interact to produce muscle contraction.
8-7 Calcium is needed to allow actin and myosin to interact.
8-8 ATP is the compound produced by the oxidation of nutrients that supplies the energy for contraction of muscle cells.
8-9 Lactic acid is produced when muscles work without oxygen, causing muscle fatigue.
8-10 The attachment of a muscle to a less movable part of the skeleton is the origin; the attachment of a muscle to a movable part of the skeleton is the insertion.
8-11 The muscle that produces a movement is called the prime mover; the muscle that produces an opposite movement is the antagonist.
8-12 The action of most muscles is represented by a third-class lever in which the fulcrum is behind the point of effort and the weight.
8-13 The diaphragm is the muscle most important in breathing.
8-14 The muscles of the abdominal wall are strengthened by having the fibers of these muscles run in different directions.

Answers to Zooming In Questions
8-1 The endomysium is the innermost layer of connective tissue in a skeletal muscle. Perimysium surrounds a fascicle of muscle fibers.
8-5 The filaments of actin and myosin do not change in length as muscle contracts, they simply overlap more.
8-7 Contraction of the biceps brachii produces flexion at the elbow.
8-11 The frontalis, temporalis, nasalis and zygomaticus are named for the bones they are near.

CHAPTER 9

Answers to Checkpoint Questions
9-1 Structurally, the nervous system can be divided into a central and a peripheral nervous system.
9-2 The somatic nervous system is voluntary and controls skeletal muscle; the autonomic (visceral) nervous system is involuntary and controls involuntary muscles and glands.
9-3 The fiber of the neuron that carries impulses toward the cell body is the dendrite; the fiber that carries impulses away from the cell body is the axon.
9-4 Myelinated fibers are white, and unmyelinated tissues are gray.
9-5 Sensory (afferent) nerves convey impulses toward the CNS; motor (efferent) nerves convey impulses away from the CNS.
9-6 Neuroglia (glial cells) are the nonconducting cells of the nervous system that serve in protection and support.
9-7 In an action potential, depolarization is the stage when the charge on the membrane reverses; repolarization is when the charge returns to the resting state.
9-8 Sodium ion (Na+) and potassium ion (K+) are the two ions involved in the generation of an action potential.
9-9 Neurotransmitters are the chemicals used to carry information across the synaptic cleft.
9-10 In the spinal cord, an H-shaped section of gray matter is located internally, and the white matter is located around it. The gray matter extends in two pairs of columns called dorsal and ventral horns.
9-11 The tracts in the white matter of the spinal cord carry impulses to and from the brain. Ascending tracts conduct toward the brain; descending tracts conduct away from the brain.
9-12 A reflex arc is a pathway through the nervous system from a stimulus to an effector.
9-13 There are 31 pairs of spinal nerves.
9-14 There are two neurons in each motor pathway of the autonomic nervous system.
9-15 The sympathetic system stimulates a stress response, and the parasympathetic system reverses it.

Answers to Zooming In Questions
9-2 The neuron shown is a motor neuron.
9-11 No. The spinal cord is not as long as the spinal column. There are seven cervical vertebrae and eight cervical spinal nerves.
9-13 The reflex arc shown is a somatic reflex arc. An interneuron is located between the sensory and motor neuron in the CNS.
9-14 There are two neurons in this spinal reflex. Acetylcholine is the neurotransmitter released at the synapse shown by number 5, as this is a somatic reflex arc involving skeletal muscle.
9-15 The sacral spinal nerves (S1) carry impulses from the skin of the toes. The cervical spinal nerves (C6,7,8) carry impulses from the skin of the anterior hand and fingers. The parasympathetic division of the autonomic nervous system has ganglia closer to the effector organ than does the sympathetic system.
CHAPTER 10

Answers to Checkpoint Questions
10-1 The main divisions of the brain are the cerebrum, the diencephalon, the brain stem, and the cerebellum.
10-2 The three layers of the meninges are the dura mater, the arachnoid, and the pia mater.
10-3 CSF is produced in the ventricles of the brain. The two lateral ventricles are in the cerebral hemispheres, the third ventricle is in the diencephalon, and the fourth is between the brain stem and the cerebellum.
10-4 The frontal, parietal, temporal, and occipital are the four surface lobes of each cerebral hemisphere.
10-5 The cerebral cortex is the outer layer of gray matter of the cerebral hemispheres where higher functions occur.
10-6 The thalamus of the diencephalon directs sensory input to the cerebral cortex; the hypothalamus helps to maintain homeostasis.
10-7 The three subdivisions of the brain stem are the midbrain, the pons, and the medulla oblongata.
10-8 The cerebellum aids in coordination of voluntary muscles, maintenance of balance, and maintenance of muscle tone.

10-9 Stroke is the common term for cerebrovascular accident.
10-10 Neuroglia are commonly involved in brain tumors.
10-11 There are 12 pairs of cranial nerves.
10-12 A mixed nerve has both sensory and motor fibers.

Answers to Zooming In Questions
10-3 Dural (venous) sinuses are located in the space where the dura mater divides into two layers.
10-4 The fourth ventricle is continuous with the central canal of the spinal cord.
10-5 The lateral ventricles are the largest ventricles.
10-6 The central sulcus separates the frontal from the parietal lobe.
10-7 Folding provides the cortex with increased surface area.
10-8 The primary sensory area (cortex) is posterior to the central sulcus. The primary motor area (cortex) is anterior to the central sulcus.
10-10 The pituitary gland is attached to the hypothalamus of the brain.

CHAPTER 11

Answers to Checkpoint Questions
11-1 Structures that protect the eye include the skull bones, eyelid, eyelashes, eyebrow, conjunctiva, and lacrimal gland.
11-2 The sclera, chorioid, and retina are the tunics (coats) of the eyeball.
11-3 The structures that refract light as it passes through the eye to the retina are the cornea, aqueous humor, lens, and vitreous body.
11-4 The rods and cones are the receptor cells of the retina.
11-5 The extrinsic eye muscles pull on the eyeball so that both eyes center on one visual field, a process known as convergence.
11-6 The iris adjusts the size of the pupil to regulate the amount of light that enters the eye.
11-7 The ciliary muscle adjusts the thickness of the lens to accommodate for near vision.
11-8 Cranial nerve II is the optic nerve. It carries impulses from the retinal rods and cones to the brain.
11-9 Hyperopia, myopia, and astigmatism are some errors of refraction.
11-10 The ossicles of the middle ear are three small bones, the malleus, incus, and stapes, that transmit sound waves from the tympanic membrane to the inner ear.

11-11 The organ of hearing is the organ of Corti located in the cochlear duct within the cochlea.
11-12 The receptors for equilibrium are located in the vestibule and the semicircular canals.
11-13 Static equilibrium and dynamic equilibrium are the two forms of equilibrium.
11-14 The senses of taste and smell are the special senses that respond to chemical stimuli.
11-15 The general senses are touch (tactile), pressure, temperature, position (proprioception), and pain.
11-16 Proprioceptors are the receptors that respond to change in position. They are located in muscles, tendons, and joints.

Answers to Zooming In Questions
11-6 Location and direction of fibers are characteristics used in naming the extrinsic eye muscles.
11-7 The circular muscles of the iris contract to make the pupil smaller; the radial muscles contract to make the pupil larger.
11-8 The suspensory ligaments of the ciliary muscle hold the lens in place.
11-10 The oculomotor nerve (III) moves the eye.
11-16 The cilia on the receptor cells bend when the fluid around them moves.

CHAPTER 12

Answers to Checkpoint Questions
12-1 Hormones are chemicals that have specific regulatory effects on certain cells or organs in the body. Some of their effects are to regulate growth, metabolism, reproduction, and behavior.
12-2 Negative feedback is the main method used to regulate the secretion of hormones.
12-3 The hypothalamus controls the pituitary.
12-4 The anterior pituitary produces growth hormone (GH), thyroid-stimulating hormone (TSH), adrenocorticotropic hormone (ACTH), prolactin (PRL), follicle stimulating hormone (FSH) and luteinizing hormone (LH).
12-5 The posterior pituitary releases antidiuretic hormone (ADH) and oxytocin.
12-6 Thyroid hormones increase the metabolic rate in cells.
A-18 ♦ APPENDIX

12-7 The mineral calcium is regulated by calcitonin and parathyroid hormone (PTH.)
12-8 Epinephrine (adrenaline) is the main hormone from the adrenal medulla.
12-9 Glucocorticoids, mineralocorticoids and sex hormones are released by the adrenal cortex
12-10 Cortisol raises the level of glucose in the blood.
12-11 Insulin and glucagon are the two hormones produced by the pancreatic islets to regulate glucose levels.
12-12 Insulin is low or ineffective in cases of diabetes mellitus.
12-13 Secondary sex characteristics are features associated with gender other than reproductive activity.

CHAPTER 13

Answers to Checkpoint Questions
13-1 Some substances transported in blood are oxygen, carbon dioxide, nutrients, electrolytes, vitamins, hormones, urea, and toxins.
13-2 7.35 to 7.45 is the pH range of the blood
13-3 The two main components of the blood are the liquid portion or plasma, and the formed elements, which include the cells and cell fragments.
13-4 Protein is the most abundant type of substance in plasma aside from water.
13-5 Blood cells form in the red bone marrow.
13-6 Hematopoietic stem cells give rise to all blood cells.
13-7 The main function of hemoglobin is to carry oxygen in the blood.
13-8 Neutrophils, eosinophils and basophils are the granular leukocytes. Lymphocytes and monocytes are the agranular leukocytes.
13-9 The main function of leukocytes is to destroy pathogens.
13-10 The blood platelets are essential to blood coagulation (clotting).
13-11 When fibrinogen converts to fibrin a blood clot forms.
13-12 A, B, AB and O are the four ABO blood type groups.
13-13 The blood antigens most often involved in incompatibility reactions are the A antigen, the B antigen, and the Rh antigen.
13-14 Blood is commonly separated into its component parts by a centrifuge.
13-15 Anemia is an abnormally low level of red cells or hemoglobin in the blood.
13-16 Leukemia is a cancer of the tissues that produce white cells, resulting in an excess number of white cells in the blood.
13-17 Platelets are low in cases of thrombocytopenia.
13-18 The hematocrit is the percentage of red cell volume in whole blood.

Answers to Zooming In Questions
13-2 Erythrocytes (red blood cells) are the most numerous cells in the blood.
13-3 Erythrocytes are described as biconcave because they have an inward depression on both sides.
13-4 The granulocytes have segmented nuclei. Monocytes are the largest in size. Lymphocytes are the smallest in size.
13-6 Simple squamous epithelium makes up the capillary wall.
13-8 Fibrin in the blood forms a clot.
13-9 No. To test for Rh antigen, you have to use anti-Rh serum. The two types of antigens are independent.
13-10 A neutrophil is in the upper left corner of the picture. Platelets are the small dark bodies between the cells.

CHAPTER 14

Answers to Checkpoint Questions
14-1 The innermost layer of the heart is the endocardium, the middle is the myocardium, and the outermost is the epicardium.
14-2 The pericardium is the sac that encloses the heart
14-3 The upper chamber on each side of the heart is the atrium; each lower chamber is the ventricle.
14-4 Valves direct the flow of blood through the heart.
14-5 The coronary circulation is the blood supply to the myocardium.
14-6 The contraction phase of the cardiac cycle is systole; the relaxation phase is diastole.
14-7 Cardiac output is determined by the stroke volume, the volume of blood ejected from the ventricle with each beat, and by the heart rate, the number of times the heart beats per minute.
14-8 The small mass of tissue that starts the heartbeat is the sinoatrial (SA) node.
14-9 The autonomic nervous system is the main influence on the rate and strength of heart contractions
14-10 A heart murmur is an abnormal heart sound.
14-11 Congenital heart disease is a defect present at birth.
14-12 Rheumatic fever is caused by certain streptococci.
14-13 Atherosclerosis commonly causes narrowing of the coronary vessels.
14-14 ECG and EKG stand for electrocardiography.
14-15 Coronary angioplasty is the technique used to open a restricted coronary artery with a balloon catheter.
Answers to Zooming In Questions
14-1 The left lung is smaller than the right lung because the heart is located more toward the left of the thorax.
14-2 The left ventricle has the thickest wall.
14-4 The aorta carries blood into the systemic circuit.
14-5 The myocardium is the thickest layer of the heart wall.
14-6 The right AV valve has three cusps; the left AV valve has two

14-10 The AV (tricuspid and mitral) valves close when the ventricles contract, and the semilunar (pulmonary and aortic) valves open.
14-11 The internodal pathways connect the SA and AV nodes.
14-12 The SA and AV nodes are affected by the autonomic nervous system.
14-16 The cardiac cycle shown in the diagram is 0.8 seconds.

Answers to Checkpoint Questions
15-1 The five types of blood vessels are arteries, arterioles, capillaries, venules and veins.
15-2 The pulmonary circuit carries blood from the heart to the lungs and back to the heart; the systemic circuit carries blood to and from all remaining tissues in the body.
15-3 Smooth muscle makes up the middle layer of arteries and veins. Smooth muscle is involuntary muscle controlled by the autonomic nervous system.
15-4 There is one cell layer in the wall of a capillary.
15-5 The aorta is divided into the ascending aorta, aortic arch, thoracic aorta, and abdominal aorta.
15-6 The common iliac arteries are formed by the final division of the abdominal aorta.
15-7 The brachiocephalic trunk supplies the arm and head on the right side.
15-8 An anastomosis is a communication between two vessels.
15-9 Superficial means near the surface.
15-10 The superior vena cava and inferior vena cava drain the systemic circuit and empty into the right atrium.
15-11 A venous sinus is a large channel that drains deoxygenated blood.
15-12 The hepatic portal system takes blood from the abdominal organs to the liver.
15-13 As materials diffuse across the capillary wall, blood

Answers to Zooming In Questions
15-1 Pulmonary capillaries pick up oxygen. Systemic capillaries release oxygen.
15-2 Veins have valves to control the flow of blood.
15-3 The artery has a thicker wall than the vein.
15-4 There is one brachiocephalic artery.
15-5 There are two brachiocephalic veins.
15-6 The hepatic veins drain into the inferior vena cava.
15-7 The proximal valve is closer to the heart.

Answers to Zooming In Questions
16-1 The lymphatic system drains excess fluid and proteins from the tissues, protects against pathogens, absorbs fats from the small intestine.
16-2 Lymphatic capillaries are more permeable than blood capillaries and begin blindly. They are closed at one end and do not bridge two vessels.
16-3 The two main lymphatic vessels are the right lymphatic duct and the thoracic duct.
16-4 The lymph nodes filter lymph. They also have lymphocytes and monocytes to fight infection.
16-5 The spleen filters blood.
16-6 T cells of the immune system develop in the thymus.
16-7 Tonsils are located in the vicinity of the pharynx (throat).
16-8 Lymphadenopathy is any disease of the lymph nodes.
16-9 Lymphoma is any tumor of lymphoid tissue. Two examples of malignant lymphoma are Hodgkin disease and non-Hodgkin lymphoma.

Answers to Checkpoint Questions
16-1 A vein receives lymph collected from the body.
16-5 An afferent vessel carries lymph into a node. An efferent vessel carries lymph out of a node.

Answers to Zooming In Questions
17-1 Factors that influence the occurrence of infection include access to preferred body tissues, the portal of entry, virulence, dose, and the predisposition of the individual to infection.
17-2 The unbroken skin and mucous membranes constitute the first line of defense against the invasion of pathogens.
17-3 Some nonspecific factors that help to control infection are chemical and mechanical barriers, phagocytosis, natural killer cells, inflammation, fever, and interferon.
17-4 Inborn immunity is inherited in a person’s genetic material; acquired immunity develops during an individual’s lifetime.

17-5 An antigen is any foreign substance, usually a protein, that induces an immune response.

17-6 Four types of T cells are cytotoxic, helper, regulatory, and memory.

17-7 An antibody is a substance produced in response to an antigen.

17-8 Plasma cells, derived from B cells, produce antibodies.

17-9 Complement is a group of proteins in the blood that sometimes is required for the destruction of foreign cells.

17-10 The active form of naturally acquired immunity comes from contact with a disease organism; the passive form comes from the passage of antibodies from a mother to her fetus through the placenta or breast milk.

17-11 Bacterial diseases for which there are vaccines include smallpox, whooping cough (pertussis), diphtheria, tetanus, Haemophilus influenzae type b (Hib), and pneumococcus.

17-12 Viral diseases for which there are vaccines include poliomyelitis, measles (rubeola), mumps, rubella (German measles), hepatitis A and B, chicken pox (varicella), influenza and rabies.

17-13 An immune serum is an antiserum prepared in an animal; immune sera can be used in emergencies to provide passive immunization.

17-14 Disorders of the immune system include allergy, autoimmunity, and immune deficiency diseases.

17-15 The tendency of every organism to destroy foreign substances is the greatest obstacle to transplantation of tissues from one individual to another.

Answers to Zooming In Questions
17-2 The phagocytic vesicle in step 2 contains fragments of foreign antigen.

17-3 Plasma cells and memory cells develop from activated B cells.

CHAPTER 18
Answers to Checkpoint Questions
18-1 The three phases of respiration are pulmonary ventilation, external exchange of gases and internal exchange of gases.

18-2 As air passes over the nasal mucosa, it is filtered, warmed, and moistened.

18-3 The scientific name for the throat is pharynx, for the voice box is larynx, and for the windpipe is trachea.

18-4 The three regions of the pharynx are the nasopharynx, the oropharynx, and the laryngeal pharynx.

18-5 The cells that line the respiratory passageways have cilia to filter impurities and to move fluids.

18-6 Gas exchange in the lungs occurs in the alveoli.

18-7 The pleura is the membrane that encloses the lung.

18-8 The two phases of breathing are inhalation, which is active, and exhalation, which is passive.

18-9 Diffusion is the movement of molecules from an area in which they are in higher concentration to an area where they are in lower concentration.

18-10 The substance in red blood cells that carries almost all of the oxygen in the blood is hemoglobin.

18-11 The main form in which carbon dioxide is carried in the blood is as bicarbonate ion.

18-12 The medulla of the brain stem sets the basic pattern of respiration.

18-13 The phrenic nerve is the motor nerve that controls the diaphragm.

18-14 Carbon dioxide is the main chemical controller of respiration.

18-15 COPD is chronic obstructive pulmonary disease. Chronic bronchitis and emphysema are commonly involved in COPD.

Answers to Zooming In Questions
18-2 The heart is located in the medial depression of the left lung.

18-4 The epiglottis is named for its position above the glottis.

18-7 The external and internal intercostals are the muscles between the ribs.

18-8 Gas pressure decreases as the volume of its container increases.

18-9 Residual volume can not be measured with a spirometer.

18-14 The esophagus is posterior to the trachea.

CHAPTER 19
Answers to Checkpoint Questions
19-1 Food must be broken down by digestion into particles small enough to pass through the plasma membrane.

19-2 The digestive tract has a wall composed of a mucous membrane (mucosa), a submucosa, smooth muscle, and a serous membrane (serosa).

19-3 The peritoneum is the large serous membrane that lines the abdominopelvic cavity and covers the organs it contains.

19-4 There are 20 baby teeth, which are also called deciduous teeth.

19-5 Proteins are digested in the stomach.

19-6 The three divisions of the small intestine are the duodenum, jejunum and ileum.

19-7 Most digestion takes place in the small intestine under the effects of digestive juices from the small intestine and the accessory organs. Most absorption of digested food and water also occurs in the small intestine.

19-8 The divisions of the large intestine are the cecum, ascending colon, transverse colon, descending colon, sigmoid colon and rectum.

19-9 The large intestine reabsorbs some water and stores, forms, and eliminates the stool. It also houses bacteria that provide some vitamins.
19-10 The salivary glands are the parotid, submandibular (submaxillary) and sublingual.
19-11 The gallbladder stores bile.
19-12 Bile emulsifies fats.
19-13 The pancreas produces the most complete digestive secretions.
19-14 Absorption is the movement of digested nutrients into the circulation.
19-15 The two types of control over the digestive process are nervous control and hormonal control.
19-16 Hunger is the desire for food that can be satisfied by the ingestion of a filling meal. Appetite is a desire for food that is unrelated to a need for food.
19-17 Caries, gingivitis and periodontitis are common diseases of the mouth and teeth.
19-18 Crohn disease and ulcerative colitis are inflammatory bowel diseases.

19-19 Hepatitis is inflammation of the liver.

Answers to Zooming In Questions
19-1 Smooth muscle (circular and longitudinal) is between the submucosa and the serous membrane in the digestive tract wall.
19-3 The mesentery is the part of the peritoneum around the small intestine.
19-4 The salivary glands are the accessory organs that secrete into the mouth.
19-7 The oblique muscle layer is an additional muscle layer in the stomach as compared to the rest of the digestive tract.
19-8 The ileum of the small intestine joins the cecum.
19-10 The accessory organs shown secrete into the duodenum.

CHAPTER 20
Answers to Checkpoint Questions
20-1 The two phases of metabolism are catabolism, the breakdown phase of metabolism, and anabolism, the building phase of metabolism.
20-2 Cellular respiration is the series of reactions that releases energy from nutrients in the cell.
20-3 Glucose is the main energy source for the cells.
20-4 An essential amino acid or fatty acid cannot be made metabolically and must be taken in as part of the diet.
20-5 Minerals are chemical elements, and vitamins are complex organic substances.
20-6 The normal range of blood glucose is 85 to 125 mg/dL.
20-7 Typical recommendations are 55-60% carbohydrate; 30% or less fat; 15 to 20% protein
20-8 Some factors that affect heat production are exercise, hormone production, food intake, and age.

20-9 The hypothalamus of the brain is responsible for regulating body temperature.
20-10 Normal body temperature is 36.2°C to 37.68°C (97°F to 100°F).
20-11 Heat cramps, heat exhaustion, and heat stroke are brought on by excessive heat.
20-12 Excessively low body temperature is hypothermia.

Answers to Zooming In Questions
20-1 Pyruvic acid produces lactic acid under anaerobic conditions; it produces CO2 and H2O under aerobic conditions.
20-4 The BMI is \(24 \div 3.2 = 24\)

CHAPTER 21
Answers to Checkpoint Questions
21-1 Body fluids are grouped into intracellular fluid and extracellular fluid.
21-2 Water is lost from the body through the kidneys, the skin, the lungs, and the intestinal tract.
21-3 The control center for the sense of thirst is located in the hypothalamus of the brain.
21-4 Sodium is the main cation in extracellular fluid. Potassium is the main cation in intracellular fluid.
21-5 Chloride is the main anion in extracellular fluid.
21-6 Some electrolytes are lost through the feces and through sweat. The kidneys have the main job of balancing electrolytes. Several hormones, such as aldosterone, parathyroid hormone, and calcitonin, are also involved.

21-7 The acid–base balance of body fluids is maintained by buffer systems, respiration, and kidney function.
21-8 Abnormally low pH of body fluids results in acidosis; abnormally high pH of body fluids results in alkalosis.
21-9 Edema is the accumulation of excessive fluid in the intercellular spaces.

Answers to Zooming In Questions
21-1 Water is lost through the skin, the lungs, the kidneys and the intestine.

CHAPTER 22
Answers to Checkpoint Questions
22-1 Systems other than the urinary system that eliminate waste include the digestive, respiratory, and integumentary systems.
22-2 The urinary system consists of two kidneys, two ureters, the bladder, and the urethra.
22-3 The retroperitoneal space is posterior to the peritoneum.
CHAPTER 23
Answers to Checkpoint Questions
23-1 Meiosis is the process of cell division that halves the chromosome number in a cell to produce a gamete.
23-2 The testis is the male gonad.
23-3 Testosterone is the main male sex hormone.
23-4 The spermatozoon, or sperm cell, is the male sex cell (gamete).
23-5 Sperm cells leave the seminiferous tubules within the testis and then travel through the epididymis, ductus (vas) deferens, ejaculatory duct, and urethra.
23-6 Glands that contribute secretions to the semen, aside from the testes, are the seminal vesicles, prostate, and bulbourethral glands.
23-7 The main subdivisions of the sperm cell are the head, midpiece, and tail (flagellum).
23-8 Follicle-stimulating hormone (FSH) and luteinizing hormone (LH), also called ICSH, are the pituitary hormones that regulate male and female reproduction.
23-9 Infectious diseases of the reproductive tract include chlamydial and gonococcal infections, genital herpes, syphilis, E. coli infections, mumps.
23-10 The ovary is the female gonad.
23-11 The ovum (egg cell) is the female gamete.
23-12 The ovarian (graafian) follicle surrounds the egg as it ripens.
23-13 Ovulation is the process of releasing an egg cell from the ovary.
23-14 The follicle becomes the corpus luteum after ovulation.
23-15 The fetus develops in the uterus.
23-16 The two hormones produced in the ovaries are estrogen and progesterone.
23-17 Menopause is the period during which menstruation ceases.
23-18 Contraception is the use of artificial methods to prevent fertilization of the ovum or implantation of the fertilized ovum.

Answers to Zooming In Questions
22-1 The renal artery supplies blood to the kidney. The renal vein drains blood from the kidney.
22-2 The aorta supplies blood to the renal artery. The inferior vena cava receives blood from the renal vein.
22-3 The outer region of the kidney is the renal cortex. The inner region is the renal medulla.
22-4 The proximal convoluted tubule is closer to the glomerular capsule. The distal convoluted tubule is farther away from the glomerular capsule.
22-5 The outer region of the kidney is the renal cortex. The inner region is the renal medulla.
22-6 The juxtaglomerular apparatus is made up of cells from the afferent arteriole and the distal convoluted tubule.
22-7 The afferent arteriole has a wider diameter than the efferent arteriole.
22-8 The afferent arteriole has a wider diameter than the efferent arteriole.
22-9 The opening of the urethra is anterior to the opening of the vagina.
22-10 The urethra passes through the prostate gland in the male.
22-11 The ureter carries urine from the kidney to the bladder.
22-12 The urethra carries urine from the bladder to the outside.
22-13 Acute kidney disorders arise suddenly, usually as a result of infection. Chronic conditions arise slowly and are often progressive, with gradual loss of kidney functions.

CHAPTER 24
Answers to Checkpoint Questions
24-1 A zygote is formed by the union of an ovum and a spermatozoon.
24-2 The placenta nourishes the developing fetus.
24-3 The umbilical cord carries blood between the fetus and the placenta.
24-4 The heartbeat first appears during the fourth week of embryonic development.
24-5 The amniotic sac is the fluid-filled sac that holds the fetus.
24-6 The approximate length of pregnancy in days is 266.
24-7 Parturition is the process of labor and delivery.
24-8 A cesarean section is an incision made in the abdominal wall and the wall of the uterus for delivery of a fetus.
24-9 The term viable with reference to a fetus means able to live outside the uterus.
24-10 Lactation is the secretion of milk from the mammary glands.
24-11 An ectopic pregnancy is one that develops in a location outside the uterine cavity.
24-12 Puerperal infection is an infection that is related to childbirth.

Answers to Zooming In Questions
24-1 The ovum is fertilized in the oviduct (fallopian, uterine) tube.
24-2 The purple color signifies a mixture of oxygenated and unoxygenated blood.
24-5 The umbilical cord connects the fetus to the placenta.
24-7 The pectoralis major underlies the breast.

CHAPTER 25
Answers to Checkpoint Questions
25-1 A gene is an independent unit of heredity. Each is a segment of DNA contained in a chromosome.
25-2 A dominant gene is always expressed, regardless of the gene on the matching chromosome. A recessive gene is only expressed if the gene on the matching chromosome is also recessive.
25-3 Meiosis is the process of cell division that forms the gametes.
25-4 The sex chromosome combination that determines a female is XX; a male is XY.
25-5 A trait carried on a sex chromosome is described as sex-linked.
25-6 A mutation is a change in the genetic material (a gene or chromosome) of a cell.
25-7 A congenital disease is present at birth. A hereditary disease is genetically transmitted or transmissible. A disorder may occur during development and be present at birth but not be inherited through the genes.
25-8 Phenylketonuria is caused by a hereditary lack of an enzyme needed for the metabolism of phenylalanine.
25-9 A pedigree is a complete, detailed family history. It is used to determine the pattern of inheritance of a genetic disease within a family.
25-10 A karyotype is a picture of the chromosomes cut out and arranged in groups according to size and form.

Answers to Zooming In Questions
25-2 25% of children will show the recessive phenotype blond hair. 50% of children will be heterozygous.
25-5 The possible genotypes of the two normal children in the F3 generation are CC or Cc.
25-7 There are 44 autosomes shown in B.