

Gould: Pathophysiology for the Health Professions, 4th Edition

Chapter 1: Introduction to Pathophysiology

Answer Key - Study Questions

1. (Up to Instructor)
2.
 - a. etiology—concerns the causative factors in a particular disease
 - b. incidence—the number of new cases of a disease in a given population noted within a stated time period
 - c. precipitating factor—a condition that triggers onset or exacerbation of disease
 - d. complication- new secondary or additional problems that arise after the original disease begins
 - e. prognosis—the probability of specific outcomes
 - f. iatrogenic—a disease caused by the actions of a health care worker including treatment, diagnosis or failure to recognize complications
3. Metaplasia—occurs when one mature cell type is replaced by a different mature cell type that is functional. Malignant neoplasms are referred to as cancer and involve dysplastic tissues.
4. Loss of function is preceded by changes in cell metabolism because of changes in structure and function. Necrosis is the death of groups of cells caused by processes such as cells being liquefied by certain enzymes (liquefaction necrosis), the cell proteins being altered or denatured (coagulative necrosis), the breakdown of fats by enzymes (fat necrosis), or the formation of a thick “cheesy” substance that later leads to liquefaction (caseous necrosis).
5. Apoptosis—programmed cell death
Gangrene—an area of ischemic and necrotic tissue that has been invaded by bacteria
6. (Up to Instructor)
7. (Individualized to student)
8. Malignant breast tumor and high blood pressure: diagnosis
high blood pressure and family cancer: medical history
medication: treatment
surgery: treatment and diagnosis
biopsy: examination of living tissue

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Chapter 2: Inflammation and Healing

Answer Key - Study Questions

1. a. Inflammation related to tissue damage causes increasing edema for at least 48 hours under the rigid, nonexpandable cast.
b. Inflammation has subsided and muscle atrophy has occurred because of immobility.
2. Pain and visible redness provide warning of tissue injury. Increased fluid at the site dilutes any toxic material. Fibrin mesh and leukocytes localize (wall off) the causative agent. Migration of phagocytic cells, leukocytes, and antibodies (globulins) to the area combat or destroy the agent and remove debris in preparation for healing.
3. a. Warmth results from vasodilation and increased blood flow to the area; fever is due to release of pyrogens from WBCs.
b. Low-grade fever occurs with increased WBCs, malaise, anorexia, and headache.
4. They confirm the presence of inflammation in the body but do not define the specific cause or location of the problem. In some cases, a differential count is helpful.
5. a. The increased permeability may permit leakage or penetration of toxins or bacteria (e.g., through the intestinal wall). Any necrosis breaks the barrier, allowing microbes to invade. The edema or increased interstitial fluid may impair arterial flow to an area, leading to ischemia and decreased access of leukocytes to the site. The exudate provides a nutritious medium for organisms to reproduce.
b. Inflammation accompanies i and ii; infection is associated with iii and iv.
6. Normal fluid should be watery, clear, and colorless.
Thick yellowish fluid often indicates the presence of a bacterial infection (peritonitis).
7. Blood volume would be low (hypovolemia), and the hematocrit would be elevated.
8. Excessive fluid in the joint cavity and surrounding tissues prevents further stretching of the tissues, such as ligaments, tendons, and skin, as required for movement.
9. The body attempts to increase body temperature through shiver-increased skeletal muscle activity, peripheral vasoconstriction, and decreased blood flow and heat loss.
10. Aspirin (acetylsalicylic acid [ASA]) interferes with blood clotting (prevents platelet adhesion).
11. Prednisone decreases the immune response, causes atrophy of lymphoid tissue, decreases the number of leukocytes, and suppresses the inflammatory response, thus decreasing resistance to infection.
12. a. Heart muscle heals through scar tissue. Cardiac muscle does not regenerate.
b. Scar tissue is nonfunctional and therefore cannot contract; thus heart contractions would be weaker.
13. Circulation may be impaired, decreasing the supply of oxygen and nutrients to the site. Metabolic rate is decreased, slowing protein synthesis and cell mitosis. Other pathologic conditions may interfere with the supply of nutrients or oxygen. Immune response is decreased, predisposing the person to infection and delaying healing.
14. a. Small intestine: Scar tissue may cause obstruction by stenosis as it shrinks, or adhesions may twist or pull on a loop of intestine.
b. Brain: Scar tissue is nonfunctional and can block conduction pathways or interfere with the flow of blood or CSF.

- c. Cornea: Scar tissue is not transparent and therefore blocks the passage of light rays, impairing vision.
 - d. Mouth: Contractures may develop, preventing normal opening and movement of the mouth, affecting eating, speech, and facial expression.
 - e. Lungs: The bronchi or bronchioles may be narrowed, reducing air flow, and adhesions may impede movement and expansion of the pleural membranes. Because scar tissue is nonelastic, large amounts of it impair expansion and recoil of the lungs. Scar tissue interferes with blood flow.
15. a. Pain—chemical mediators irritate nerves; edema results from increased capillary permeability; erythema occurs because of increased blood in the area.
b. Long-term, low protein levels occur with protein shifts into tissue and loss in exudates. In addition, protein is in increased demand for repair, but anorexia results in decreased intake, further lowering protein levels.
16. a. It removes damaging chemical and prevents penetration into the deeper layers of the skin.
b. Good nutrition (including protein and vitamins), promotion of circulation, warmth, and avoidance of secondary infection would promote rapid healing.
17. Scar tissue is not elastic and tends to contract over time, leading to reduced range of movement or contractures, decreased coordination of fine movements, and loss of sensory function (e.g., touch, heat).
18. Function could be impaired because of possible distortion of the mouth and eyelids, interfering with function (speaking, eating) and facial expressions such as a smile. There may be restricted mobility related to contractures or loss of elasticity, reduced sensitivity to touch or other sensory stimuli, and less strength.

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Chapter 3: Immunity and Abnormal Responses

Answer Key - Study Questions

1. Following phagocytosis of foreign material, macrophages process the antigen for use by the lymphocytes, thus initiating an immune response. Macrophages also stimulate proliferation of lymphocytes.
2. Lymphocytes originate from the stem cells in bone marrow, mature in the thymus or bone marrow, and then migrate to lymphoid tissue, where they are responsible for the immune response.
3. Active natural immunity results when a person naturally experiences an infection such as chickenpox (varicella) and develops permanent immunity (memory cells) to the invading virus. Passive artificial immunity is a temporary protection against an infection such as rabies, gained through forced introduction of antibodies into the body from an external source.
4. A booster is an additional injection of antigen that serves as a reminder to the memory cells in the immune system and stimulates additional production of antibodies.
5. Gamma globulin is given as an injection of antibodies from an external source immediately following exposure to a microbe to minimize the effects of an impending infection (e.g., measles, rubella).
6. IgA is found in saliva, the secretions and mucous membranes of the respiratory and digestive tracts, and in colostrum.
7. Immune deficits may result from dysfunction of the cellular component or antibody production. One or both kinds of lymphocytes may be deficient because of bone marrow problems or damage to mature lymphocytes (e.g., from human immunodeficiency virus [HIV]). Phagocytic cells also may be defective. The second group of immunodeficiencies arises from an abnormality of the immunoglobulins, which may result from a protein deficit, genetic abnormalities, or B-cell dysfunction. Immune deficits for both these groups may be classified as primary or secondary disorders.
8. On first exposure to the pollen, IgE antibodies form and attach to mast cells in the nasal mucosa. On subsequent exposure to the same pollen, the allergen reacts with the antibodies on the mast cell, causing release of histamine and other chemical mediators from the mast cells, resulting in inflammation of the nasal mucosa. Inflammation causes swelling of the nasal mucosa, sneezing, and increased watery secretions (hay fever).
9. Anaphylaxis results in severe hypoxia very quickly because of combined respiratory (airway obstructions) and cardiovascular (shock) impairment, leading to loss of consciousness and potential cardiac or respiratory arrest. Immediate treatment is essential.
10. An antigen-antibody complex forms and is deposited in tissue, activating complement and causing inflammation.
11. In an autoimmune disorder, the immune system identifies a component of the individual's tissues as foreign (self antigens), and develops autoantibodies to it. The ensuing antigen-antibody reaction causes inflammation and, eventually, necrosis in various organs and tissues. In a normal immune response, the body does not identify its own tissues as foreign, and any antibodies are formed as a defense against external foreign material.

12. A successful organ transplant is promoted by a close tissue match, using blood type and HLA antigens on the lymphocytes; good circulation; and maintenance of antirejection drugs.
13. When someone is HIV-positive, the virus and antibodies are present in body fluids, but there are no obvious signs, and the T-lymphocyte count is normal. With AIDS, active infection is present, the T lymphocyte count is reduced, and acute opportunistic infections and cancers occur.
14. Opportunistic infections are common with AIDS because of reduced resistance/surveillance/immune response.
15. HIV may be transmitted by blood or contaminated needles, through sexual intercourse, and/or transplacentally or through breastfeeding; it is not transmitted by casual contact, kissing, fomites, oral secretions, or toilets.
16. Common complications associated with AIDS are pneumonia (PCP), severe lung congestion, wasting syndrome (severe diarrhea, malnutrition), and cancer (Kaposi's sarcoma—purple tumors on skin and organs or lymphomas in the brain).

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Chapter 4: Infection

Answer Key - Study Questions

1.
 - a. Endotoxins are released from the cell wall of dead gram-negative organisms and cause fever and shock.
 - b. Microbes survive unseen for a long time under adverse conditions, cannot destroy, can reproduce after entering the body.
 - c. The capsule protects the microbe from phagocytosis.
2.
 - a. A deficit of WBCs reduces phagocytosis and immune response; a deficit of RBCs decreases oxygen and mitosis.
 - b. Circulatory impairment reduces cells—WBCs, RBCs, and antibodies—to the area, slowing tissue repair.
 - c. A puncture wound is characterized by reduced oxygen and a risk of anaerobes causing infection because it is difficult to remove foreign material..
3. Resident flora deter invasion by other microbes, aid digestion, produce vitamin K, and maintain local pH (skin, vagina).
4. Infection results from microbial action; inflammation has many causes, ischemia, allergy, irritants, thermal injury, etc.
5. A respiratory infection's chances of being transmitted are reduced by covering the mouth and nose when coughing; handwashing; properly disposing of tissues; protecting food, dishes, and people from contact with respiratory secretions; cleaning any contaminated surfaces; and maintaining a well-ventilated room.
6.
 - a. Invaders must take time to colonize and reproduce; sufficient microbes are needed to produce signs.
 - b. Reproduction is decreased as nutrient supply is diminished and wastes build up, altering pH, etc. Defenses are activated.
 - c. Antimicrobial agents may be prescribed to prevent secondary infections and in cases involving virulent microbes, dangerous sites, such as the brain, and immunosuppressed individuals or those with chronic disease.
7. The complete course of medication should be taken because if all microbes are not eradicated, infection may recur. In addition, microbes mutate after drug exposure and become drug-resistant.
8. Viral infections are difficult to treat because they are more difficult to culture and identify, and viruses exist inside host cells. Moreover, antiviral drugs can reduce replication, but they do not destroy the virus.
9. Local signs of influenza are sore throat and a nonproductive cough. Systemic signs of influenza are fever, aching, and headache.
10. Viral strains mutate, change antigen, loss of immunity; strains from three groups, A, B, and C, of the virus may cause infection.

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Chapter 5: Neoplasms

Answer Key - Study Questions

1. Benign neoplasms are often encapsulated, grow slowly, do not spread to other sites, lack systemic effects, and have cells that are differentiated. Malignant neoplasms are rarely encapsulated; grow more rapidly; spread by invasion or metastases; have systemic effects; and have poorly differentiated, nonfunctional, atypical cells, with large nuclei and more mitotic figures.
2. The zone of inflammation adds to the pressure effect of the mass and tissue ischemia, and the chemical mediators irritate nerves.
3. Each cell that breaks away from the primary tumor may travel through different blood vessels and lodge at various sites, each giving rise to a secondary tumor.
4. Chemotherapy may be recommended to control the growth and spread of the tumor, reduce clinical signs such as pain, and decrease the risk of complications such as obstruction of a passage.
5. Thrombocytes or platelets are required for blood clotting; a deficit leads to severe hemorrhage and shock.
6. Infection may accompany cancer because inflammation and necrosis cause inflammation and necrosis, and there is a loss of barriers to microbes. In addition, the immune response is depressed, and the pressure of the tumor decreases blood flow to area, thus decreasing defenses.
7. Chronic blood loss leads to iron deficiency anemia. Severe hemorrhage causes hypovolemic shock. Blood often causes irritation and inflammation in tissues to which it is “foreign.” Bleeding also causes specific local effects (e.g., restricts breathing if it occurs in the pleural cavity).
8. Local effects of radiation include inflammation and scar tissue; vasculitis; and tissue necrosis, if extensive.
9. Both benign and malignant tumors occupy space, increasing pressure on the brain.
10. Basal cell carcinoma presents as an obvious, persistent painless nodule that ulcerates centrally. It grows slowly, invading the neighboring tissue, is easily treated, and has an excellent prognosis. Ovarian cancer is asymptomatic until the mass is large or until complications develop. It spreads throughout the peritoneal cavity early in its course. Late detection and early spread result in a poor prognosis.

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Chapter 6: Fluid, Electrolyte, and Acid-Base Imbalances

Answer Key - Study Questions

1. Intracellular fluid is fluid contained within the cells. Extracellular fluid includes all fluids outside the cells such as blood, interstitial fluid, CSF, digestive tract secretions, pleural fluid, and lymph.
2. Intracellular fluid makes up the higher proportion of body fluid.
3. The proportion of fluid in the body decreases throughout the life span.
4. Dehydration affects cell function because the transport of nutrients into the cell and removal of wastes from the cell are decreased, impairing cell metabolism and function.
5. Sodium ion (Na^+) helps to maintain extracellular fluid volume (as the major cation exerting osmotic pressure), contributes to neuromuscular function, and plays a role in acid-base balance and metabolic processes.
6. Hypernatremia tends to increase extracellular fluid volume by drawing water out of the cells, thus decreasing intracellular volume.
7. The primary location of potassium is in the intracellular compartment.
8. Aldosterone and the kidney control sodium and potassium levels through the exchange of Na^+ and K^+ in the renal tubules.
9. Signs and symptoms of hypocalcemia include skeletal muscle twitches and tetany, numbness and tingling in the face and fingers, and weak cardiac contraction.
10. A vitamin D deficit would lead to (a) bone demineralization and decreased bone density and (b) a low serum calcium level.
11. Hypochloremia leads to increased serum bicarbonate levels as bicarbonate moves out of the red blood cells to maintain electrochemical neutrality by making up for low chloride level. Increased serum bicarbonate results in higher serum pH or alkalosis.
12. The normal range of pH for (a) blood is 7.35 to 7.45 and for (b) urine is 4.5 to 8.
13. Very slow, shallow respirations would (a) increase PCO_2 and (b) decrease serum pH (increase carbonic acid).
14. Metabolic acidosis may occur with infection (increased BMR), renal disease (retention of acids), severe vomiting or diarrhea (loss of bicarbonate and increased acids), starvation, or diabetic ketoacidosis (increased acid production).
15. a. Ketoacids bind with bicarbonate ions, decreasing serum bicarbonate and serum pH.
b. Respirations increase. Kidneys excrete more acids and increase bicarbonate production and reabsorption.
c. Rate and depth of breathing increase, and urine has a low pH (e.g., 5).
d. Carbon dioxide or carbonic acid levels in the blood decrease, resulting in decreased total acids in the body
16. a. Serum pH is less than 7.35 because acidosis depresses CNS function. Bicarbonate raises serum pH to normal by combining with ketoacids.
b. The serum potassium level is elevated because of acidosis.
c. Insulin reduces serum potassium
d. The pulse would be weak and thready because of hypovolemia. When CNS function is decreased, heart rate is slow or irregular.

17. Mild exercise promotes continued circulation to remove lactic acid from muscle tissue, decrease acidosis, and restore oxygen reserves.
18. Slow, shallow respirations lead to increased carbon dioxide in the blood. Reduced oxygen and sluggish circulation contribute to more anaerobic metabolism and increased lactic acid levels. Therefore, serum pH is decreased, and acidosis is common during and following surgery.

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Chapter 7: Congenital and Genetic Disorders

Answer Key - Study Questions

1. Homozygous—the pair of alleles or genes at a site that determine a specific trait are identical. Heterozygous—the pair of matching alleles for a trait differs in expression.
2. A pedigree chart can be used to trace a genetic trait back through previous generations by checking the occurrence of the disorder or characteristic in all family members. Such a chart may confirm the presence of an inherited condition in the family and indicate the type of inheritance.
3. The effects are not noted until data are collected at a much later time, and it may be difficult to identify one teratogen out of many possible factors to which any one person was exposed. Ethically, experiments cannot be performed to identify suspected teratogens; therefore, it requires collation of many incident reports over a long period of time to identify the source.
4. The probability of passing on the gene for hemophilia is the same for each pregnancy, depending on the possible combinations of the genes derived from the parents, regardless of events in prior pregnancies.
5. Both parents must carry the defective gene in order for the female child to be affected. A female child may be a carrier if either parent passes on the defective gene.
6. The father passes his Y chromosome to a son, not the X chromosome carrying the defective gene.
7. If an unaffected female child mates with an unaffected male, hemophilia A will not be carried forward. A female carrier child who mates with an unaffected male from a different family could produce affected children (see Figures 7-4 and 7-5).
8. The probability that a parent carrying a dominant trait will pass that trait on is a 50% chance with each pregnancy
9. Chromosome analysis indicates the components of pair 23, either XX or XY. Ultrasound may portray the penis.
10. A needle is inserted through the abdominal wall into the uterus and amniotic sac, guided by ultrasound visualization, and a small amount of amniotic fluid is withdrawn. The fluid is tested for marker enzymes or chemicals that are significant in certain diseases, and the fetal cells in the fluid are cultivated for several weeks. As the cells proliferate, chromosomes may be extracted from a cell and a karyotype prepared to check for chromosome abnormalities in the fetus, and DNA testing may be accomplished.
11. Monosomy X can be identified by an abnormal karyotype.

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Chapter 8: Diseases Associated with Adolescence

Answer Key - Study Questions

1. Sexual maturation in a female is characterized by development of breasts, onset of menstrual cycles and ovulation, broadening of the pelvis, growth of pubic hair, and the development of fat deposits on hips and thighs.
2. Functional scoliosis is secondary to another problem such as unequal leg length. Structural scoliosis may be idiopathic or may result from defects in the spinal structure or support, such as hemivertebrae or muscle paralysis.
3. Juvenile rheumatoid arthritis involves the joint and impaired movement, usually in multiple joints, whereas osteomyelitis causes pain and swelling in the shaft at one site only. Fever and leukocytosis are often more severe with osteomyelitis, whereas a rash or involvement of the eye or other areas may accompany juvenile rheumatoid arthritis.
4. The eating pattern differs, with anorexics refusing food, and bulimics ingesting huge quantities and then vomiting or eliminating it. The anorexic person usually appears malnourished, whereas the bulimic may appear normal. However, there may be overlap between the two conditions.
5. Fluid and electrolyte imbalances may cause serious cardiac problems. Malnutrition may predispose the individual to infection.
6. Infection deep in the hair follicle and rupture of the pustule may lead to extensive tissue necrosis and scar formation. If a cyst forms because of necrosis, scars result.
7. Infectious mononucleosis is transmitted by the Epstein-Barr virus in saliva.
8. Undescended testes should not go untreated because of a high risk of testicular cancer, infertility, or sterility.
9. Obesity is the cause of metabolic syndrome with increased abdominal fat and a change in metabolism of glucose and lipoprotein. This may lead to early onset of type 2 diabetes mellitus, hypertension, and congestive heart failure.

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Chapter 9: Potential Complications of Pregnancy

Answer Key - Study Questions

1. Breasts become larger and tender, and vaginal secretions increase. Urinary frequency is common in the early stage. Nausea and vague abdominal discomfort or heartburn occurs.
2. Intake should ensure adequate amounts of basic nutrients to meet maternal and fetal needs, including protein, minerals, and vitamins, adjusted according to the needs of each trimester. For example, in the first trimester, essential nutrients are necessary for organogenesis, but large quantities of food are not needed at this point. Fiber content often needs to be increased to reduce constipation. Fresh foods are recommended, and the use of additives is discouraged to reduce the risk of any teratogenic effects. Sodium may have to be restricted if there is any tendency to hypertension or edema. Vitamin or iron supplements may be needed. Total food intake may be divided into frequent small meals to reduce nausea and heartburn. Eight glasses of water daily are recommended to ensure good digestion and clearance of wastes and to minimize constipation. Excessive caloric intake is deposited as fat in the mother.
3. Regular exercise promotes circulation and cardiorespiratory fitness, reduces stress, and assists in keeping blood pressure at a reasonable level. It maintains muscle tone, which reduces backache, and it is helpful during labor. It may be necessary to reduce some activities that require jumping or fine balance. Strenuous exercise, particularly in hot weather, is not recommended.
4. Abruptio placentae occurs during the last trimester; abdominal pain, vaginal bleeding of dark red blood, and ultrasound shows premature separation of the placenta from the uterine wall.
Placenta previa: occurs as Braxton Hicks contractions begin late in the end of pregnancy; it is characterized by painless, bright red bleeding. The placenta is implanted in the lower uterus or over the cervical os, and when the uterus expands and contracts, the placenta is torn.
Ectopic pregnancy occurs early in pregnancy at the time of implantation outside the uterus; symptoms occur at weeks 8-12, as the placenta is forming and the mass stretches the tube. It is accompanied by severe hemorrhage, peritonitis, and severe pain and can result in hypovolemic shock in the woman and is considered a surgical emergency.
5. PIH could damage the kidneys or the retina of the eye and cause stroke or heart failure in the mother. Degeneration of the placenta could harm development and/or survival of the fetus.
Eclampsia could cause generalized seizures or coma in the mother, and immediate hospitalization is required to prevent harm to fetus.
Gestational diabetes requires close monitoring of the mother during pregnancy. The fetus is large in size and may be a difficult delivery. Fetal abnormalities and stillbirth are at higher risk. The fetus needs monitoring after birth, and the mother may develop type 2 diabetes at a later time
6. Pregnant adolescents often lack prenatal care and have inadequate nutrition, and smoking, alcohol abuse, and drug intake are more prevalent in adolescents; psychosocial factors are

often present. Delivery may be complicated by a too small pelvis.

7. Symptoms of postpartum infection include fever, vomiting, lower abdominal pain, foul smelling discharge from the vagina, tachycardia, severe pain, and abdominal distention.

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Chapter 10: Aging and Disease Processes

Answer Key - Study Questions

1. Diet should be well-balanced and provide adequate amounts of all nutrients, protein, minerals (e.g., calcium and iron), all vitamins, carbohydrates, and fats to maintain cell function, regeneration, and repair. Fiber content should be sufficient to prevent constipation. The total energy requirement is decreased because of the decreased basal metabolic rate. The amount of fat, particularly animal fat, may be reduced to decrease total caloric intake and risk of elevated cholesterol levels; however, some fat as well as fat-soluble vitamins are necessary. Adequate water should be included, particularly when salivary secretion is reduced. There may be dietary restrictions, such as restrictions on sodium, glucose, or cholesterol, imposed by certain diseases. In some cases, chewing and swallowing problems may necessitate some alteration in the form or preparation of the food.
2. Exercise improves cardiac capacity and peripheral circulation helps to maintain tissues, and reduces the risk of vascular problems. It also helps in reducing stress and maintaining mental well-being and exercise maintains strong bone and skeletal muscle tone, coordination, and posture, and improves respiratory function.
3. Variations exist because of the presence of chronic illness, particularly in persons with cardiovascular and neurologic diseases, genetic factors, exposure to environmental hazards, activity level, nutrition, and socialization.
4. Infections are more common in older adults because of impaired circulation, a decreased immune response, slower tissue repair, fragile skin, and mucosal barriers.

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Chapter 11: Effects of Immobility

Answer Key - Study Questions

1. Circulation is more sluggish, and blood tends to pool in dependent areas, causing edema. Blood clots may form with stasis of blood or pressure on blood vessels. Orthostatic hypotension occurs after prolonged immobility because reflexes are slow.
2. Decreased circulating blood and any respiratory impairment limit the supply of nutrients available for healing. Edema in the area interferes with healing. Appetite may be reduced, or immobility may restrict the availability of food and water. Any infection or stress such as pain is an additional drain on resources.
3.
 - a. Interstitial fluid that has accumulated in a dependent area would probably be decreased when body position changes, affecting blood flow and pressures at the capillaries.
 - b. Frequent changes in position promote movement of respiratory secretions, facilitating their removal; a different position may permit better expansion of the lungs, allowing deep breathing and coughing.
 - c. Changes in position improve circulation by relieving pressure and edema and allowing exposure to air for drying.

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Chapter 12: The Influence of Stress

Answer Key - Study Questions

1. Bronchodilation promotes increased oxygen flow into the lungs and increased diffusion. Increased heart rate and contractility improve cardiac output, transporting oxygenated blood to cells in vital organs such as the brain. Although vasoconstriction reduces blood flow into some tissues, it also shunts blood quickly back to the lungs to be reoxygenated and to vital organs.
2. For example, trauma, such as a dislocated shoulder may be cited as a stressor. The response might be heart palpitations, sweating, and greater awareness of surroundings. In this case, the pain of the injury caused shock, and blood pressure was slightly low. The stress response prevented blood pressure from dropping more.
3. Rheumatoid arthritis, eczema, asthma, herpes simplex, Crohn's disease, and peptic ulcer are exacerbated by stress.
4. Potential complications of severe stress include multiple stress ulcers in the stomach that frequently bleed and infection if stress is prolonged; renal failure is seen with severe stress.
5. Maladaptive coping mechanisms frequently cause additional stress such as obesity and hypertension, malnutrition, or alcoholism.

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Chapter 13: Pain

Answer Key - Study Questions

1.
 - a. Nociceptors are free sensory nerve endings that respond to chemical, thermal, or physical stimuli.
 - b. C fibers are unmyelinated sensory nerve fibers that transmit impulses slowly, with pain perceived as dull and aching.
 - c. The spinothalamic tract is a bundle of sensory nerve fibers conducting afferent pain impulses up the spinal cord to the brain.
 - d. The parietal lobe is the somatosensory area of the brain where pain characteristics and location are identified.
 - e. The reticular formation includes the reticular activating system, which determines awareness of the brain to sensory stimuli.
 - f. Endorphins and enkephalins are opioids or morphine-like substances produced in the CNS that can naturally block the pain pathway.
2. Referred pain is perceived in an area some distance away from its origin; for example, cardiac pain is perceived in the left arm and shoulder.
3. Acute pain is sudden and severe, often temporary, and usually arises from a specific cause and responds to appropriate treatments. Intractable pain may have an unknown cause and does not respond to the usual methods of treatment. It is chronic and may be disabling.
4. Factors that can alter the perception of and response to pain are prior experience with pain, age, physiologic status, the cause of pain, anxiety or fear, and conditioning.
5. Possible methods of pain control include analgesics, anti-inflammatory drugs, anesthetics, application of heat or cold, massage, surgery, acupuncture, relaxation techniques, hypnosis, and distracting activities.

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Chapter 14: Substance Abuse

Answer Key - Study Questions

1. Predisposing factors include increased acceptance and publicity regarding drug use socially and in sports or as a solution for problems; long-term use of narcotics for pain, psychological factors, and avoidance behavior; increased availability, on prescription, and illegally.
2. Signs of substance abuse include altered behavior or personality, poor work or school attendance and performance, decreased awareness of people and environment, inadequate personal care, weight loss, wearing long-sleeved shirts in hot weather, any criminal activity.
3. Substance abuse can lead to cardiovascular disorders, heart attacks, fetal alcohol syndrome, liver damage, hepatitis B, and human immune deficiency virus infection.
4. Withdrawal can be assisted in a facility, and serious effects such as convulsions or changes in blood pressure can be prevented.

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Chapter 15: Environmental Hazards

Answer Key - Study Questions

1. A reduction in the use of pesticides and insecticides would mean less contamination of food, water, and air; less risk of toxic effects in humans or animals immediately and years later; less interference with ecosystems; and less risk of dangerous mutations of microbes or insects.
2. Inhaled particles include asbestos, aluminum, silica, or dust; gases include sulfur dioxide and hydrogen sulfide.
3. Potential effects of chemicals on respiratory tissue are inflammation, congestion, damage to cilia, loss of elastic fibers, fibrosis, obstructions, and carcinogenesis.
4. The sun is a source of UV radiation that causes cumulative mutations in the skin cells with repeated exposure.
5. Machines, drills, and loud music are sources of excessive noise.
6.
 - a. Bite: Animal saliva carrying the rabies virus causes nerve paralysis.
 - b. Hypersensitivity: Bee or wasp stings cause anaphylaxis.
 - c. Injection of toxin: Venom from a snake causes nerve paralysis.
7. A carrier is an asymptomatic person in whom the microorganism is present but produces no symptoms. The carrier can transmit the infection to others.
8. Disease is spread by ingestion of food or water contaminated by microorganisms in the feces of an infected person (e.g., gastroenteritis due to *Salmonella* or *Escherichia coli*).

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Chapter 16: Introduction to Basic Pharmacology and Selected Therapies

Answer Key - Study Questions

1. A generic name is an official name assigned to a specific drug, regardless of manufacturer; the trade name is assigned to a particular drug by the manufacturer; there may be many brand names to match one generic name.
2. Dosing is based on maintaining an effective blood level; if a drug is quickly excreted, it must be taken more frequently. But if a drug is stored for a time in certain tissues or bound to protein in the plasma, the effects are more prolonged.
3. a. Advantages of oral medications are inexpensive easy administration, and portability; disadvantages are that some medication is lost in the digestive tract, has a slow onset, may have an unpleasant taste, or may irritate the stomach.
b. IV administration acts immediately, it can be used when the patient is unconscious, and no drug is lost during administration; however, the medication cannot be retrieved if an overdose occurs. Other disadvantages include expense, the necessity of special equipment and technique, and a short package life.
4. a. Synergism causes more effect than expected (e.g., overdose), which can be dangerous.
b. When intended, synergism can reduce the dose and side effects of an individual drug; it may be more effective if each drug acts at different points.
5. Some drug may be inactivated in the digestive tract or liver and excreted.
6. a. An occupational therapist could best assist with a wheelchair.
b. A speech-language pathologist could best assist a child with a swallowing problem.
7. Osteopathic physicians are licensed medical doctors who also use manipulations of the musculoskeletal system in practice.
Chiropractors do not use traditional drugs or surgery, but they work through the nervous system.
8. Acupuncture, a Chinese treatment, involves fine needles inserted at selected acupoints on the meridians to balance energy in the body.
Shiatsu is a Japanese therapy that uses the thumbs or other parts of the body to apply pressure to tsubo (acupoints) over the whole body.

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Chapter 17: Blood and Lymphatic Disorders

Answer Key - Study Questions

1. Oxygen: cell metabolism and energy; hormones: cell metabolism; glucose, amino acids, and other nutrients: cell growth and reproduction; cells—red blood cells: oxygen, white blood cells: defense, thrombocytes: clotting; clotting factors (e.g., prothrombin): hemostasis; wastes (e.g., carbon dioxide, urea, lactic acid): to be removed; buffers: maintain serum pH; electrolytes (e.g., sodium): fluid balance, metabolism; and antibodies and phagocytic cells: remove foreign material.
2. Individual blood type depends on which antigens are on the red blood cells. The plasma contains antibodies, which may not be compatible with another person's blood. For example, a person with type A blood (with A antigens on the red blood cells) has anti-B antibodies in the plasma and therefore would have an antigen-antibody reaction if the person received type B blood. Rh incompatibility is also possible.
3. Blood clotting is impaired by a deficit of platelets or other clotting factors, lack of vitamin K, liver failure, or interference with the clotting process by drugs or other agents.
4. Gastritis leads to atrophy of the gastric mucosa and glands and less secretion of intrinsic factor in the stomach. Vitamin B₁₂ is not absorbed in the ileum unless intrinsic factor is available for transport.
5. Secondary polycythemia could develop as compensation in cases of VSD, CHF, and COPD.
6. DIC develops as a complication when the clotting process is activated, using up available clotting factors, eventually resulting in hemorrhage. Signs are purpura, decreased BP, and thrombocytopenia.
7. Proliferation of malignant cells in the bone marrow causes pressure on nerves in the surrounding rigid bone.
8. Hodgkin's lymphoma is characterized by T lymphocyte and Reed Sternberg cells and painless nontender cervical lymph nodes; it spreads to adjacent lymph nodes. Non-Hodgkin's lymphoma is characterized by multiple involvement of scattered lymph nodes; multiple myeloma: plasma cells (B lymphocytes) in bone marrow, multiple tumors in vertebrae, skull, ribs, pain, and pathologic fractures.

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Chapter 18: Cardiovascular Disorders

Answer Key - Study Questions

1. Mechanisms to increase cardiac output include increased cardiac contractility (force), a moderate increase in cardiac rate, increased venous return, and increased blood volume.
2. Blood flows backward into the left atrium during ventricular systole, and less blood enters the aorta.
3.
 - a. High elastic content in the aorta allows for expansion during systole and recoil during diastole and prevents extreme high or low blood pressure
 - b. Smooth muscle controls peripheral resistance by vasoconstriction, capacity of cardiovascular system and blood pressure, and distribution in the body.
 - c. The large surface area for the liver allows for exchange of nutrients and removal of wastes; in the lungs, extensive capillaries permit gas exchange; valves in veins prevent backflow and assist venous return.
4. Angina results from a temporary increase in the demands on the heart and the presence of insufficient blood to supply the heart muscle (in some cases because of partial obstruction of the coronary arteries). Chest pain ceases when the demands decrease. Myocardial infarction involves necrosis of myocardial tissue resulting from total obstruction of a coronary artery; chest pain is usually more severe and persistent.
5. Call for assistance and transport person to the hospital. Treat as for shock, and give oxygen if available.
6. Damaged arterial walls (due to fibrosis, calcification, and presence of atheroma) cannot respond to drugs and dilate.
7. Cardiac dysrhythmias may be caused by inflammation or scar tissue in the myocardium (may or may not involve conduction fibers), electrolyte imbalances (particularly potassium), hypoxia, or drug toxicity (e.g., digoxin).
8. PVCs are additional cardiac contractions caused by an ectopic focus of irritability outside the conduction pathway or a reentry mechanism in the conduction fibers. Occasional PVCs do not affect heart function, but increased numbers of them tend to reduce output and may progress to fibrillation and cardiac arrest. Heart blocks result from interference with passage of the stimulus in the AV node or bundles and cause the heart to delay or miss a contraction. This decreases cardiac output and can become serious if total block occurs, and there is a long delay before the ventricles contract.
9. Individual answers will vary.
10. Stress increases the demands on the heart, causing an increased heart rate. It could cause congestive heart failure.
11. Inflammation causes fibrous scar tissue on valves that shrinks or fuses the cusps, narrowing the opening.
12. Secondary polycythemia could develop as compensation with VSD, CHF, and COPD.
13. Arterial walls are damaged, particularly in the brain, kidneys, and retina. Atherosclerosis or aneurysms are predisposed by damaged arteries. Congestive heart failure or strokes may develop.
14. Intermittent claudication refers to pain in the leg developing with exercise because partial

occlusion of the arteries in the leg results in insufficient blood supply to satisfy the demands of exercise, and ischemic pain occurs.

15. The sympathetic nervous system is stimulated, resulting in restlessness, cutaneous vasoconstriction (pale, cool skin), diaphoresis (moist skin), tachycardia (to increase blood pressure), and thirst. Oliguria results from renal vasoconstriction.
16. With pain, fluid and protein shift from capillaries to interstitial fluid because of inflammation.

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Chapter 19: Respiratory Disorders

Answer Key - Study Questions

1. Goblet cells secrete mucus to trap inhaled foreign particles before they can damage the lungs, and cilia sweep any secretions and foreign particles upward from the lungs to be coughed out.
2. a. They raise and extend the ribs and sternum to enlarge the thoracic cavity.
b. Quiet expiration involves relaxation of the diaphragm and external intercostals, but no energy expenditure.
Forced expiration requires energy to contract many muscles—the internal intercostals, abdominal muscles, and neck and shoulder muscles.
3. a. Chemoreceptors in the medulla respond to elevated carbon dioxide and decreased pH (CSF), and chemoreceptors in the aortic arch and carotid bodies respond to low oxygen levels and decreased pH (arterial blood).
b. Carbon dioxide creates the primary respiratory drive.
4. Carbon dioxide forms carbonic acid, decreasing serum pH.
5. a. Carbon dioxide is transported primarily as bicarbonate ion, but some is transported as carbonic acid, or as carbaminohemoglobin or is dissolved in plasma.
b. Carbon monoxide can displace oxygen from hemoglobin.
6. Chronic hypoxia due to respiratory impairment causes tachycardia and secondary polycythemia. Chronic hypercapnia leads to increased renal excretion of acids and increased production and reabsorption of bicarbonate with elevated serum bicarbonate levels. Respiratory rate increases but is not effective compensation. Also respiratory control depends on hypoxic drive.
7. Young children are more vulnerable because the airway is very small and easily obstructed, and the walls have less cartilage and therefore collapse more easily. With croup, the laryngeal mucosa is edematous and filled with exudate, causing obstruction. With epiglottitis, the epiglottis is swollen and cannot swing open, often leading to obstruction of the airway.
8. a. *Mycoplasma* or influenza virus type A or B cause primary atypical pneumonia.
b. Inflammation is interstitial (around the alveoli) in viral pneumonia. Pneumococcal pneumonia results in exudate (including red blood cells) that fills the alveoli. Both processes impair the diffusion of oxygen.
9. a. A positive tuberculin test indicates prior exposure to mycobacterium and formation of antibodies but does not indicate whether active disease is present. The test is also positive if the person has been immunized with bacille Calmette-Guérin vaccine (BCG).
b. Tuberculosis may be contagious with cavitation when erosion into the bronchi and blood vessels promotes spread of organisms in the sputum and to other parts of the body.
c. Wear protective mask and gloves and wash hands frequently. Careful use of disinfectant is effective against mycobacterium (and spores) on all surfaces and equipment. Maintain adequate sterilization for resistant organisms and careful removal of tissue and any disposable equipment. Ensure good ventilation in the room. Encourage the patient to cover the mouth and nose when coughing and wash hands after coughing or sneezing. In some patients, it may be best to postpone treatment until sputum tests are negative or acute

problems have been resolved.

10. a. *Bacillus anthracis* has been identified and classified as a potential terrorist bioweapon.
b. Filtration devices for those working with anthrax and early identification and treatment of infection can prevent development of the disease, which often results in death.
11. Sleep apnea results when the pharyngeal tissues collapse during sleep leading to repeated and momentary cessation of breathing. This repeated/momentary cessation of breathing can result in chronic hypoxia, fatigue, pulmonary hypertension, congestive heart failure, cerebrovascular accident, and erectile dysfunction due to complication of low oxygen levels.
12. a. Fibrosis and thickening of the bronchial wall, edema of the mucosa, increased mucous secretions, and decreased ciliary action contribute to obstruction.
b. Partial obstruction causes air trapping as air moves in with inspiration but cannot pass obstruction during passive expiration. Atelectasis occurs when total obstruction results from bronchospasm, mucosal edema, or thick mucus. Air diffuses out of the alveoli and cannot be replaced.
c. Obstruction causes decreased air flow and hypoxia. Initially, respiratory alkalosis occurs because of increased respiratory rate and carbon dioxide diffuses easily.
d. Increased obstruction leads to air trapping and retention of carbon dioxide. More atelectasis and greater hypoxia result in anaerobic metabolism and additional lactic acid production. Increased respiratory muscle effort and stress response add metabolic acid levels.
13. a. Obstructions and loss of elasticity lead to air trapping and overinflated lungs, resulting in the ribs becoming fixed in an inspiratory position.
b. Expiration and removal of carbon dioxide is difficult because alveoli do not recoil, and obstructions partially block expiratory air flow. Forced expiration often collapses damaged bronchiolar walls, resulting in more air trapping in alveoli.
c. (1) Cor pulmonale develops when alveolar destruction and reflex pulmonary vasoconstriction due to hypoxia cause pulmonary hypertension or increased resistance to the pumping action of the right ventricle; (2) Secondary polycythemia results from increased erythropoietin secretion stimulated by chronic hypoxia.
14. a. Meconium ileus is an intestinal obstruction in the newborn by very thick, sticky meconium (a greenish-black mass of mucus, cell debris, and bile accumulated during fetal development and excreted after birth).
b. In the lungs airways are obstructed by highly viscous mucus, causing hypoxia and retained secretions. Frequent infections and diffuse atelectasis occur. In the liver, mucus obstructs the bile ducts in the liver, causing backup of bile and inflammation and fibrosis of the liver (cirrhosis) as well as malabsorption problems.
c. Permanent damage can occur in the lungs because frequent infections and diffuse atelectasis damage the tissues, leading to necrosis and fibrosis, emphysematous changes, and bronchiectasis. In the pancreas, obstruction in pancreatic ducts causes backup of pancreatic secretions, resulting in diffuse inflammation and eventual fibrosis of pancreatic tissue.
15. a. The lungs provide the first smaller blood vessels that can trap tumor cells that enter the venous return from many areas of the body, and it is a favorable environment for tumor growth.
b. Systemic signs include weight loss, anemia, and fatigue; local signs are a persistent cough, dyspnea, blood-streaked sputum, and wheezing; Signs related to paraneoplastic syndrome include for example, Cushing's syndrome (increased ACTH), facial edema, easy bruising on the skin, muscular weakness, and increased blood pressure.

- c. Prognosis for lung cancer is poor because early signs, such as cough, are masked by cough due to a predisposing factor (e.g., smoking). Lung cancer is characterized by rapid growth and early metastasis and there is a poor response of many tumors to chemotherapy and radiation.
16. a. Factors predisposing to aspiration are neurologic deficits that interfere with swallowing (e.g., anesthesia); a supine position when eating; congenital anomalies, such as cleft palate; infants and young children putting smooth spherical objects in the mouth; and talking while eating or drinking.
b. Obstruction of airway by solid food, edema, or spasm; massive inflammation in the lungs due to highly acidic gastric contents, fatty foods, and alcohol are potential effects of aspirating vomitus.
17. a. Slow shallow respirations (decreased aeration) and decreased coughing fail to remove secretions due to drugs, pain, and a recumbent position and abdominal distention compressing the lungs predispose a patient to atelectasis following abdominal surgery.
b. Increased dyspnea, tachycardia, tachypnea, chest pain, and asymmetrical chest movements are signs of atelectasis.
18. a. Pulmonary edema causes severe hypoxia because of decreased diffusion of oxygen through increased amounts of interstitial fluid and alveolar fluid.
b. The potential path of a pulmonary embolus follows: Leg vein, external femoral, then common iliac vein; inferior vena cava; right side of the heart; pulmonary artery; branch of pulmonary artery in lungs.
c. A small embolus would have no effect; a very large embolus interferes primarily with pulmonary circulation and cardiovascular function and indirectly with respiration.
19. a. Atelectasis occurs on the affected side. During inspiration, the unaffected lung is compressed by air entering the thoracic cavity, further reducing inspiratory volume. Venous return is decreased by increased pressure in the thoracic cavity, loss of normal respiratory mechanics (bellows action), and kinking of the inferior vena cava due to mediastinal flutter, thus resulting in shock.
b. Covering an open pneumothorax improves oxygen levels through better expansion of the “good” lung and improved venous return.
c. Tension pneumothorax may develop if “valve” effect occurs with covering.
20. a. Loss of rigid chest wall allows flail portion of chest to be drawn inward (low-pressure area) during inspiration, compressing the lung and reducing oxygen diffusion. Possible shunt of air between the lungs leads to decreased oxygen concentration in the alveoli and decreased diffusion. Mediastinal flutter develops, decreasing venous return and oxygenation of blood.
b. Atelectasis does not occur directly with a flail chest injury because there is no penetration or access of atmospheric air into the pleural cavity.
21. a. In the infant respiratory distress results from immature lungs and a deficit of surfactant; in the adult, the damage to lung tissue by chemicals, ischemia, aspiration, and so on contributes to respiratory distress syndromes.
b. Signs of infant respiratory distress are continued rapid respirations, flared nostrils, and chest retractions.
c. Criteria for a diagnosis of respiratory failure are severe hypoxemia (less than 50 mm Hg) and/or severe hypercapnia (more than 50 mm Hg).
22. a. Carbon monoxide (CO) displaces oxygen from hemoglobin causing severe hypoxia.
b. Inflammation and necrosis, and possibly muscle spasm, obstruct the airways.

- c. The rigid eschar (burned tissue) prevents lung expansion.
23. As the “gas bubbles” circulate, they can obstruct blood flow (similarly to thrombi) in various tissues, causing ischemia or necrosis.

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Chapter 20: Digestive System Disorders

Answer Key - Study Questions

- Saliva removes foreign material quickly and contains antibacterial lysozymes and IgA antibodies. Mucus reduces the risk of tissue injury, entry points for organisms. Epithelium is constantly regenerated. Lymphoid tissue traps organisms and foreign material.
 - Normal flora are found in the oral cavity and colon.
 - Gastric secretions have a pH of 2, which activates pepsinogen to pepsin and destroys most microorganisms ingested.
- The liver converts glucose to glycogen and stores it.
 - The liver maintains normal blood glucose levels; synthesizes protein; converts amino acids; produces clotting factors; stores iron and vitamin B₁₂ and vitamins A, D, and K; produces bile to assist digestion and absorption; removes foreign material absorbed from the digestive tract; inactivates and excretes hormones and drugs; converts ammonia to urea for excretion; excretes bilirubin and excess cholesterol; and serves as a blood reservoir.
- In the small intestine carbohydrates are absorbed as monosaccharides, proteins as amino acids, and fats as monoglycerides or free fatty acids.
 - The colon is the major site of absorption of water and electrolytes.
 - Substances absorbed by active transport are glucose and other simple sugars, and amino acids; water is absorbed through osmosis.
 - Active transport requires energy and a carrier system supplied by a healthy cell.
- Reflex through parasympathetic nervous system in sacral spinal nerves is initiated when the rectum is distended; parasympathetic response results in contraction of the rectal wall and relaxation of anal sphincters.
- The enterogastric reflex decreases gastric secretions and delays gastric emptying.
 - An excessively rapid flow of chyme results in incomplete digestion and absorption and excessive loss of water and electrolytes.
- Diarrhea leads to loss of Na⁺, K⁺, and HCO₃⁻.
 - Sodium loss causes fluid imbalance; potassium affects neuromuscular activity, particularly cardiac.
 - In the presence of severe vomiting, serum bicarbonate is below normal; PCO₂ levels are below normal, and serum pH is at the low end of normal—7.35.
- Steatorrhea is characterized by bulky, fatty, foul-smelling stool, associated with malabsorption caused by chronic intestinal inflammation, degenerative changes in the intestinal wall (lack of villi), or lack of pancreatic enzymes or bile secretions for digestion.
- Vasoconstriction causes ischemia, decreased mucous secretions, and breakdown of the mucosa. Motility is decreased, leading to stasis of food and secretions. Increased glucocorticoid levels reduce regeneration of the mucosal cells and increase gastric secretions.
- An H₂ antagonist blocks histamine₂ receptors in the parietal cells of the gastric mucosa, reducing gastric secretions.
- Stricture narrows the esophagus and prevents stretching to allow passage of solid food.
 - Food collects in the diverticulum, causing inflammation of the mucosa and obstruction of the lumen.

11. a. A large meal increases pressure in the herniated pouch.
b. Lying down increases abdominal pressure upward on the stomach and promotes the reflux of stomach contents into the esophagus.
12. a. Inflammation or toxins or increased secretions increase motility that limits absorption.
b. Decreased absorption of water results in dehydration. Loss of bicarbonate ions leads to metabolic acidosis.
13. a. Peptic ulcers are slow to heal because of the difficulty of isolating ulcers from irritants (food and secretions) to allow healing; in addition, the patient is unable to maintain treatment for a long period and predisposing factors remain.
b. A gastric ulcer occurs as a small deep crater with well-defined edges, frequently located in the pyloric antrum. Gastric cancer appears as a larger crater with irregular edges and is often found on the greater curvature.
c. A large volume of chyme enters the intestine at one time, and additional fluid shifts from the blood into the intestine, resulting in distention of the wall and cramping.
14. a. Cholecystitis is inflammation of the gallbladder.
b. High cholesterol intake, obesity, and oral contraceptives lead to high cholesterol levels. Hemolytic anemia results in high bilirubin levels.
c. The path of a gallstone may be as follows: Bile canaliculi in the liver to small bile ducts (obstruction has little effect unless widespread) to the right/left hepatic ducts to the common hepatic duct (obstruction causes backup of bile into the liver, leading to jaundice), then through the cystic duct to be stored in the gallbladder. When stimulated by food intake, the gallbladder contracts, bile flows out of the cystic duct (stone here causes biliary colic as the gallbladder and duct contract to force the stone along) into the common bile duct (backup of bile into the liver), which opens into the duodenum at the duodenal papilla (backup of bile may cause pancreatitis as well as liver dysfunction). Jaundice develops whenever bile backs up into the liver and eventually into the blood. Obstruction of the common hepatic duct or common bile duct affects digestion and absorption.
15. a. Posthepatic jaundice is caused by gallstones, cancer of the liver or pancreas, or congenital biliary atresia; it leads to increased serum conjugated bilirubin and total bilirubin.
b. Acute hepatitis manifests as hepatomegaly and dull pain in the upper right quadrant, anorexia and nausea, headache, and jaundice.
16. Chronic hepatitis may affect liver tissue with continued low-grade inflammation and necrosis with formation of fibrous scar tissue intermingled with nodules of regenerated hepatocytes and loss of organization. Fulminant refers to severe and rapidly progressive hepatitis, leading to liver failure.
17. a. Portal or Laënnec's cirrhosis, caused by alcohol abuse, has three stages—fatty liver, alcohol hepatitis or inflammation and necrosis, and end-stage disease or cirrhosis with fibrosis; biliary cirrhosis is due to obstruction of bile flow causing inflammation and fibrosis; and postnecrotic cirrhosis is due to inflammation and fibrosis resulting from toxins.
b. Nausea results from inadequate bile for digestion and absorption, or ascites, or abnormal serum electrolytes; pain is caused by stretching of the liver capsule; esophageal varices: scar tissue in the liver causes portal hypertension, backup of blood from gastric veins into anastomosing esophageal veins; hepatic encephalopathy: failure to convert ammonia into urea and accumulation of other toxic wastes impairs function of CNS.
18. Cancer can obstruct the bile ducts, causing jaundice and digestive problems, and it can obstruct the blood vessels, causing portal hypertension and ascites.

19. Neurogenic shock results from pain; hypovolemic shock results from extensive inflammation and erosion of blood vessels.
20.
 - a. Inflammation of the small intestine interferes with absorption, either by active transport or diffusion. Secretion of intestinal enzymes may be impaired.
 - b. Blood loss results in loss of iron, which normally remains in the body to be recycled to produce more hemoglobin. Only a small proportion of iron is absorbed from dietary intake; therefore, any loss results in a deficit.
 - c. Inflammation and ulceration slowly erode the intestinal wall and extend into the adjacent tissue, with fibrous tissue forming along the pathway, creating a passageway or tunnel between two areas (e.g., two loops of intestine or intestine and bladder).
 - d. Crohn's disease is characterized by intermittent diarrhea and partly formed stools that may contain occult blood. Ulcerative colitis is marked by frequent loose stools with frank blood and mucus.
21. Acute appendicitis is characterized by obstruction of the appendiceal lumen, inflammation and increased pressure, compression of blood supply in the appendiceal wall, increased permeability and necrosis of wall with escape of bacteria, localized peritonitis, rupture of appendiceal wall, and generalized peritonitis.
22.
 - a. Low-residue diet leads to decreased fecal bulk and constipation, raising the pressure inside the intestine and causing outpouching of the mucosa at weak points in the muscle layers.
 - b. Inflammation can cause obstruction of the lumen.
23. Early signs for colorectal cancer include tarry stool (melena) or presence of occult blood, for cancer in ascending or right colon and iron deficiency anemia. Obstructive signs such as ribbon-shaped stool, feeling of discomfort relieved by defecation, or reddish blood on surface of stool are signs for cancer in the sigmoid colon or rectum
24. Usually detection is late, and tumor has already metastasized.
25. Volvulus is a loop of intestine twisted on itself, with a knot at the neck, obstructing flow of contents. Paralytic ileus is marked by lack of innervation or propulsive peristaltic movements. Tumor may protrude into the lumen or encircle the wall, narrowing the lumen.
26. Pressure increases inside the lumen, resulting in increased secretions inside the intestine. Fluid is not absorbed, particularly with small intestine obstructions, and much fluid is lost by vomiting.
27.
 - a. Peritoneum or omentum adheres to an area of inflammation, localizing the problem.
 - b. The large expanse of moist membrane promotes spread of infection or irritants along it. High vascularity promotes movement into the blood of microorganisms.
 - c. Hypovolemia occurs because of the shift of fluid from many blood vessels in the peritoneal membrane and intestinal wall. Vomiting also causes fluid loss. Severe pain causes neurogenic shock. Septic shock may be present in persons with gram-negative infection.

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Chapter 21: Urinary System Disorders

Answer Key - Study Questions

1. Blood flow through the kidney proceeds in this order: renal artery, lobar arteries, interlobar artery, arcuate artery, interlobular artery, afferent arteriole, glomerular capillaries, efferent arterioles, peritubular capillaries, interlobular veins, arcuate vein, interlobar vein, lobar vein, and renal vein.
2. Bowman's capsule, filtrate forms; proximal convoluted tubule, major site of reabsorption of water, glucose and other nutrients, and electrolytes; loop of Henle, reabsorption of Na⁺, Cl⁻, and water; proximal convoluted tubule, secretion of acids, drugs, reabsorption of bicarbonate ion, and adjustment of acid-base and electrolyte balances (aldosterone); collecting duct, absorption of water (ADH); renal calyces and pelvis; ureter; bladder, storage; urethra, elimination.
3. Vasoconstriction and reduced blood flow stimulate renin secretion, activating angiotensin, a systemic vasoconstrictor, and stimulating aldosterone secretion, which increases blood volume, resulting in increased blood pressure and decreased urine output.
4. The signs of cystitis—bacteriuria and pyuria, often dysuria, frequency and urgency, and lower abdominal discomfort—are present with both conditions. Pyelonephritis causes additional signs—urinary casts, flank pain, and more marked systemic signs such as fever, headache, and anorexia.
5. Pyelonephritis is an infection commonly caused by *Escherichia coli*, with purulent exudate in the renal pelvis and medulla that reduces blood flow and urine flow.
Acute poststreptococcal glomerular nephritis results from an abnormal immune reaction to antibodies formed against certain strains of group A beta hemolytic streptococcus. An antigen-antibody complex is deposited in the glomerulus, causing an inflammatory reaction that increases glomerular permeability and decreases GFR.
Nephrotic syndrome may be idiopathic or secondary to a variety of disorders, systemic and local. Large amounts of protein leak through the glomerular capillaries, causing albuminuria and hypoalbuminemia. Elevated serum lipids and lipiduria are present.
6. Changes in urine pH can decrease solubility of such solutes as calcium or uric acid. Infection causes increased cell debris, which may form a focus for stone formation.
7. Acute renal failure results suddenly when greatly reduced blood flow or toxins cause the tubular epithelium to swell and become necrotic, blocking the tubules, or when kidney disease obstructs glomerular blood flow or filtrate flow. The damage may be reversible if the primary factor can be resolved. Chronic renal failure involves the gradual irreversible destruction of kidney tissue by a disease process in the kidney, such as infection or inflammation, and the replacement by fibrous tissue until filtration of the blood is insufficient to meet the metabolic needs of the body.
8. Acidosis and increased nitrogen wastes depress the CNS. Severe anemia reduces the oxygen level. High blood pressure may cause cerebral edema. Electrolyte imbalance impairs neuromuscular function.
9. Healing is delayed and there is an increased risk of infection because of anemia and protein deficiency, as well as some risk of hepatitis B and HIV infection. Prophylactic antibiotics are given to prevent infection at the implant site. If dental work is done immediately

following hemodialysis there is increased bleeding caused by the anticoagulants used (check clotting times). Minimal doses of drugs such as analgesics are given. Check the blood pressure (hypertension is common) and fatigue level of the patient.

10. Substances that should pass from the blood into the dialyzing fluid are wastes such as urea, creatinine, and acids; excess levels of electrolytes such as sodium and potassium; excess amounts of water; and drugs.
11. Increased protein metabolism increases serum urea and creatinine levels, causing CNS depression.
12. Infection increases metabolic rate and production of metabolic wastes, which the kidney cannot excrete. A respiratory infection decreases the elimination of carbon dioxide (acid) through the lungs and increases production of lactic acid because of an oxygen deficit, thereby increasing acidosis.
13. Protein deficiency reduces growth; lack of vitamin D impairs calcium metabolism needed for bone and tooth development; anemia decreases growth as well as activity level for bone and muscle development. Chronic illness reduces stimulation and development related to social and intellectual activities.
14. Frequency occurs with cystitis because the inflammation and irritability in the bladder stimulate the reflex as soon as a little urine accumulates. With renal insufficiency, frequency results because increased urine volume (dilute) fills up the bladder quickly.
15. Urinary retention is related to dysfunction of the bladder and an inability to contract and empty it. Anuria occurs when the kidneys are unable to produce urine.

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Chapter 22: Acute Neurologic Disorders

Answer Key - Study Questions

1.
 - a. The subdural space has no content but potential space; the subarachnoid space contains the CSF; and the dura mater contains the venous sinuses.
 - b. Auditory association area surrounds the primary auditory cortex in the temporal lobe and interprets auditory impulses; prefrontal area is located in the cortex in the anterior part of the frontal lobe; it controls behavior, personality, motivation, and intellectual functions; Broca's area is located at the base of the premotor area in the left frontal lobe; it is the process area for language and speech; the cerebellum is dorsal to the pons and medulla under the occipital lobe; it coordinates balance and equilibrium and controls coordinated movements; the RAS is part of the reticular formation in the brainstem; it controls the wakefulness of the cerebral cortex and awareness of sensory stimuli.
 - c. See Tables 22-2 and 22-3 and add the results of dysfunction. For example, the function of the occipital lobe is vision; its damage or dysfunction results in blindness.
2. See Figure 22-12A.
3.
 - a. The circle of Willis provides anastomoses or an alternate source of blood if a major artery is obstructed.
 - b. Obstruction would result in infarction of the medial part of left frontal lobe, paralysis of the contralateral leg, and impaired intellectual function.
 - c. Neurons are constantly functioning, requiring energy, and have little storage capacity for required nutrients.
4.
 - a. A spinal cord tract is a bundle of nerve fibers connecting a specific source to a specific destination that conducts the same type of impulses (e.g., corticospinal tracts are efferent fibers from the motor cortex to the lower motor neurons in the spinal cord and are concerned with voluntary movements).
 - b. Upper motor neurons have cell bodies in the motor cortex of the frontal lobe and initiate voluntary movement in a specific location. Lower motor neurons have cell bodies in the spinal cord and control the impulses going to specific skeletal muscles.
 - c. It is the site of intermingling of spinal nerves, providing the peripheral nerves with nerve fibers from several spinal segments.
 - d. An acquired reflex controls body position without conscious effort (e.g., riding a bicycle).
5. The SNS is located in the thoracic area of the spinal cord; stimulation of the SNS increases cardiovascular activity, stimulates the adrenal medulla, activates the stress response, and suppresses digestive activity.
The PNS is located in the cranial nerves and sacral spinal nerves; it increases digestive tract secretions and motility, controls micturition and defecation reflexes, and slows heart rate and contractility.
6.
 - a. With deep coma, there is loss of reflexes; no responses; fixed dilated pupils; and a slow, irregular pulse.
 - b. Left-sided hemiplegia would result from right frontal lobe damage; receptive aphasia would result from left temporal lobe damage (Wernicke's area); and loss of hearing from auditory nerve damage or temporal lobe damage.

7.
 - a. Visual signs of increased ICP include papilledema (congestion and edema at the optic disc), ipsilateral dilated pupil that is unresponsive to light, ptosis (droopy upper eyelid), and perhaps hemianopia (loss of part of visual field).
 - b. Stretching of the meninges or large blood vessels causes headache.
 - c. Increasing or widening pulse pressure results from increased systolic pressure due to systemic vasoconstriction, but diastolic pressure increases very little because of slower heart rate and cyclic vasoconstriction in Cushing's ischemic response; pulse and respiration are slow.
8.
 - a. Common signs and symptoms of a frontal lobe tumor are contralateral motor weakness, decreased cognitive function, expressive aphasia, and personality change.
 - b. A parietal lobe tumor produces few signs initially then a sensory deficit as it grows. Much of the parietal lobe has no obvious function.
 - c. A tumor in the occipital lobe would cause hemianopia and general signs; a tumor in the brainstem would cause cranial nerve dysfunction, motor-sensory losses, respiratory irregularities, and general signs of pressure.
 - d. The pressure of tumor causes increased pressure of CSF throughout the brain.
9.
 - a. TIA: An atheroma that partially obstructs a cerebral artery or vascular spasm could cause a transient ischemic attack or when a temporary decrease in blood flow occurs. Signs of dysfunction are short-term. A cerebrovascular accident could result if the atheroma completely blocks blood flow, or if an embolus forms. Tissue necrosis causes permanent damage.
 - b. Atheroma with thrombus that occludes a cerebral or a carotid artery gradually may provide an opportunity for some collateral circulation to develop and cause warning signs. There is likely less permanent damage to brain tissue. An embolus arises from atheroma and causes a sudden obstruction; therefore, there will likely be a larger area of damage in the brain. A hemorrhage causes the most severe damage because of the increased pressure of the blood as well as the abrupt loss of blood supply to the tissues.
 - c. Damage from a CVA can be minimized by maintaining oxygen levels, reducing reflex vasoconstriction and edema, and preventing further thrombi; also rehabilitation, relearning skills, and developing new neural pathways will help in recovery.
10.
 - a. Causative organisms in meningitis are *Escherichia coli* in neonates, *Haemophilus influenzae* in young children, *Neisseria meningitidis* or meningococcus in young adults, and *Streptococcus pneumoniae* in older adults.
 - b. Meningitis causes nuchal rigidity and severe headache because of irritation of the meninges. Brain abscess causes focal signs in addition to general signs of intracranial pressure. CSF contains leukocytes and exerts increased pressure. General signs of infection include leukocytosis and fever.
11.
 - a. Closed head injuries result in brain damage, although no fracture occurs. Hematoma may develop if blood vessels are ruptured. Open head injury may involve penetrating or lacerating injuries or compression of brain tissue, and the blood vessels and meninges are damaged. There is usually more extensive swelling of the brain tissue and increased risk of infection.
 - b. Epidural hematoma is a collection of blood between the dura mater and skull, often resulting from a tear in the middle meningeal artery; loss of consciousness occurs following a brief period of responsiveness.
12.
 - a. In a fall, the spinal cord could be damaged by compression or crushing of the spinal cord by bone; laceration by bone fragments could cause a penetration wound.

b. Inflammation and bleeding cause increased pressure and ischemia, preventing any function, but the effects may be reversible. Spinal shock blocks any responses in the initial period, preventing any assessment of damage.

c. Immediately after injury: flaccid paralysis and loss of sensation below the neck, urinary retention, and loss of defecation reflex (paralytic ileus) because no conduction of impulses and no reflexes occur at or below the level of the injury.

Following the spinal shock period: reflexes below the level of injury return, but no motor or sensory impulses are able to cross the transected area, resulting in spastic paralysis in the legs and trunk, sensory loss, bowel and bladder incontinence, and, in males, reflex erections.

d. A stimulus such as pain from a decubitus ulcer or a distended bladder activates the SNS in a patient with a cervical spinal cord injury. This stimulus does not reach the CNS, nor can central controls inhibit the excessive SNS activity in the chains of ganglia and peripheral nerves. SNS stimulation causes vasoconstriction and greatly increased blood pressure, headache, blurred vision, and sweating. This SNS excitation continues as long as the original stimulus persists. The baroreceptors respond to the high blood pressure through the cardiac center to slow the heart rate (through the vagus nerve from the brainstem). This differs from the stress response, in which tachycardia occurs.

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Chapter 23: Chronic Neurologic Disorders

Answer Key - Study Questions

- Communicating hydrocephalus results when absorption of CSF is impaired because of a defect in the arachnoid villi; the noncommunicating form is caused by stenosis blocking the flow of CSF (e.g., aqueduct).
 - Massive pressure, exudate, or scar tissue from injury or infection blocks CSF flow or damages the arachnoid.
- Myelomeningocele is a developmental error affecting the vertebrae and spinal cord. There is usually motor impairment at and below the level of the protrusion. Communication is not affected unless there is associated hydrocephalus or meningitis.
Cerebral palsy is caused by brain damage due to factors such as hypoxia during fetal development or in the perinatal period, and the effects depend on the site of damage. There is always motor damage, the basis for classifying CP. Communication may be hampered by paralysis, by visual or hearing defects, or by mental retardation.
- The sequence of events in a general tonic-clonic seizure are aura, loss of consciousness, tonic muscle contraction, a cry, clonic convulsions, incontinence, return of consciousness, and sleep.
 - Status epilepticus is recurrent tonic-clonic seizures without recovery between them.
 - Bleeding or inflammation increases the excitability of the surrounding neurons, causing them to fire spontaneously and uncontrollably.
- Multiple sclerosis results from diffuse demyelination of any neurons in the CNS, including motor and sensory neurons and neurons of the autonomic nervous system, in the brain, cranial nerves, or spinal cord. Early signs include visual impairment, diplopia, and weakness in the legs.
Parkinson's disease results from degeneration of the basal nuclei and a deficit of the neurotransmitter dopamine. Early signs include tremors in the hands, muscle weakness, and loss of facial expressions.
- Alzheimer's disease involves atrophy of the cerebral cortex, especially the frontal and temporal lobes, leading to widened sulci and dilated ventricles. Many senile plaques and neurofibrillary tangles occur in the neurons as well as a deficit of acetylcholine. Insidious loss of memory, poor concentration, and loss of problem-solving ability are common early indications. During the late stage, the person does not recognize family or friends, has no awareness of events or surroundings, and cannot function in any basic daily activities (hygiene, dressing).
- Depression is a mood disorder characterized by loss of motivation and energy and difficulty in concentrating. Treatment consists of antidepressant drugs.
Panic disorder is an anxiety disorder and is manifest by periods of extreme fear, heart palpitations, hyperventilation, and sensations of choking. Antianxiety agents or anxiolytic drugs (minor tranquilizers) are used as treatment.
- Herniation of the intervertebral disk is preceded by degeneration or trauma, causing a tear in the annulus fibrosus.
- The protruding nucleus pulposus exerts pressure on the spinal nerve root (sensory fibers),

causing pain.

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Chapter 24: Disorders of the Eye and Ear

Answer Key - Study Questions

1. The sclera functions as a tough protective covering of the eyeball; the cornea is a transparent covering, allowing passage of light rays into the pupil; the lens refracts light rays to provide an accurate image on the retina; the choroid is a vascular structure that provides nutrients to the retina, and pigment in it absorbs light rays; the ciliary process secretes aqueous humor.
2. Acute glaucoma causes severe eye pain, photophobia, a cloudy bulging cornea, and increased intraocular pressure. Chronic glaucoma causes loss of peripheral vision, cupping of the optic disc, and increased intraocular pressure. Cataract causes blurred vision. Detached retina causes expanding dark area in one part of the visual field and flashing lights.
3. Sound is heard when an air wave enters the external auditory meatus; the tympanic membrane vibrates; ossicles (malleus, incus, stapes) vibrate; the oval window vibrates; waves in the fluids (endolymph and perilymph) and movements of the membranes in the cochlea stimulate the hair cells or nerve receptors in the organ of Corti, which converts sound waves to electrical impulses in the auditory branch of cranial nerve VIII; the impulses enter the brainstem and divide; half of the nerve fibers go to the auditory area in the temporal lobe on the same side; half go to the contralateral temporal lobe; impulses are received in the auditory cortex and interpreted in the auditory association area.
4. Adhesions prevent vibration of tympanic membrane or ossicles, or tympanic membrane ruptures and scar tissue prevent vibration.
5. Excess fluid affects movement of hair cells in both cochlea and semicircular canals.

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Chapter 25: Endocrine Disorders

Answer Key - Study Questions

1. Hyperparathyroidism draws calcium from the bones into the blood, resulting in fragile bones.
2. The effects of hypocalcemia on skeletal muscle are twitching, spasm, and tetany (carpopedal spasm); for cardiac muscle, hypocalcemia leads to weakness.
3. Teenagers have changing insulin needs because of growth spurts and hormonal changes; they may have difficulty in maintaining a routine for meals and activities to balance insulin intake; and they may experience peer pressure regarding food intake.
4. Diabetic ketoacidosis is marked by signs of dehydration—thirst, decreased skin turgor, dry oral mucosa, rapid, weak pulse—and of ketoacidosis— deep rapid respirations with acetone breath. Hyperosmolar hyperglycemic nonketotic coma is characterized by signs of dehydration but not ketoacidosis. Both conditions are marked by lethargy and decreasing responsiveness.
5. Diabetes insipidus results in a large volume of dilute urine with no glucose. Diabetes mellitus results in a large volume of urine containing glucose.
6. Hyperthyroidism is characterized by weight loss, increased appetite, hyperactivity, tremors, tachycardia, and diarrhea. Hypothyroidism is indicated by weight gain, loss of appetite, lethargy, bradycardia, and constipation.
7. Glucocorticoids break down proteins and fats (to produce glucose), leading to reduced muscle mass, and they decrease bone formation, leading to decreased bone density and mass.
8. A deficiency of mineralocorticoids leads to severe dehydration and decreased blood pressure. Deficiency of glucocorticoids causes hypoglycemia.
9. Effects of hyperaldosteronism are increased sodium and water retention, hypertension, and edema.

10.

Condition	Hormone Imbalance	Effects
a. Gigantism	Excessive growth hormone in child	increased longitudinal bone growth; very tall but normal proportions
b. Cretinism	Untreated congenital hypothyroidism after birth	Mental retardation, short stature, typical abnormal facie
c. Pheochromocytoma	Benign tumor of adrenal medulla; increased secretion of epinephrine and/or norepinephrine	Intermittent high blood pressure, and tachycardia
d. Myxedema	Severe hypothyroidism in the adult	Puffy face, lethargy, mental dullness, cold intolerance, and weight gain
e. Acromegaly	Increased levels of growth hormone after epiphyseal plate is closed	Thickening of bones and soft tissue in hands, feet, skull, increased size of hands, and headache
f. Diabetes insipidus	Deficit of antidiuretic hormone	Polyuria, and thirst

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Chapter 26: Musculoskeletal Disorders

Answer Key - Study Questions

- The endosteum is the lining of the bone marrow; it contains osteoblasts.
 - The medullary cavity is the spongy bone in the center of bones containing marrow; it is either red or yellow (fat).
 - Diaphysis is the shaft, or elongated central portion, of a long bone made up of compact bone surrounding the medullary cavity.
- Irregular bones have unique shapes, such as the vertebrae, and some of the facial bones.
- In adults, red bone marrow is found in the sternum, ribs, vertebrae, cranium, and hip bone (iliac crest). Red bone marrow is the site of hematopoiesis (production of blood cells).
- Adenosine triphosphate is required. It is derived from glucose and stored glycogen during active muscle contraction and from fatty acids in relatively inactive muscle. Prolonged exercise requires anaerobic respiration.
 - Blocking agents prevent stimulation of muscle by acetylcholine; therefore, no muscle contraction occurs.
 - Anabolic steroids increase protein synthesis, increase size of muscle cells, and augment muscle mass and strength.
 - Tendon attaches muscle to bone, and it is formed by extension of tough connective tissue covering the muscle (perimysium).
 - It is replaced by fibrous scar tissue.
- The structures that stabilize and support a joint are the fibrous articular capsule covering the joint, ligaments that strap a joint, and meniscus or small cartilage that prevents excessive movement of the bone.
 - Amphiarthroses, consisting of fibrocartilage, with only slight movement is possible.
 - The origin of a muscle is the fixed bone to which the muscle is attached.
- In a compression fracture the bone is crushed into many fragments; with a pathologic fracture, the bone spontaneously breaks at a point already weakened by disease; and in a spiral fracture, the break line curves around the bone like an S (the result of an injury).
 - Procallus is the initial bridging cartilage across a fracture site; it is not strong enough to bear weight. Bony callus is calcified bone that forms a collar and fills the gap; it is able to bear weight.
- A strain is a tear in a tendon, causing inflammation and swelling; it reduces strength and range of movement. Subluxation is partial dislocation of a bone at a joint, with loss of part of the contact between the two bone surfaces. Swelling, deformity, and limited movement result.
- Osteoporosis is loss of bone matrix and mineralization, leading to decreased mass and density. Osteomalacia is soft bone, resulting from lack of calcification during bone formation. Paget's disease is excessive bone breakdown and replacement by fibrous tissue, predisposing to pathologic fracture.
- Muscle tissue is replaced by fibrous or fatty tissue, leading to increased mass or pseudohypertrophy.
 - The defect is transmitted on the X chromosome.

- c. The initial weakness appears in the lower body, whereas the arms remain strong.
10. a. In rheumatoid arthritis, the synovial fluid is cloudy and contains leukocytes and RF factor.
- b. In gout, it contains urate (uric acid) crystals.
 - c. In septic arthritis, it contains microorganisms and WBCs.
 - d. In osteoarthritis, it may contain fragments of cartilage.
11. Calcification of costovertebral joints, fixation of ribs, and kyphosis prevent deep inspiration. The head is bent forward and down, interfering with eating and ventilation

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Chapter 27: Skin Disorders

Answer Key - Study Questions

1. The structure of a hair follicle is an indentation in the skin, lined with epithelial cells from the base of which a hair grows. A sebaceous gland opens into the hair follicle and a smooth muscle is attached.
2. Resident flora are present on the skin in all areas but are more numerous in hairy areas. They may vary in constituents in different areas and are found deep in hair follicles and glands as well as on the surface.
3. Nerves and blood vessels of the skin are found in the dermis.
4. The skin acts as a mechanical barrier to passage of foreign material, maintains body temperature, prevents fluid loss from the body, responds to many sensory stimuli, and synthesizes vitamin D.
5. A papule is a small, firm, raised red lesion; an ulcer is a cavity into the dermis, resulting from necrosis; a fissure is a deep crack or tear in the skin.
6. They reduce the immune response, response to allergens, and inflammatory response (e.g., contact dermatitis, eczema).
7. Allergic dermatitis results from a type IV hypersensitivity response to an allergen at the site of contact. Irritant dermatitis is a direct inflammatory response to a chemical.
8.
 - a. Shingles is the recurrence of varicella virus that causes a painful vesicular rash unilaterally along the path of a spinal or cranial nerve.
 - b. With a boil, *Staphylococcus aureus* causes infection in a hair follicle and surrounding dermis, causing a hard, red, painful raised lesion filled with purulent exudate.
 - c. Scabies is caused by a mite, *Sarcoptes scabiei*, that burrows into the epidermis to lay eggs, causing a tiny brownish line, perhaps with vesicles, that is highly pruritic.
 - d. Scleroderma has an unknown cause, but the skin becomes tight, hard, and shiny and is immovable over the face or body.
9. Contagious skin disorders include scabies, impetigo, herpes simplex, shingles, tinea, and pediculosis.
10. Avoid exposure to the sun or ultraviolet light.
11. The antibodies remain on the mast cells, waiting for the next exposure to the antigen.
12. A furuncle has a thick yellowish purulent exudate; herpes simplex produces a clear, watery exudate.
13. Surveillance and destruction of abnormal cells (neoplastic changes) by the immune system are reduced; therefore, cancer develops more easily.
14.
 - a. In scabies, the burrows contain waste from mites, in addition to tissue damage, causing irritation.
 - b. In pediculosis, the bites release irritating saliva into the skin.
 - c. With contact dermatitis, an allergen causes an inflammatory reaction and the release of histamine.

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Chapter 28: Reproductive System Disorders

Answer Key - Study Questions

- The scrotum is a sac outside the abdominal cavity posterior to the penis that contains the testes.
 - The spermatic cord carries blood vessels, lymphatics, and nerves from the abdominal cavity to the testes.
 - The prostate gland surrounds the urethra at the base of the bladder and produces alkaline secretions for semen.
- Testosterone is responsible for maturation of sperm; secondary sex characteristics—deep voice, hair growth, and external genitalia; it also promotes protein synthesis, skeletal muscle development, and erythropoiesis.
- With hypospadias, the urethra opens on the ventral surface of the penis, interfering with normal urine flow and sexual function.
 - Cryptorchidism is characterized by impaired spermatogenesis and infertility and possible later development of cancer.
- Hormonal changes in estrogen and testosterone levels occur in older men and may cause an imbalance, leading to benign prostatic hypertrophy.
- Signs of BPH include difficulty with urination—hesitancy, dribbling, frequency, recurrent infections.
- Prostatic cancer metastasizes in bone first, pelvic lymph nodes, lungs, and liver; testicular cancer metastasizes in iliac lymph nodes, mediastinal lymph nodes, lungs, liver, and brain.
- A significant effect of cystocele is recurrent cystitis caused by incomplete bladder emptying.
- Endometriosis is characterized by severe inflammation resulting from shedding of endometrium and blood outside the uterus, often inside the abdominal cavity and no drainage pathway.
 - Primary dysmenorrhea results from excessive prostaglandin released during monthly endometrial shedding.
- Allows direct entry of any microorganisms from the fallopian tubes into the peritoneal cavity, extending infection.
- The outer layer of the uterine wall, perimetrium, is parietal peritoneum, a serous membrane; myometrium is smooth muscle; endometrium consists of two layers, the functional layer that responds to hormones, proliferating in preparation for implantation and shedding at menses, and the underlying basal layer, which regenerates the functional layer during each cycle.
- Thick epithelium, acidic pH of secretions (during reproductive years), mucous secretions, and distensibility of vagina reduce risk of trauma to tissues.
- Increased estrogen secretion during the menstrual cycle leads to proliferation of endometrium in preparation for implantation of the fertilized ovum.
- Candida albicans* (a fungus or yeast) causes vaginal candidiasis, in which the mucosa is red, edematous, and pruritic; there is thick, white discharge, and dysuria and dyspareunia occur.
- The inflamed peritoneum or other inflamed structures adhere at infected sites, walling off the infection, but a hidden pocket of infection remains.
- Only proliferative types with atypical epithelial cells may become malignant.

Nonproliferative abnormalities are not precancerous.

16. Endometriosis, fibrocystic breast disorders, dysmenorrhea are painful disorders of the menstrual cycle.
17. Invasive means eroding or infiltrating nearby structures (e.g., cervical cancer). Metastatic refers to cancer that spreads via blood or lymph to distant sites (e.g., breast cancer).
18. a. Cervical cancer is characterized by a Pap test that indicates in situ lesion, discharge, or painless bleeding, and spotting after invasion causes ulceration or inflammation.
b. Uterine cancer is characterized by painless vaginal bleeding, often postmenopausal, as cancer erodes tissue.
c. Ovarian cancer is characterized by abdominal discomfort and change in bowel habits and a large abdominal mass (see Chapter 5).
19. Hormone-dependent disorders include breast cancer, in which growth is increased by estrogen or progesterone; prostate cancer, in which growth is increased by testosterone; and uterine fibroids, for which growth declines when estrogen and progesterone levels decrease.
20. *Chlamydia trachomatis* is a gram-negative bacterium and an obligate intracellular parasite that requires a host cell for reproduction in chlamydial infection
21. Many are asymptomatic or have mild manifestations (e.g., particularly in women the chancre of syphilis is hidden on the cervix and is painless, gonorrhea in women is not evident). STDs may occur in combination (e.g., gonorrhea and chlamydia), masking signs; herpes and syphilis may be transmitted during the latent stages.
22. Manifestations of the secondary stage of syphilis include a red maculopapular rash on the skin, including the palms and soles, malaise; sore throat; and fever.
23. Antiviral agents can block viral reproduction and viral shedding and reduce the duration and severity of the active lesion.
24. a. A chancre in syphilis stage 1 is caused by *Treponema pallidum*.
b. A vesicle in herpes is caused by herpes virus type 2.
c. A gumma in syphilis stage 2 is caused by *T. pallidum*.
d. Purulent exudates in gonorrhea are caused by *Neisseria gonorrhoeae* or in chlamydia by *Chlamydia trachomatis*.
e. Pharyngitis is caused by *N. gonorrhoeae*.
f. A genital wart is caused by condyloma acuminatum or human papillomavirus.