IRDVD
- Animations
- 3D interactive animation of lymphatic system anatomy
- Sickle cell anemia
- Drag-and-drop labeling activity for:
  - Blood typing
  - Lymphatic system anatomy
- Videos
  - Leukemia
  - Phlebotomy
- Inflammation
- Anaphylaxis
- AIDS
- Digital library of all figures from text chapter, labeled and unlabeled
- Test bank with 200 objective questions per chapter plus two short answer questions
- 20 classroom response questions
- PowerPoint presentation for classroom or online utilization

OBJECTIVE 1
Identify and define the combining forms and suffixes introduced in this chapter.
Text pages: 168; 179; PowerPoint slides: 6–8; 65–67

LECTURE NOTES
Blood Combining Forms

<table>
<thead>
<tr>
<th>Combining Form</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>agglutin/o</td>
<td>clumping</td>
</tr>
<tr>
<td>bas/o</td>
<td>base</td>
</tr>
<tr>
<td>chrom/o</td>
<td>color</td>
</tr>
<tr>
<td>coagul/o</td>
<td>clotting</td>
</tr>
<tr>
<td>eosin/o</td>
<td>rosy red</td>
</tr>
<tr>
<td>erythr/o</td>
<td>red</td>
</tr>
<tr>
<td>fibrin/o</td>
<td>fibers, fibrous</td>
</tr>
<tr>
<td>granul/o</td>
<td>granules</td>
</tr>
<tr>
<td>hem/o</td>
<td>blood</td>
</tr>
<tr>
<td>hemat/o</td>
<td>blood</td>
</tr>
<tr>
<td>leuk/o</td>
<td>white</td>
</tr>
<tr>
<td>morph/o</td>
<td>shape</td>
</tr>
<tr>
<td>neutr/o</td>
<td>neutral</td>
</tr>
<tr>
<td>phag/o</td>
<td>eat, swallow</td>
</tr>
<tr>
<td>sanguin/o</td>
<td>blood</td>
</tr>
<tr>
<td>thromb/o</td>
<td>clot</td>
</tr>
</tbody>
</table>

Blood Suffixes

- apheresis  removal, carry away
- cytosis     more than the normal number of cells
- emia         blood condition
- globin       protein

TEACHING STRATEGIES
- Encourage/remind students to add new word parts to flash cards.

Medical Terminology Bee
- Create PowerPoint flash cards of new combining forms and suffixes presented in this chapter; have all students stand and then define word part; if student is correct, he/she remains standing; if student is wrong, he/she sits down; continue until only one student is standing.

LEARNING ACTIVITIES

Worksheet 6A
- New Combining Form and Suffix Handout

Worksheet 6B
- Med Term Analysis

Quiz 6A
- May be used as a worksheet

Text
- Practice Exercises

Student DVD-ROM
- Learning games
- Make flash cards
OBJECTIVE 2
Correctly spell and pronounce medical terms and major anatomical structures relating to blood and the lymphatic and immune systems.

Lecture Notes
Pronunciation for medical terms in this chapter can be found:
- In parentheses following key terms
- In the Audio Glossary on Student DVD-ROM
- In the Audio Glossary at Companion Website

Teaching Strategies
Emphasize to students:
- Importance of correctly spelling terms.
- How sounding out terms can assist in learning how to spell the terms.
Say each new term in class and have students repeat it.

Pop Questions
- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension of spelling strategies.

Learning Activities
Worksheet 6B
- Medical Term Analysis

Terminology Checklist
- Can be used to practice pronunciation using the Audio Glossary as a reference

Text
- Practice Exercises

Flash cards
- Look at definition and write out/pronounce terms

- -penia abnormal decrease, too few
  - -phil attracted to
  - -poiesis formation
  - -stasis standing still

Lymphatic and Immune Systems Combining Forms
- adenoid/o adenoids
- immun/o protection
- lymph/o lymph
- lymphaden/o lymph node
- lymphangi/o lymph vessel
- path/o disease
- splen/o spleen
- thym/o thymus
- tonsill/o tonsils
- tox/o poison

Lymphatic and Immune Systems Suffixes
- -globulin protein

Assessments
Quiz 6A—New Word Parts Quiz
Test Bank—Fill-in-the-Blank questions

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OBJECTIVE 3

Locate and describe the major components, structures, and organs of blood and the lymphatic and immune systems and their functions.


LECTURE NOTES

Blood

- Average adult has about five liters of blood
- Circulates throughout body within blood vessels
- Mixture of cells floating in watery plasma
- Cells are referred to as formed elements; three different kinds: erythrocytes or red blood cells, leukocytes or white blood cells, and platelets
- Cells produced in red bone marrow by process of hematopoiesis
- Plasma and erythrocytes are responsible for transporting substances
- Leukocytes protect body from invading microorganisms
- Platelets play role in controlling bleeding

Plasma

- Liquid plasma composes about 55 percent of whole blood

TEACHING STRATEGIES

Visual Aids

- Use full-size anatomical charts and models to illustrate different types of blood cells and lymphatic system organs.

IRDVD

- See PowerPoint presentation on the Instructor's Resource DVD for a drag-and-drop lymphatic system anatomy activity; display on screen and have students discuss and place labels during class.
- See PowerPoint presentation on the Instructor's Resource DVD for a 3D animation of the lymphatic system organs.

Student DVD-ROM

- Audio Glossary
- Spelling Challenge game
- Crossword and Word Search puzzles

ASSESSMENTS

Quiz 6B—Spelling Quiz

Suggested terms:
1. hematopoiesis
2. erythrocyte
3. eosinophil
4. thromboplastin
5. leukocytopenia
6. dyscrasia
7. septicemia
8. hypochromic
9. pernicious
10. thalassemia
11. hematocrit
12. phlebotomy
13. plasmapheresis
14. macrophage
15. vaccination
16. lymphadenopathy
17. anaphylaxis
18. urticaria
19. immunodeficiency
20. sarcoidosis

Test Bank—questions
• 90 to 92 percent water; remaining 8 to 10 percent portion of plasma is dissolved substances, especially plasma proteins such as albumin, globulins, and fibrinogen.
• Albumin helps transport fatty substances that cannot dissolve in watery plasma.
• Three main types of globulins; most commonly known is gamma globulin, which acts as antibodies.
• Fibrinogen is blood-clotting protein.
• Smaller amounts of other important substances are dissolved in plasma for transport: calcium, potassium, sodium, glucose, amino acids, fats, and waste products such as urea and creatinine.

Erythrocytes
• Red blood cells (RBCs).
• Biconcave disks and are enucleated, meaning they no longer contain a nucleus; see Figure 6.1.
• Appear red in color because contain hemoglobin, iron-containing pigment; part of red blood cell that picks up oxygen from lungs and delivers it to tissues.
• About five million erythrocytes per cubic millimeter of blood; total number in an average-sized adult is 35 trillion; males have more red blood cells than females.
• Average life span of 120 days; spleen removes worn-out and damaged ones from circulation; much can be recycled, like iron; but bilirubin is waste product disposed of by liver.

Leukocytes
• White blood cells (WBCs).
• Provide protection against invasion of pathogens such as bacteria, viruses, and foreign material.
• Have spherical shape with large nucleus; see Figure 6.2.
• About 8,000 per cubic millimeter of blood.
• Five different types of white blood cells, each with own strategy for protecting body; can be subdivided into two categories: granulocytes (with granules in the cytoplasm) and agranulocytes (without granules in the cytoplasm).
• See Table 6.1.

**TABLE 6.1 Types of Leukocytes**

<table>
<thead>
<tr>
<th>Leukocyte</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Granulocytes</strong></td>
<td></td>
</tr>
<tr>
<td>Basophils (basos)</td>
<td>Release histamine and heparin to damaged tissues</td>
</tr>
<tr>
<td>Eosinophils (eosins)</td>
<td>Destroy parasites and increase during allergic reactions</td>
</tr>
<tr>
<td>Neutrophils</td>
<td>Important for phagocytosis; most numerous of the leukocytes</td>
</tr>
<tr>
<td><strong>Agranulocytes</strong></td>
<td></td>
</tr>
<tr>
<td>Monocytes (monos)</td>
<td>Important for phagocytosis</td>
</tr>
<tr>
<td>Lymphocytes (lymphs)</td>
<td>Provide protection through an immunity activity</td>
</tr>
</tbody>
</table>
Platelets

- Modern term for *thrombocyte*
- Smallest of all formed blood elements
- Not whole cells, but rather are formed when cytoplasm of large precursor cell shatters into small plate-like fragments; see Figure 6.3
- Between 200,000 and 300,000 per cubic millimeter
- Play critical part in blood-clotting process or *hemostasis*; they *agglutinate* or clump together into small clusters when blood vessel is cut or damaged
- Also release substance called *thromboplastin*, which, in presence of calcium, reacts with *prothrombin*, clotting protein in blood, to form *thrombin*; thrombin works to convert fibrinogen to *fibrin*, which eventually becomes the mesh-like blood clot

Lymphatic and Immune Systems

- Lymphatic system consists of network of *lymphatic vessels, lymph nodes, spleen, thymus gland, and tonsils*
- Perform several quite diverse functions
  1. Collect excess tissue fluid throughout body; return it to circulatory system; fluid once inside lymphatic vessel is referred to as *lymph*; see Figure 6.7
  2. Lymph vessels around small intestines called *lacteals*; able to pick up absorbed fats for transport
  3. Lymphatic system works with immune system to form groups of cells, tissues, organs, and molecules that serve as body's primary defense against invasion of pathogens, as well as removing our own cells that have become diseased

Lymphatic Vessels

- Extensive network of vessels throughout entire body
- Unlike circulatory system, these vessels not in closed loop; serve as one-way pipes conducting lymph from tissues toward thoracic cavity
- See Figures 6.8 and 6.9
- Begin as very small *lymphatic capillaries* in tissues; excessive tissue fluid enters capillaries to begin trip back to circulatory system
- Capillaries merge into larger lymphatic vessels; very low pressure system; vessels have *valves* along length to ensure lymph moves forward toward thoracic cavity
- Vessels drain into one of two large *lymphatic ducts, right lymphatic duct or thoracic duct*; smaller right lymphatic duct drains right arm and right side of neck and chest; duct empties lymph into right subclavian vein; larger thoracic duct drains lymph from rest of body and empties into left subclavian vein

Lymph Nodes

- Small organs composed of lymphatic tissue located along route of lymphatic vessels
- Also referred to as *lymph glands*
- House lymphocytes and antibodies
- Work to remove pathogens and cell debris as lymph passes through them on way back to thoracic cavity
- Also serve to trap and destroy cells from cancerous tumors
- Particularly concentrated in several regions; see Figure 6.9 and Table 6.2 for description of some of the most important sites for lymph nodes
Tonsils

- Collections of lymphatic tissue located on each side of throat or pharynx
- See Figure 6.11
- Three sets of tonsils: palatine tonsils; pharyngeal tonsils (commonly referred to as adenoids); and lingual tonsils
- Contain large number of leukocytes
- Act as filters to protect body from invasion of pathogens through digestive or respiratory systems
- Not vital organs and can safely be removed if they become continuous site of infection

Spleen

- Located in upper left quadrant of abdomen
- Consists of lymphatic tissue highly infiltrated with blood vessels
- See Figure 6.12
- Vessels spread out into slow-moving blood sinuses
- Filters out and destroys old red blood cells, recycles iron, and also stores some of blood supply for body
- Phagocytic macrophages line blood sinuses engulf and remove pathogens; blood moves through spleen slowly, macrophages have time to carefully identify pathogens and worn-out red blood cells
- Not a vital organ and can be removed due to injury or disease; without spleen, person’s susceptibility to bloodstream infection may be increased

Thymus Gland

- Located in upper portion of the mediastinum
- Essential for proper development of immune system
- See Figure 6.13
- Assists body with immune function and development of antibodies
- Secrets hormone, thymosin; changes lymphocytes to T lymphocytes (simply called T cells); play important role in immune response
- Active in unborn child and throughout childhood until adolescence, when it begins to shrink in size

### TABLE 6.2 Common Lymph Node Locations

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axillary</td>
<td>Armpits</td>
<td>Become enlarged during infections of arms and breasts; cancer cells from breasts may be present</td>
</tr>
<tr>
<td>Cervical</td>
<td>Neck</td>
<td>Drains parts of head and neck; may be enlarged during upper respiratory infections</td>
</tr>
<tr>
<td>Inguinal</td>
<td>Groin</td>
<td>Drains area of the legs and lower pelvis</td>
</tr>
<tr>
<td>Mediastinal</td>
<td>Chest</td>
<td>Assists in draining infection from within the chest cavity</td>
</tr>
</tbody>
</table>
OBJECTIVE 4
Describe the blood typing systems.

LECTURE NOTES
• Each person's blood different due to presence of antigens on surface of erythrocytes
• Before person receives blood transfusion important to do blood typing
• Laboratory test to determine if donated blood is compatible with recipient's blood
• Many different subgroups of blood markers, but two most important ones are ABO system and Rh factor

ABO System
• In ABO blood system there are two possible red blood cell markers, A and B
• Markers are one method by which cells identify themselves
• Person with A marker is said to have type A blood; type A blood produces anti-B antibodies that attack type B blood
• B marker gives type B blood and anti-A antibodies that will attack type A blood
• Both markers are present; the blood is type AB and does not contain any antibodies; type AB blood will not attack other blood types
• Absence of either A or B marker results in type O blood; contains both anti-A and anti-B antibodies; type O blood attacks all other blood types
• Further information on antibodies is in lymphatic section later in this chapter
• Universal donor: because type O blood does not have either marker A or B, it will not react with anti-A or anti-B antibodies; for this reason person with type O blood is referred to as universal donor; in extreme cases, type O blood may be given to person with any of other blood types
• Universal recipient: type AB blood is universal recipient; person with type AB blood has no antibodies against other blood types; in extreme cases, can receive any type of blood

Rh Factor
• Not as difficult to understand as ABO system
• Person with Rh factor on his or her red blood cells is Rh-positive (Rh+); this person has factor so will not make anti-Rh antibodies
• Person without Rh factor is Rh-negative (Rh−); will produce anti-Rh antibodies
• Rh+ person may receive both Rh+ and Rh− transfusion
• Rh− person can receive only Rh− blood

TEACHING STRATEGIES
IRDVD
• See PowerPoint presentation on the Instructor's Resource DVD for drag-and-drop activity on blood typing; display on screen and have students discuss and place labels during class.

Pop Questions
• Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture

Guest Speaker
• Invite someone from a blood bank, American Red Cross, or plasma donation center to speak to the class; if possible, have him or her do blood typing for volunteers from the class.

LEARNING ACTIVITIES
Worksheet 6C
• Chapter Review

Text
• Practice Exercises

Student DVD-ROM
• Learning games

CW
• Practice questions

ASSESSMENTS
Quiz 6G—Chapter Review
Test Bank—questions
OBJECTIVE 5
Describe immunity, the immune response, and standard precautions.

Text pages: 184–186; PowerPoint slides: 90–100

LECTURE NOTES

Immunity

- Body’s ability to defend itself against pathogens, such as bacteria, viruses, fungi, protozoans, toxins, and cancerous tumors
- Comes in two forms: natural immunity and acquired immunity
- Natural immunity, also called innate immunity, is not specific to particular disease; does not require prior exposure to pathogenic agent; example is macrophage; these leukocytes are present throughout all tissues of body, but are concentrated in areas of high exposure to invading bacteria, like lungs and digestive system; very active phagocytic cells, ingesting and digesting any pathogen they encounter (see Figure 6.14)
- Acquired immunity is body’s response to specific pathogen; may be established either passively or actively
- Passive acquired immunity results when person receives protective substances produced by another human or animal; may take form of maternal antibodies crossing placenta to baby, or antitoxin or gamma globulin injection
- Active acquired immunity develops following direct exposure to pathogenic agent; agent stimulates body’s immune response, series of different mechanisms all geared to neutralize the agent; example — person typically can catch chickenpox only once because once body has successfully fought virus it will be able to more quickly recognize and kill it in future
- Immunizations or vaccinations are special types of active acquired immunity; instead of actually being exposed to infectious agent and having disease, person is exposed to modified or weakened pathogen still capable of stimulating immune response but not actually causing disease

Immune Response

- Disease-causing agents are recognized as being foreign because they display proteins that are different from person’s own natural proteins
- Foreign proteins, called antigens, stimulate immune response; consists of two distinct and different processes: humoral immunity (also called antibody-mediated immunity) and cellular immunity (also called cell-mediated immunity)
- Humoral immunity refers to production of B lymphocytes, also called B cells; respond to antigens by producing protective protein, antibody; antibodies combine with antigen to form antigen–antibody complex; complex either targets foreign substance for phagocytosis or prevents infectious agent from damaging healthy cells
- Cellular immunity involves production of T cells and natural killer (NK) cells; these defense cells are cytotoxic, meaning they physically attack and destroy pathogenic cells

TEACHING STRATEGIES

Pop Questions
- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

LEARNING ACTIVITIES

Worksheet 6C
- Chapter Review
- Practice Exercises
Student DVD-ROM
- Learning games
CW
- Practice tests

ASSESSMENTS

Quiz 6G—Chapter Review
Test Bank—questions
Standard Precautions

- Hospital and other healthcare settings contain large number of infective pathogens; patients and healthcare workers are exposed to each other's pathogens and sometimes become infected; infection acquired in this manner is referred to as nosocomial infection; spread in several ways
  1. **Cross infection**—person, either patient or healthcare worker, acquires pathogen from another patient or healthcare worker
  2. **Reinfection**—patient becomes infected again with same pathogen that originally brought him or her to hospital
  3. **Self-inoculation**—person becomes infected in different part of body by pathogen from another part of his or her own body—such as intestinal bacteria spreading to the urethra

- Appearance of human immunodeficiency virus (HIV) and hepatitis B virus (HBV) in the mid-1980s, fight against spreading infections took on even greater significance; in 1987 Occupational Safety and Health Administration (OSHA) issued mandatory guidelines to ensure that all employees at risk of exposure to body fluids are provided with personal protective equipment

- Guidelines state that all human blood, tissue, and body fluids must be treated as if they were infected with HIV, HBV, or other blood-borne pathogens

- Guidelines expanded in 1992 and 1996 to encourage fight against not just blood-borne pathogens, but all nosocomial infections spread by contact with blood, mucous membranes, nonintact skin, and all body fluids (including amniotic fluid, vaginal secretions, pleural fluid, cerebrospinal fluid, peritoneal fluid, pericardial fluid, and semen)

- Guidelines are commonly referred to as Standard Precautions:
  1. Wash hands before putting on and after removing gloves and before and after working with each patient or patient equipment.
  2. Wear gloves when in contact with any body fluid, mucous membrane, or nonintact skin or if you have chapped hands, rash, or open sores.
  3. Wear nonpermeable gown or apron during procedures that are likely to expose you to any body fluid, mucous membrane, or nonintact skin.
  4. Wear mask and protective equipment or face shield when patients are coughing often or if body fluid droplets or splashes are likely.
  5. Wear facemask and eyewear that seal close to face during procedures that cause body tissues to be vaporized.
  6. Remove for proper cleaning any shared equipment—such as thermometer, stethoscope, or blood pressure cuff—that has come into contact with body fluids, mucous membrane, or non-intact skin.
### OBJECTIVE 6

Build and define blood and lymphatic and immune systems medical terms from word parts.

Text pages: 173; 187; PowerPoint slides: 31–35; 101–104

### TEACHING STRATEGIES

- Reinforce how many blood and lymphatic and immune system terms can be constructed from word parts.
- Read aloud chapter terms that are made up of word parts; have students identify the parts and define the terms, either aloud or individually on paper.
- Write sentences on the board using common words; have students substitute correct medical terms.

### Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

### LECTURE NOTES

#### Blood

<table>
<thead>
<tr>
<th>Combining Form</th>
<th>Medical Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>fibrin/o</td>
<td>fibrinogen</td>
<td>fiber producing</td>
</tr>
<tr>
<td></td>
<td>fibrinolysis</td>
<td>destruction of fibers</td>
</tr>
<tr>
<td></td>
<td>fibrinous</td>
<td>pertaining to fibers</td>
</tr>
<tr>
<td>hem/o</td>
<td>hemoglobin</td>
<td>blood protein</td>
</tr>
<tr>
<td></td>
<td>hemolysis</td>
<td>blood destruction</td>
</tr>
<tr>
<td></td>
<td>hemolytic</td>
<td>blood destruction</td>
</tr>
<tr>
<td></td>
<td>hemorrhage</td>
<td>rapid flow of blood</td>
</tr>
<tr>
<td>hemat/o</td>
<td>hematologist</td>
<td>blood specialist</td>
</tr>
<tr>
<td></td>
<td>hematic</td>
<td>pertaining to blood</td>
</tr>
<tr>
<td>sanguin/o</td>
<td>sanguinous</td>
<td>pertaining to blood</td>
</tr>
</tbody>
</table>

#### Suffix

| -cyte          | erythrocyte                   | red cell                      |
|                | leukocyte                     | white cell                    |
|                | thrombocyte                   | clotting cell                 |
|                | granulocyte                   | granular cell                 |
|                | agranulocyte                  | nongranular cell              |
| -cytosis       | erythrocytosis                | too many red cells            |
|                | leukocytosis                  | too many white cells          |
|                | thrombocytosis                | too many clotting cells       |
| -penia         | erythropenia                  | too few red (cells)           |
|                | leukopenia                    | too few white (cells)         |
|                | thrombopenia                  | too few clotting (cells)      |
|                | pancytopenia                  | too few of all cells          |
| -poiesis       | erythropoiesis                | red (cell) producing          |
|                | hematopoiesis                 | blood producing               |
|                | leukopoiesis                  | white (cell) producing        |
|                | thrombopoiesis                | clotting (cell) producing     |

### Lymphatic and Immune Systems

<table>
<thead>
<tr>
<th>Combining Form</th>
<th>Medical Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>adenoid/o</td>
<td>adenoidectomy</td>
<td>removal of adenoids</td>
</tr>
<tr>
<td></td>
<td>adenoiditis</td>
<td>inflammation of adenoids</td>
</tr>
<tr>
<td>immun/o</td>
<td>immunologist</td>
<td>immunity specialist</td>
</tr>
<tr>
<td>lymph/o</td>
<td>lymphadenectomy</td>
<td>removal of lymph gland</td>
</tr>
<tr>
<td></td>
<td>lymphadenopathy</td>
<td>lymph gland disease</td>
</tr>
<tr>
<td></td>
<td>lymphangiogram</td>
<td>record of lymph vessels</td>
</tr>
<tr>
<td></td>
<td>lymphangiomma</td>
<td>lymph vessel tumor</td>
</tr>
<tr>
<td></td>
<td>lymphoma</td>
<td>lymph tumor</td>
</tr>
<tr>
<td></td>
<td>lymphatic</td>
<td>pertaining to lymph</td>
</tr>
<tr>
<td>path/o</td>
<td>pathogenic</td>
<td>disease producing</td>
</tr>
<tr>
<td></td>
<td>pathology</td>
<td>study of disease</td>
</tr>
</tbody>
</table>

### LEARNING ACTIVITIES

**Worksheet 6A**
- New Word Parts handout

**Worksheet 6B**
- Med Term Analysis

**Worksheet 6C**
- Chapter Review

**Quiz 6E**
- May be used as a worksheet

**Text**
- Practice Exercises
- Terminology Checklist

**Student DVD-ROM**
- Learning games
- Flash cards

**CW**
- Practice questions

### ASSESSMENTS

**Quiz 6E**—Word Building quiz
**Quiz 6G**—Chapter Review quiz
**Test Bank**—questions
splen/o  splenectomy removal of spleen
       splenomegaly enlarged spleen
thym/o  thymectomy removal of thymus
       thymoma thymus tumor
tonsill/o tonsillar pertaining to tonsils
tonsillar tonsillectomy removal of tonsils
tonsillitis tonsillitis inflammation of tonsils

OBJECTIVE 7
Identify and define blood and lymphatic and immune systems vocabulary terms.
Text pages: 174; 187–188; PowerPoint slides: 36–38; 105–110

LECTURE NOTES
Blood
Term                  Definition
blood clot            hard collection of fibrin, blood cells, and tissue debris that is end result of hemostasis or blood-clotting process
coagulate             convert from liquid to gel or solid, as in blood coagulation
dyscrasia             general term indicating presence of disease affecting blood
hematology            branch of medicine specializes in treating diseases and conditions of blood; physician is hematologist
hematoma              collection of blood under skin as result of blood escaping into tissue from damaged blood vessels; commonly referred to as bruise
hemostasis            to stop bleeding or stagnation of blood flow through tissues
packed cells transfusion of only formed elements and without plasma
whole blood            mixture of both plasma and formed elements

Lymphatic and Immune Systems
Term                  Definition
allergen               antigen that causes allergic reaction
allergist              physician specializes in testing for and treating allergies
allergy                hypersensitivity to common substance in environment or to medication
autoimmune disease     disease resulting from body’s immune system attacking its own cells as if they were pathogens; examples include systemic lupus erythematosus, rheumatoid arthritis, and multiple sclerosis
hives                  appearance of wheals as part of allergic reaction
human immunodeficiency virus (HIV) virus that causes AIDS; also known as a retrovirus
immunocompromised      immune system that is unable to respond properly to pathogens; also called immunodeficiency disorder

TEACHING STRATEGIES
• Write sentences on the board using common words; have students substitute correct medical terms.

Jeopardy Game
• Have students create questions for terms in this section for a Jeopardy game to be played in class—may be combined with Pathology, Diagnostic, and Therapeutic terms.

Pop Questions
• Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

LEARNING ACTIVITIES
Worksheet 6C
• Chapter Review

Text
• Practice Exercises
• Terminology Checklist
• Medical Record Analysis
• Chart Note Transcription

Student DVD-ROM
• Learning games
• Flash cards

CW
• Practice questions
• Case Study

ASSESSMENTS
Quiz 6G—Chapter Review
Test Bank—questions
immunoglobulins antibodies secreted by B cells; antibodies are immunoglobulins and assist in protecting body and its surfaces from invasion of bacteria; example, immunoglobulin IgA in colostrum, first milk from mother, helps protect newborn from infection

immunology branch of medicine concerned with diagnosis and treatment of infectious diseases and other disorders of immune system; physician is immunologist

inflammation tissues’ response to injury from pathogens or physical agents; characterized by redness, pain, swelling, and feeling hot to touch

lymphedema edema appearing in extremities due to obstruction of lymph flow through lymphatic vessels

opportunistic infections infectious diseases associated with patients who have compromised immune systems and therefore lowered resistance to infections and parasites; may be result of HIV infection

urticaria severe itching associated with hives, usually linked to food allergy, stress, or drug reactions

**OBJECTIVE 8**

Identify and define selected blood and lymphatic and immune systems pathology terms.

Text pages: 174–175; 189; PowerPoint slides: 39–46; 111–118

**LECTURE NOTES**

**Blood**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood</td>
<td>clear fluid that carries nutrients, gases, hormones, etc., to blood vessels</td>
</tr>
<tr>
<td>hemophilia</td>
<td>hereditary blood disease; blood-clotting time is prolonged due to lack of one vital clotting factor; transmitted by sex-linked trait from females to males, appearing almost exclusively in males</td>
</tr>
<tr>
<td>hyperlipidemia</td>
<td>condition of having too high level of lipids such as cholesterol in bloodstream; risk factor for developing atherosclerosis and coronary artery disease</td>
</tr>
<tr>
<td>septicemia</td>
<td>bacteria or their toxins in bloodstream; <em>sepsis</em> is term that means putrefaction; commonly called blood poisoning</td>
</tr>
<tr>
<td>Erythrocytes</td>
<td></td>
</tr>
<tr>
<td>anemia</td>
<td>large group of conditions characterized by reduction in number of red blood cells or amount of hemoglobin in blood; results in less oxygen reaching the tissues</td>
</tr>
<tr>
<td>aplastic anemia</td>
<td>severe form of anemia that develops as consequence of loss of functioning red bone marrow; results in decrease in number of all formed elements; treatment may eventually require bone marrow transplant</td>
</tr>
</tbody>
</table>

**TEACHING STRATEGIES**

- Select two students to do 5-minute presentations of their Internet research in class.
- Write sentences on the board using common words; have students substitute correct medical terms.

**Jeopardy Game**

- Have students create questions for terms in this section for Jeopardy game to be played in class—may be combined with Vocabulary, Diagnostic, and Therapeutic terms.

**IRDVD**

- See PowerPoint presentation on the Instructor's Resource DVD for videos on the following topics:
  - Leukemia
  - Inflammation
  - Anaphylaxis
  - AIDS
- See PowerPoint presentation on the Instructor's Resource DVD for an animation on the topic of sickle cell anemia.
hemolytic anemia  anemia develops as result of excessive loss of erythrocytes
hemolytic reaction  destruction of patient’s erythrocytes; occurs when receiving transfusion of incompatible blood type; also called transfusion reaction
hypochromic anemia  insufficient hemoglobin in erythrocytes; named because hemoglobin molecule is responsible for dark red color of erythrocytes
iron-deficiency anemia  insufficient iron to manufacture hemoglobin
pernicious anemia (PA)  insufficient absorption of vitamin B₁₂ by digestive system; necessary for erythrocyte production
polycythemia vera  production of too many red blood cells by bone marrow; blood becomes too thick to easily flow through blood vessels
sickle cell anemia  genetic disorder; erythrocytes take on abnormal curved or “sickle” shape; cells are fragile and are easily damaged, leading to hemolytic anemia
thalassemia  genetic disorder; body is unable to make functioning hemoglobin, resulting in anemia
Leukocytes
leukemia  cancer of white blood cell-forming red bone marrow; resulting in a large number of abnormal and immature white blood cells circulating in blood

Lymphatic and Immune Systems

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allergic Reactions</td>
<td></td>
</tr>
<tr>
<td>anaphylactic shock</td>
<td>life-threatening condition severe allergic reaction; may be triggered by bee stings, medications, or foods; circulatory and respiratory problems occur, including respiratory distress, hypotension, edema, tachycardia, and convulsions; also called anaphylaxis</td>
</tr>
<tr>
<td>Lymphatic System</td>
<td></td>
</tr>
<tr>
<td>elephantiasis</td>
<td>inflammation, obstruction, and destruction of lymph vessels; results in enlarged tissues due to edema</td>
</tr>
<tr>
<td>Hodgkin’s disease (HD)</td>
<td>also called Hodgkin’s lymphoma; cancer of lymphatic cells found in lymph nodes</td>
</tr>
<tr>
<td>lymphadenitis</td>
<td>inflammation of lymph nodes; referred to as swollen glands</td>
</tr>
<tr>
<td>mononucleosis (mono)</td>
<td>acute infectious disease with large number of abnormal lymphocytes; caused by Epstein–Barr virus; abnormal liver function may occur</td>
</tr>
<tr>
<td>non-Hodgkin’s lymphoma (NHL)</td>
<td>cancer of lymphatic tissues other than Hodgkin’s lymphoma</td>
</tr>
</tbody>
</table>

Pop Questions
- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

Learning Activities

Internet Research
- Have students select a specific pathology and use internet resources to research its symptoms, diagnosis, and treatments.

Worksheet 6C
- Chapter Review

Text
- Practice Exercises
- Terminology Checklist
- Medical Record Analysis
- Chart Note Transcription

Student DVD-ROM
- Learning games
- flash cards

CW
- Practice questions
- Case Study
- Web Destination activities on leukemia and sickle cell anemia
- New York Times link for research into specific pathologies

Assessments

Quiz 6G—Chapter Review
Test Bank—questions
Objective 9
Identify and define selected blood and lymphatic and immune systems diagnostic procedures.

Text pages: 176–177; 190; PowerPoint slides: 47–54; 119–122

Lecture Notes

Blood

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Laboratory Tests</td>
<td></td>
</tr>
<tr>
<td>blood culture and sensitivity (C&amp;S)</td>
<td>sample of blood is incubated in laboratory to check for bacterial growth; if bacteria are present, they are identified and tested to determine to which antibiotics they are sensitive</td>
</tr>
<tr>
<td>complete blood count (CBC)</td>
<td>blood test; consists of red blood cell count (RBC), white blood cell count (WBC), hemoglobin (Hgb), hematocrit (Hct), white blood cell differential, and platelet count</td>
</tr>
</tbody>
</table>

Teaching Strategies

- Review actual laboratory report of blood test results.
- Write sentences on the board using common words; have students substitute correct medical terms.

IRDVD

- See PowerPoint presentation on the Instructor's Resource DVD for video on the topic of phlebotomy.

Jeopardy Game

- Have students create questions for terms in this section for a Jeopardy game to be played in class—may be combined with Vocabulary, Pathology, and Therapeutic terms.
Electrolyte sedimentation rate (ESR, sed rate) blood test; determines rate at which mature red blood cells settle out of blood after addition of an anticoagulant; is indicator of presence of inflammatory disease

Hematocrit (HCT, Hct, crit) blood test; measures volume of red blood cells within total volume of blood

Hemoglobin (Hgb, hb) blood test; measures amount of hemoglobin present in given volume of blood

Platelet count blood test; determines number of platelets in given volume of blood

Prothrombin time (Pro time, PT) blood test; measures blood’s coagulation abilities by measuring how long it takes for clot to form after prothrombin has been activated

Red blood cell count (RBC) blood test; determines number of erythrocytes in volume of blood; decrease in red blood cells may indicate anemia; an increase may indicate polycythemia vera

Red blood cell morphology examination of specimen of blood for abnormalities in shape (morphology) of erythrocytes; determines diseases like sickle cell anemia

Sequential multiple analyzer computer (SMAC) machine for doing multiple blood chemistry tests automatically

White blood cell count (WBC) blood test; measures number of leukocytes in volume of blood; increase may indicate presence of infection or a disease such as leukemia; decrease may be caused by radiation therapy or chemotherapy

White blood cell differential (diff) blood test; determines number of each variety of leukocytes

**Medical Procedures**

Bone marrow aspiration sample of bone marrow is removed by aspiration with needle and examined for diseases such as leukemia or aplastic anemia

Phlebotomy incision into vein to remove blood for diagnostic test; also called venipuncture

**Lymphatic and Immune Systems**

**Clinical Laboratory Tests**

**Term**

**Definition**

Enzyme-linked immunosorbent assay (ELISA) blood test for antibody to AIDS virus; positive test means person has been exposed to virus; may be false-positive reading and then Western blot test would be used to verify results

Western blot test used as backup to ELISA blood test to detect the presence of antibody to HIV (AIDS virus) in blood

**Pop Questions**

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

**Guest Speaker**

- Invite a Clinical Lab Technologist or Technician or phlebotomist to class to discuss laboratory procedures.

**Learning Activities**

**Worksheet 6C**

- Chapter Review

**Text**

- Practice Exercises
- Terminology Checklist
- Medical Record Analysis
- Chart Note Transcription

**Student DVD-ROM**

- Learning games
- Flash cards

**CW**

- Practice questions
- Case Study
- *New York Times* link for research into specific diagnostic procedures

**Assessments**

**Quiz 6G—Chapter Review**

**Test Bank—questions**
Diagnostic Imaging
lymphangiography  X-ray taken of lymph vessels after injection of dye; lymph flow through chest is traced

Additional Diagnostic Procedures
Monospot  test for infectious mononucleosis
scratch test  allergy testing in which body is exposed to allergen through light scratch in skin

OBJECTIVE 10
Identify and define selected blood and lymphatic and immune systems therapeutic procedures.
Text pages: 177; 191; PowerPoint slides: 55–56; 123–124

LECTURE NOTES
Blood Term Medical Procedures  Definition
autologous transfusion  procedure for collecting and storing patient's own blood several weeks prior to actual need; used to replace blood lost during surgical procedure
blood transfusion  artificial transfer of blood into bloodstream
bone marrow transplant (BMT)  patient receives red bone marrow from donor after patient's own bone marrow has been destroyed by radiation or chemotherapy
homologous transfusion  replacement of blood by transfusion of blood received from another person
plasmapheresis  removing plasma from body without depleting formed elements; whole blood is removed and cells and plasma are separated; cells are returned to patient along with donor plasma

Lymphatic and Immune Systems Term Medical Procedures  Definition
immunotherapy  injection of immunoglobulins or antibodies in order to treat disease; antibodies may be produced by another person or animal, for example, antivenom for snake bites; more recent developments include treatments to boost activity of immune system, especially to treat cancer and AIDS
vaccination  exposure to weakened pathogen that stimulates immune response and antibody production in order to confer protection against full-blown disease; also called immunization

TEACHING STRATEGIES
• Write sentences on the board using common words; have students substitute correct medical terms.

Jeopardy Game
• Have students create questions for terms in this section for a Jeopardy game to be played in class—may be combined with Vocabulary, Pathology, & Diagnostic terms.

Pop Questions
• Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

Guest Speaker
• Invite someone from the local blood bank or American Red Cross to speak to the class about blood transfusions.

LEARNING ACTIVITIES
Worksheet 6C
• Chapter Review

Text
• Practice Exercises
• Terminology Checklist
• Medical Record Analysis
• Chart Note Transcription

Student DVD-ROM
• Learning games
• Flash cards

CW
• Practice questions
• Case Study
OBJECTIVE 11

Identify and define selected medications relating to blood and the lymphatic and immune systems.

Text pages: 178; 191; PowerPoint slides: 57; 125–126

LECTURE NOTES

Blood

**Classification**

**Action**

**Generic and Brand Names**

- **Anticoagulant**
  - prevents blood clot formation; commonly called *blood thinners*.
  - heparin, HepLock; warfarin, coumadin.

- **Antihemorrhagic**
  - prevents or stops hemorrhaging; also called *hemostatic agent*.
  - aminocaproic acid, Amicar; vitamin K.

- **Antiplatelet agents**
  - interferes with action of platelets; prolongs bleeding time; used to prevent heart attacks and strokes.
  - clopidogrel, Plavix; ticlopidine, Ticlid.

- **Hematinic**
  - increases number of erythrocytes or amount of hemoglobin in blood.
  - epoetin alfa, Procrit; darbepoetin alfa, Aranesp.

- **Thrombolytic**
  - dissolves existing blood clots.
  - alteplase, Activase; streptokinase, Streptase.

Lymphatic and Immune Systems

**Classification**

**Action**

**Generic and Brand Names**

- **Antihistamines**
  - block effects of histamine released by body during allergic reaction.
  - cetirizine, Zyrtec; diphenhydramine, Benadryl.

- **Corticosteroids**
  - hormone produced by the adrenal cortex; has very strong anti-inflammatory properties; used to treat autoimmune diseases.
  - prednisone; methylprednisolone, Solu-Medrol.

TEACHING STRATEGIES

**Pop Questions**

- Use Clicker questions as either pretest or posttest quiz to gauge student comprehension during lecture.

**Learning Activities**

- Have students use a PDR and/or the Internet to look up additional information regarding these medications, such as dosage, side effects, and contraindications.

**Worksheet 6C**

- Chapter Review

**Text**

- Practice Exercises
- Terminology Checklist

**Student DVD-ROM**

- Learning games
- Flash cards

**CW**

- Practice questions

ASSESSMENTS

**Quiz 6G—Chapter Review**

**Test Bank—questions**

Surgical Procedures

lymphadenectomy: removal of lymph node; usually done to test for malignancy.

- Web Destination activity on kidney transplants
- *New York Times* link for research into specific treatment procedures
immunosuppressants block certain actions of immune system; prevents rejection of transplanted organ

protease inhibitor drugs inhibit protease, an enzyme viruses need to reproduce

reverse transcriptase inhibitor drugs inhibit reverse transcriptase, an enzyme needed by viruses to reproduce

mycophenolate mofetil, CellCept; cyclosporine, Neoral

indinavir, Crixivan; saquinavir, Fortovase

lamivudine, Epivir; zidovudine, Retrovir

OBJECTIVE 12
Define selected abbreviations associated with blood and lymphatic and immune systems.

Text pages: 178; 191; PowerPoint slides: 58–61; 127–128

LECTURE NOTES

Blood

ALL acute lymphocytic leukemia
AML acute myelogenous leukemia
basos basophils
BMT bone marrow transplant
CBC complete blood count
CLL chronic lymphocytic leukemia
CML chronic myelogenous leukemia
diff differential
eosins, eos eosinophils
ESR, SR, sed rate erythrocyte sedimentation rate
HCT, Hct, crit hematocrit
Hgb, Hb, HGB hemoglobin
lymphs lymphocytes
monos monocytes
PA pernicious anemia
PCV packed cell volume
PMN, polys polymorphonuclear neutrophil
PT, pro-time prothrombin time
RBC red blood cell
Rh+ Rh-positive
Rh− Rh-negative
segs segmented neutrophils
SMAC sequential multiple analyzer computer
WBC white blood cell

TEACHING STRATEGIES
- Emphasize the importance of learning abbreviations and their full meanings; point out how some abbreviations, such as CBC, Hgb, sed rate, and GVHD are typically used rather than full terms.
- Encourage students to add abbreviations to their flash cards.
- Write sentences on the board using medical terms; have students substitute correct abbreviations for terms.

Memory Game
- Have students assist in creating a memory game to play in class.

Pop Questions
- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

LEARNING ACTIVITIES

Worksheet 6C
- Chapter Review

Quiz 6F
- May be used as a worksheet

Text
- Practice Exercises
Lymphatic and Immune Systems

AIDS  acquired immunodeficiency syndrome
ARC  AIDS-related complex
ELISA  enzyme-linked immunosorbent assay
GVHD  graft vs. host disease
HD  Hodgkin's disease
HIV  human immunodeficiency virus
Ig  immunoglobulins (IgA, IgD, IgE, IgG, IgM)
KS  Kaposi's sarcoma
mono  mononucleosis
NHL  non-Hodgkin's lymphoma
NK  natural killer cells
PCP  Pneumocystis carinii pneumonia
SCIDS  severe combined immunodeficiency syndrome

Student DVD-ROM
  • Learning games
  • Flash cards
CW
  • Practice questions

ASSESSMENTS
Quiz 6F—Abbreviations Quiz
Quiz 6G—Chapter Review
Test Bank—questions
# Worksheet 6A

**New Combining Form and Suffix Handout**

Directions: For each combining form below, write out its meaning and then locate a new term from the chapter that uses the combining form or suffix.

<table>
<thead>
<tr>
<th>Combining Forms</th>
<th>Meaning</th>
<th>Chapter Term</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. agglutin/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. bas/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. chrom/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. coagul/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. eosin/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. eryth/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. fibrin/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. granul/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. hem/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. hemat/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. leuk/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. morph/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. neutr/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. phag/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. sanguin/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. thromb/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. adenoid/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. immun/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. lymph/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. lymphaden/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. lymphangi/o</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. path/o</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>Combining Forms</th>
<th>Meaning</th>
<th>Chapter Term</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. splen/o</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>24. thym/o</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>25. tonsill/o</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>26. tox/o</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

**Suffixes**

<table>
<thead>
<tr>
<th>Suffix</th>
<th>Meaning</th>
<th>Chapter Term</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>27. –apheresis</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>28. –cytosis</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>29. –emia</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>30. –globin</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>31. –penia</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>32. –phil</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>33. –poiesis</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>34. –stasis</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>35. –globulin</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>
# Worksheet 6B
## Medical Term Analysis

Directions: Below are terms built from word parts used in this chapter that are not analyzed in the Word Building Table. Many are built from word parts you have learned in previous chapters. Analyze each term presented below and list and define the word parts used to build each term.

<table>
<thead>
<tr>
<th>Medical Term</th>
<th>Word Part Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. basophil</td>
<td>____________________</td>
</tr>
<tr>
<td>2. eosinophil</td>
<td>____________________</td>
</tr>
<tr>
<td>3. lymphocyte</td>
<td>____________________</td>
</tr>
<tr>
<td>4. neutrophil</td>
<td>____________________</td>
</tr>
<tr>
<td>5. hemostasis</td>
<td>____________________</td>
</tr>
<tr>
<td>6. hematology</td>
<td>____________________</td>
</tr>
<tr>
<td>7. hematoma</td>
<td>____________________</td>
</tr>
<tr>
<td>8. hypochromic</td>
<td>____________________</td>
</tr>
<tr>
<td>9. morphology</td>
<td>____________________</td>
</tr>
<tr>
<td>10. phlebotomy</td>
<td>____________________</td>
</tr>
<tr>
<td>11. thoracic</td>
<td>____________________</td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th></th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.</td>
<td>immunoglobulin</td>
</tr>
<tr>
<td>13.</td>
<td>immunology</td>
</tr>
<tr>
<td>14.</td>
<td>lymphadenitis</td>
</tr>
<tr>
<td>15.</td>
<td>lymphangiography</td>
</tr>
<tr>
<td>16.</td>
<td>immunotherapy</td>
</tr>
</tbody>
</table>
Worksheet 6C
Chapter Review

Anatomy and Physiology

1. The formed elements of the blood are: _______________, _______________, and _______________.
2. The watery fluid of blood is _______________.
3. Three examples of plasma proteins are: _______________, _______________, and _______________.
4. _______________ is the iron-containing pigment that gives red blood cells their color.
5. Platelets release _______________, which initiates the blood clotting process.
6. The universal donor is type _______________ blood; the universal recipient is type _______________ blood.
7. _______________ are lymphatic vessels around the small intestine.
8. Lymph nodes house _______________ and _______________ to remove pathogens from lymph.
9. Tonsils protect the body from invasion of pathogens through the _______________ or _______________ system.
10. _______________ immunity develops following direct exposure to a pathogen.

Word Building

Directions: Build a term that means:

1. blood protein ________________________________________________________
2. pertaining to fibers ______________________________________________________
3. clotting cell ________________________________________________________
4. too many red cells ______________________________________________________
5. too few clotting (cells) ______________________________________________________
6. blood producing ________________________________________________________
7. enlarged spleen ________________________________________________________
8. removal of tonsils ________________________________________________________
9. record of lymph vessels ______________________________________________________
10. study of disease ________________________________________________________

(Continued)
Matching

1. allergy  a. body attacks its own cells
2. inflammation  b. prevents blood clot formation
3. urticaria  c. born with nonfunctioning immune system
4. autoimmune disease  d. to stop bleeding
5. opportunistic  e. bruise
6. anaphylaxis  f. severe itching with hives
7. Hodgkin’s disease  g. immunization
8. mononucleosis  h. caused by vitamin B₁₂ deficiency
9. SCIDS  i. red bone marrow stops making blood cells
10. vaccination  j. hypersensitivity to common allergen
11. protease inhibitor  k. dissolves clots
12. ELISA  l. computer to do blood chemistry tests
13. dyscrasia  m. drug that keeps virus from reproducing
14. hemostasis  n. cancer of lymphatic cells in lymph nodes
15. hemophilia  o. test to identify infecting bacteria
16. aplastic anemia  p. lab test for AIDS
17. polycythemia vera  q. infection occurring in immunocompromised
18. C&S  r. measures volume of erythrocytes in blood
19. phlebotomy  s. general term for blood condition
20. anticoagulant  t. tissues’ response to injury
21. thrombolytic  u. venipuncture
22. SMAC  v. prolonged blood-clotting time
23. hematocrit  w. life-threatening allergic reaction
24. pernicious anemia  x. too many red blood cells
25. hematoma  y. caused by Epstein-Barr virus
Quiz 6A

New Word Parts Quiz

Directions: Define the combining form or suffix in the spaces provided.

1. thromb/o ___________________________________________________________________________
2. agglutin/o ___________________________________________________________________________
3. chrom/o ______________________________________________________________________________
4. coagul/o ______________________________________________________________________________
5. eryth/o ________________________________________________________________________________
6. fibrin/o ________________________________________________________________________________
7. hemat/o ________________________________________________________________________________
8. phag/o ________________________________________________________________________________
9. leuk/o ________________________________________________________________________________
10. morph/o ______________________________________________________________________________
11. sanguin/o _____________________________________________________________________________
12. eosin/o ________________________________________________________________________________
13. thym/o ________________________________________________________________________________
14. adenoid/o _____________________________________________________________________________
15. tonsill/o ______________________________________________________________________________
16. tox/o ________________________________________________________________________________
17. splen/o ________________________________________________________________________________
18. lymphaden/o __________________________________________________________________________
19. lymphangi/o __________________________________________________________________________
20. -cytosis ______________________________________________________________________________
21. -globin ________________________________________________________________________________
22. -poiesis ______________________________________________________________________________
23. -penia ________________________________________________________________________________
24. -stasis ________________________________________________________________________________

Quiz 6B
Spelling Quiz

Directions: Write each term as your instructor pronounces it.

1. ________________________________
2. ________________________________
3. ________________________________
4. ________________________________
5. ________________________________
6. ________________________________
7. ________________________________
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9. ________________________________
10. ________________________________
11. ________________________________
12. ________________________________
13. ________________________________
14. ________________________________
15. ________________________________
16. ________________________________
17. ________________________________
18. ________________________________
19. ________________________________
20. ________________________________
Quiz 6C
Labeling Diagram

Directions: Label the components of whole blood.

1. ____________

2. ____________

3. ____________

4. ____________
Quiz 6D
Labeling Diagram

Directions: Label the organs of the lymphatic system.

1. __________________
2. __________________
3. __________________
4. __________________
5. __________________
Quiz 6E
Word Building Quiz

Directions: Build a single medical term for each phrase below.

1. inflammation of adenoids ______________________________________________________________________
2. removal of lymph gland ________________________________________________________________________
3. lymph vessel tumor __________________________________________________________________________
4. disease producing _____________________________________________________________________________
5. enlarged spleen ______________________________________________________________________________
6. pertaining to tonsils __________________________________________________________________________
7. clot dissolving ________________________________________________________________________________
8. vein incision _________________________________________________________________________________
9. blood protein ________________________________________________________________________________
10. red cell ____________________________________________________________________________________
11. pertaining to insufficient color __________________________________________________________________
12. blood protein ________________________________________________________________________________
13. too few of all cells ____________________________________________________________________________
14. rapid flow of blood __________________________________________________________________________
15. fiber producing ______________________________________________________________________________
16. more than normal number white cells __________________________________________________________________
17. blood stopping ______________________________________________________________________________
18. blood tumor __________________________________________________________________________________
Quiz 6F

Abbreviations Quiz

Directions: Write the medical term for which each abbreviation stands.

1. AIDS ________________________________
2. GVHD ________________________________
3. HD ________________________________
4. Ig ________________________________
5. mono ________________________________
6. KS ________________________________
7. NK ________________________________
8. PCP ________________________________
9. SCIDS ________________________________
10. HIV ________________________________
11. CBC ________________________________
12. BMT ________________________________
13. diff ________________________________
14. ESR ________________________________
15. HCT ________________________________
16. Hgb ________________________________
17. PA ________________________________
18. PT ________________________________
19. RBC ________________________________
20. WBC ________________________________
21. SMAC ________________________________
22. lymphs ________________________________
23. ALL ________________________________
24. eosins ________________________________
25. monos ________________________________
Quiz 6G
Chapter Review

PART I: Multiple Choice

Directions: Circle the correct answer.

1. A blood disorder characterized by excessive increase in abnormal white blood cells is
   b. leukemia.
   c. hemophilia.
   d. leukoplakia.

2. The lymph nodes located in the underarm region are termed
   a. axillary.
   b. cervical.
   c. mediastinal.
   d. inguinal.

3. Which blood type is known as the universal recipient?
   a. type O
   b. type A
   c. type B
   d. type AB

4. An example of active acquired immunity would be
   a. mother's antibodies crossing placenta.
   b. having the disease.
   c. receiving an antitoxin.
   d. macrophages engulfing bacteria.

5. Which is NOT a type of leukocyte?
   a. basophil
   b. eosinophil
   c. hemocyte
   d. lymphocyte

6. Which blood test measures the volume of erythrocytes in a given volume of blood?
   a. differential
   b. bleeding time
   c. hematocrit
   d. hemoglobin

7. Which is a test for infectious mononucleosis?
   a. menatocrit
   b. prothrombin time
   c. erythrocyte sedimentation rate
   d. monospot

8. In which type of blood transfusion does the blood come from another person?
   a. autohemotherapy
   b. dialysis transfusion
   c. autologous transfusion
   d. homologous transfusion

9. The largest lymph vessels are called
   a. ducts.
   b. arteries.
   c. capillaries.
   d. angios.

10. Which type of anemia is inherited?
    a. pernicious anemia
    b. aplastic anemia
    c. sickle cell anemia
    d. iron-deficiency anemia

(Continued)
PART II: Matching
Directions: Match the term with its definition.

____ 1. platelets  a. increases number of erythrocytes
____ 2. ABO  b. plasma and formed elements
____ 3. whole blood  c. pharyngeal tonsils
____ 4. septicemia  d. test for inflammation in the body
____ 5. sed rate  e. acquired in a hospital
____ 6. hematinic  f. play role in blood clotting process
____ 7. adenoids  g. caused by blocked lymph flow
____ 8. nosocomial infection  h. an autoimmune disease
____ 9. lymphedema  i. blood poisoning
____ 10. sarcoidosis  j. blood typing system

PART III: Abbreviations
Directions: Write the full meaning of the following abbreviations.

1. ARC ________________________________
2. GVHD ________________________________
3. PCP ________________________________
4. CBC ________________________________
5. PA ________________________________
Chapter 6 Answer Keys

Worksheet 6A Answer Key

Combining Forms
1. clumping
2. base
3. color
4. clotting
5. rosy red
6. red
7. fibers, fibrous
8. granules
9. blood
10. blood
11. white
12. shape
13. neutral

Suffixes
27. removal, carry away
28. more than normal number of cells
29. blood condition
30. protein
31. abnormal decrease, too few
32. attracted to
33. formation
34. standing still
35. protein

Worksheet 6B Answer Key

1. bas/o = base; -phil = attracted to
2. eosin/o = red; -phil = attracted to
3. lymph/o = lymph; -cyte = cell
4. neutr/o = neutral; -phil = attracted to
5. hem/o = blood; -stasis = standing still
6. hemat/o = blood; -logy = study of
7. hemat/o = blood; -oma = growth
8. hypo- = insufficient; chrom/o = color; -ic = pertaining to
9. morph/o = shape; -logy = study of
10. phleb/o = vein; -otomy = incision into
11. thorac/o = chest; -ic = pertaining to
12. immune/o = protection; -globulin = protein
13. immun/o = protection; -logy = study of
14. lymph/o = lymph; aden/o = gland; -itis = inflammation
15. lymph/o = lymph; angi/o = vessel; -graphy = process of recording
16. immun/o = protection; -therapy = treatment

Worksheet 6C Answer Key

Anatomy and Physiology
1. erythrocytes, leukocytes, platelets
2. plasma
3. albumin, globulins, fibrinogen
4. hemoglobin
5. thromboplastin
6. O, AB
7. lacteals
8. lymphocytes, antibodies
9. respiratory, digestive
10. active acquired

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Word Building

1. hemoglobin
2. fibrinous
3. thrombocyte
4. erythrocytosis
5. thrombopenia
6. hematopoiesis
7. splenomegaly
8. tonsillectomy
9. lymphangiogram
10. pathology

Matching

1. j
2. t
3. f
4. a
5. q
6. w
7. n
8. y
9. c
10. g
11. m
12. p
13. s
14. d
15. v
16. i
17. x
18. o
19. u
20. b
21. k
22. l
23. r
24. h
25. e

Quiz 6A Answer Key

1. clot
2. clumping
3. color
4. clotting
5. red
6. fibers, fibrous
7. blood
8. eat, swallow
9. white
10. shape
11. blood
12. rosy red
13. thymus
14. adenoids
15. tonsils
16. poison
17. spleen
18. lymph node
19. lymph vessel
20. more than the normal number of cells
21. protein
22. formation
23. abnormal decrease, too few
24. standing still
25. phlebotomy

Quiz 6B Answer Key

1. hematopoiesis
2. erythrocyte
3. eosinophil
4. thromboplastin
5. leukocytopenia
6. dyscrasia
7. septicemia
8. hypochromic
9. pernicious
10. thalassemia
11. hematocrit
12. phlebotomy
13. plasmapheresis 17. anaphylaxis
14. macrophage 18. urticaria
15. vaccination 19. immunodeficiency
16. lymphadenopathy 20. sarcoidosis

Quiz 6C Answer Key
1. plasma 3. platelets or thrombocytes
2. red blood cells or erythrocytes 4. white blood cells or leukocytes

Quiz 6D Answer Key
1. thymus gland 4. spleen
2. lymph node 5. lymphatic vessels
3. tonsil

Quiz 6E Answer Key
1. adenoiditis 10. erythrocyte
2. lymphadenectomy 11. hypochromic
3. lymphangioma 12. hemoglobin
4. pathogenic 13. pancytopenia
5. splenomegaly 14. hemorrhage
6. tonsillar 15. fibrinogen
7. thrombolytic 16. leukocytosis
8. phlebotomy 17. hemostasis
9. hemoglobin 18. hematoma

Quiz 6F Answer Key
1. acquired immunodeficiency syndrome 14. erythrocyte sedimentation rate
2. graft vs. host disease 15. hematocrit
3. Hodgkin’s disease 16. hemoglobin
4. immunoglobulins 17. pernicious anemia
5. mononucleosis 18. pro-time
6. Kaposi’s sarcoma 19. red blood cell
7. natural killer cells 20. white blood cell
8. Pneumocystis carinii pneumonia 21. sequential multiple analyzer computer
9. severe combined immunodeficiency syndrome 22. lymphocytes
10. human immunodeficiency virus 23. acute lymphocytic leukemia
11. complete blood count 24. eosinophils
12. bone marrow transplant 25. monocytes
13. differential
Quiz 6G Answer Key

Multiple Choice
1. B  
2. A  
3. D  
4. B  
5. C  
6. C  
7. D  
8. D  
9. A  
10. C

Matching
1. f  
2. j  
3. b  
4. i  
5. d  
6. a  
7. c  
8. e  
9. g  
10. h

Abbreviations
1. AIDS-related complex  
2. graft vs. host disease  
3. Pneumocystis carinii pneumonia  
4. complete blood count  
5. pernicious anemia