Using Figure 12.1, identify the following:

1) A lymph capillary is indicated by letter __________.
   Answer: D
   Diff: 2    Page Ref: 404

2) A lymph node is indicated by letter __________.
   Answer: B
   Diff: 2    Page Ref: 404

3) The lymph duct is indicated by letter __________.
   Answer: A
   Diff: 2    Page Ref: 404

4) Blood capillaries are indicated by letter __________.
   Answer: E
   Diff: 2    Page Ref: 404

5) Lymphatic collecting vessels are indicated by letter __________.
   Answer: C
   Diff: 2    Page Ref: 404
Using Figure 12.2, identify the following:

6) The spleen is indicated by letter __________.
   Answer: C  
   Diff: 1   Page Ref: 407

7) The tonsils are indicated by letter __________.
   Answer: A  
   Diff: 1   Page Ref: 407

8) The thymus gland is indicated by letter __________.
   Answer: B  
   Diff: 1   Page Ref: 407

9) The Peyer’s patches are indicated by letter __________.
   Answer: D  
   Diff: 1   Page Ref: 407

10) The lymphoid organ that destroys worn-out blood cells is indicated by letter __________.
    Answer: C  
    Diff: 2   Page Ref: 407
11) The lymphoid tissues that trap and remove bacteria that enter the throat are indicated by letter __________.
Answer: A
Diff: 2  Page Ref: 407–408

Fill in the blank or provide a short answer:
12) Lymph fluid and some plasma proteins originate (escape) from the __________.
Answer: blood plasma
Diff: 2  Page Ref: 403–404

13) Excess accumulations of fluid, which impair the exchange of materials within the tissues, is called __________.
Answer: edema
Diff: 2  Page Ref: 403

14) The fibrous capsule of lymph nodes contains strands called __________ that divide the node into compartments.
Answer: trabeculae
Diff: 3  Page Ref: 406

15) Lymph exits the lymph node via the __________ vessels.
Answer: efferent lymphatic
Diff: 2  Page Ref: 406

16) The role of the __________ in the lymphatic system is to remove worn-out blood cells and return some of the products to the liver.
Answer: spleen
Diff: 2  Page Ref: 407

17) Peyer's patches and the tonsils are part of the collection of small lymphoid tissues that protect the upper respiratory and digestive tracts from infection and are referred to as __________.
Answer: MALT (mucosa-associated lymphatic tissue)
Diff: 3  Page Ref: 408

18) Harmful or disease-causing microorganisms from which nonspecific defenses protect the body are called __________.
Answer: pathogens
Diff: 1  Page Ref: 409

19) The process by which WBCs and phagocytes migrate to an area experiencing acute inflammation is called __________.
Answer: chemotaxis
Diff: 3  Page Ref: 411

20) The process by which neutrophils squeeze through capillary walls is called __________.
Answer: diapedesis
Diff: 2  Page Ref: 412
21) The binding of complement proteins to certain sugar or proteins on a foreign cell’s surface is called __________.
   Answer: complement fixation
   Diff: 3   Page Ref: 413

22) One effect of complement fixation that causes the cell membranes of foreign cells to become sticky so that they are easier to phagocytize is called __________.
   Answer: opsonization
   Diff: 3   Page Ref: 413

23) Cells studded with protein molecules found on our own cells that do not trigger an immune response within us (but may within others) are called __________.
   Answer: self-antigens (autoantigens)
   Diff: 1   Page Ref: 416

24) Troublesome small molecules or incomplete antigens that may mount an attack that is harmful rather than protective are called __________.
   Answer: haptens
   Diff: 3   Page Ref: 416

25) When an antigen binds to B cell surface receptors, it becomes sensitized (activated) and undergoes __________.
   Answer: clonal selection
   Diff: 3   Page Ref: 418

26) When B cells encounter antigens and produce antibodies against them, we exhibit __________.
   Answer: active immunity
   Diff: 2   Page Ref: 420

27) Antibodies constitute an important part of blood proteins and are also referred to as __________.
   Answer: immunoglobulins
   Diff: 2   Page Ref: 421

28) The five major immunoglobulin classes are __________.
   Answer: IgM, IgA, IgD, IgG, IgE
   Diff: 1   Page Ref: 422

29) The binding of antibodies to specific sites on bacterial exotoxins or viruses is called __________.
   Answer: neutralization
   Diff: 2   Page Ref: 424

30) The clumping of foreign cells, a type of antigen-antibody reaction, is called __________.
   Answer: agglutination
   Diff: 2   Page Ref: 424

31) Killer T cells, which kill virus-invaded body cells, are also called __________.
   Answer: cytotoxic T cells
   Diff: 3   Page Ref: 425
32) Antigens that produce abnormally vigorous immune responses whereby the immune system causes tissue damage as it fights off a perceived threat that would otherwise be harmless are called __________.
Answer: allergens or hypersensitivities
Diff: 2   Page Ref: 430

33) Systemic (bodywide) acute allergic response caused by allergens that directly enter the blood, as with certain bee stings or spider bites, is called __________.
Answer: anaphylactic shock
Diff: 2   Page Ref: 430

34) AIDS cripples the immune system by interfering with the activity of cells called __________.
Answer: helper T cells
Diff: 2   Page Ref: 431

35) A tropical disease that results when parasitic worms clog the lymphatic vessels is called __________.
Answer: elephantiasis
Diff: 2   Page Ref: 431

Multiple Choice

1) The fluid that is forced out of the capillary beds by hydrostatic and osmotic pressures and into the tissue spaces is called:
   A) arterial blood
   B) venous blood
   C) plasma
   D) interstitial fluid
   E) lymph
Answer: E
Diff: 1   Page Ref: 403-404

2) Lymph flows:
   A) in a circular pattern within the tissues
   B) away from the heart only
   C) toward the heart only
   D) both toward and away from the heart
   E) into the capillaries
Answer: C
Diff: 1   Page Ref: 404

3) Lymph from the left arm would return to the heart through the:
   A) inferior vena cava
   B) thoracic duct
   C) right lymphatic duct
   D) left subclavian artery
   E) aorta
Answer: B
Diff: 3   Page Ref: 404; 406
4) Which one of the following is NOT a mechanism that aids lymph return:
   A) milking action of skeletal muscles
   B) pressure changes within the thorax
   C) the pumping action of the heart
   D) smooth muscle contractions within the lymphatic vessels
   E) presence of valves within the larger lymph vessels

   Answer: C
   Diff: 1     Page Ref: 404

5) Which one of the following is NOT true of lymph nodes:
   A) they remove foreign materials from the lymph fluid
   B) they have valves similar to those found in veins
   C) they contain lymphocytes
   D) they act as filters along the lymphatic vessels
   E) they contain macrophages

   Answer: B
   Diff: 2     Page Ref: 405–406

6) Which lymphatic organ's major job is to destroy worn-out red blood cells and return some of the products to the liver:
   A) tonsils
   B) spleen
   C) thymus gland
   D) tonsils
   E) Peyer's patches

   Answer: B
   Diff: 2     Page Ref: 407

7) Which lymphoid tissues trap and remove bacteria entering the throat:
   A) axillary lymph nodes
   B) cervical lymph nodes
   C) tonsils
   D) Peyer's patches
   E) thymus gland

   Answer: C
   Diff: 2     Page Ref: 408

8) Which one of the following is NOT a type of lymphoid organ:
   A) spleen
   B) thymus gland
   C) tonsils
   D) appendix
   E) Peyer's patches

   Answer: D
   Diff: 2     Page Ref: 407–408
9) The lymph organ that programs T cells and functions at peak levels only during youth is the:
   A) thymus
   B) spleen
   C) appendix
   D) tonsils
   E) Peyer's patches
   Answer: A
   Diff: 2 Page Ref: 408

10) The lymph tissues found within the walls of the small intestine are called:
    A) tonsils
    B) appendix
    C) Peyer's patches
    D) thymus tissues
    E) intestinal nodes
    Answer: C
    Diff: 2 Page Ref: 408

11) Which of these lymphoid organs is found along the left side of the abdominal cavity:
    A) spleen
    B) Peyer's patches
    C) thymus gland
    D) tonsils
    E) axillary lymph nodes
    Answer: A
    Diff: 1 Page Ref: 407

12) Musoca-associated lymphatic tissue (MALT) includes:
    A) spleen
    B) thymus gland
    C) tonsils only
    D) tonsils and Peyer's patches
    E) tonsils and spleen
    Answer: D
    Diff: 3 Page Ref: 408

13) The body's first line of defense against the invasion of disease-causing microorganisms is:
    A) phagocytes
    B) natural killer cells
    C) skin and mucous membranes
    D) inflammatory response
    E) fever
    Answer: C
    Diff: 2 Page Ref: 409
14) Compared to the nonspecific chemicals that cover body surfaces and mucous membranes, the specific body defense system is:
   A) faster
   B) slower
   C) the same speed
   D) sometimes faster and sometimes slower
   E) not comparable in speed
Answer: B
Diff: 2  Page Ref: 409

15) Which one of the following is NOT one of the nonspecific body defenses:
   A) intact skin
   B) antibody production
   C) the inflammatory response
   D) fever
   E) natural killer cells
Answer: B
Diff: 2  Page Ref: 409–415

16) The process by which neutrophils are squeezed through the capillary walls during the inflammatory process is called:
   A) agglutination
   B) chemotaxis
   C) diapedesis
   D) coagulation
   E) antibody production
Answer: C
Diff: 2  Page Ref: 412

17) Which one of the following is NOT one of the four most common indicators of the inflammatory response:
   A) redness
   B) heat
   C) swelling
   D) fever
   E) pain
Answer: D
Diff: 1  Page Ref: 410–412

18) The migration of phagocytes and white blood cells to an inflamed area along a chemical gradient is called:
   A) diapedesis
   B) chemotaxis
   C) immunity
   D) perforins
   E) complement fixation
Answer: B
Diff: 2  Page Ref: 411
19) The inflammatory process begins with release of chemicals, which do all of the following EXCEPT:
   A) dilate blood vessels
   B) attract phagocytes to the area
   C) stimulate release of lysozyme
   D) cause capillaries to become leaky
   E) activate pain receptors
Answer: C
Diff: 2 Page Ref: 411–412

20) Tissues invaded by viruses, which attempt to replicate themselves by taking over cellular machinery, secrete small proteins called _________ to protect nearby cells and hinder further multiplication of the viruses.
   A) histamine
   B) interferon
   C) kinins
   D) interleukins
   E) pyrogens
Answer: B
Diff: 2 Page Ref: 413; 415

21) The body’s temperature-regulating “thermostat” that can be reset upward in response to pyrogens is located in the:
   A) hypothalamus
   B) thalamus
   C) pineal gland
   D) cerebellum
   E) medulla oblongata
Answer: A
Diff: 1 Page Ref: 415

22) Fever has the effect of doing all of the following EXCEPT:
   A) denaturing (scrambling) proteins
   B) stimulating the liver and spleen to gather up iron and zinc
   C) increasing metabolic rate of tissue cells
   D) stimulating complement fixation
   E) speeding up repair processes
Answer: D
Diff: 3 Page Ref: 415

23) The study of immunity is called:
   A) histology
   B) anatomy
   C) pathology
   D) immunology
   E) microbiology
Answer: D
Diff: 1 Page Ref: 415
24) Which of the following substances is NOT typically perceived as an antigen:
   A) pollen grains
   B) bacteria
   C) self-antigens
   D) fungi
   E) virus particles
   Answer: C
   Diff: 2  Page Ref: 416

25) Which one of the following CANNOT be said about the history of immunity:
   A) the ancient Greeks knew something existed within the body to protect it from infectious disease
   B) scientists of the 1800s discovered "factors" now called antibodies
   C) scientists of the 1800s demonstrated that immune serum could protect another animal from disease
   D) scientists of the mid-1900s discovered the viral origin of AIDS
   E) scientists of the mid-1900s discovered that injection of serum containing antibodies did NOT always protect a recipient from disease
   Answer: D
   Diff: 2  Page Ref: 415

26) Regardless of whether it matures into a B cell or a T cell, a lymphocyte that is capable of responding to a specific antigen by binding to it is said to be:
   A) clonal
   B) incompetent
   C) immune
   D) immunocompetent
   E) complemented
   Answer: D
   Diff: 3  Page Ref: 416

27) The specific foreign substances that an individual’s immune system has the ability to recognize and resist is determined by:
   A) individual exposure to the specific foreign substance
   B) individual genetic makeup
   C) the total number of lymphocytes present at a given time
   D) the total number of macrophages at a given time
   E) the total number of self-antigens at a given time
   Answer: B
   Diff: 3  Page Ref: 417

28) Which one of the following is NOT true of macrophages:
   A) they are considered the "big eaters" of the immune system
   B) they engulf foreign particles
   C) they circulate continuously throughout the body
   D) they act as antigen presenters
   E) they secrete monokines
   Answer: C
   Diff: 2  Page Ref: 418
29) B cells develop immunocompetence in the:
   A) thymus gland
   B) bone marrow
   C) spleen
   D) thyroid gland
   E) lymph nodes
Answer: B
Diff: 2    Page Ref: 417

30) The specific type of acquired immunity that a fetus obtains from maternal antibodies that cross the placenta is called:
   A) naturally acquired active immunity
   B) naturally acquired passive immunity
   C) artificially acquired active immunity
   D) artificially acquired passive immunity
   E) artificially acquired natural immunity
Answer: B
Diff: 1    Page Ref: 420

31) What specific type of acquired immunity do vaccines provide:
   A) naturally acquired active immunity
   B) naturally acquired passive immunity
   C) artificially acquired active immunity
   D) artificially acquired passive immunity
   E) naturally acquired artificial immunity
Answer: C
Diff: 1    Page Ref: 420

32) Vaccines are NOT for:
   A) pneumonia
   B) tetanus
   C) measles
   D) snake bites
   E) polio
Answer: D
Diff: 2    Page Ref: 420

33) Immune sera are used for all of the following EXCEPT:
   A) tuberculosis
   B) rabies
   C) snake bites
   D) botulism
   E) tetanus
Answer: A
Diff: 2    Page Ref: 421
34) Which one of the following is NOT true of basic antibody structure:
   A) they consist of four amino acid chains
   B) they are linked together by disulfide bonds
   C) the heavy chains are identical
   D) the heavy chains are about 400 amino acids long
   E) the light chains are often of differing lengths
   Answer: E
   Diff: 3   Page Ref: 421–422

35) Which one of the following is NOT true of the constant (C) regions of antibodies:
   A) they are the same or nearly the same
   B) they form the "stem" of an antibody
   C) they determine the specific type of antibody class formed
   D) they form an antigen-binding site
   E) they determine how an antibody class will carry out its immune role
   Answer: D
   Diff: 3   Page Ref: 422

36) Which one of the following is NOT one of the antibody classes:
   A) IgA
   B) IgB
   C) IgD
   D) IgG
   E) IgE
   Answer: B
   Diff: 1   Page Ref: 422

37) IgA:
   A) is mainly found in mucus and secretions such as tears and saliva
   B) is passed from mother to fetus during pregnancy
   C) is the most abundant antibody in blood plasma
   D) can fix complement
   E) is involved in allergies
   Answer: A
   Diff: 3   Page Ref: 423

38) Which one of the following is NOT a method by which antibodies inactivate antigens:
   A) agglutination
   B) chemotaxis
   C) complement fixation
   D) neutralization
   E) precipitation
   Answer: B
   Diff: 2   Page Ref: 423–424
39) The specific antibody class that has the ability to cross the placental barrier and provide immunity to the fetus is:
   A) IgM  
   B) IgA  
   C) IgD  
   D) IgG  
   E) IgE  
   Answer: D  
   Diff: 2  Page Ref: 422–423

40) The process by which antibodies bind to specific sites on bacterial exotoxins (toxic chemicals secreted by bacteria) to block their harmful effects is called:
   A) agglutination  
   B) chemotaxis  
   C) complement fixation  
   D) neutralization  
   E) precipitation  
   Answer: D  
   Diff: 2  Page Ref: 424

41) Antigen presentation is essential for the activation and clonal selection of:
   A) T cells  
   B) B cells  
   C) plasma cell  
   D) antigen-presenting cells  
   E) antibodies  
   Answer: A  
   Diff: 2  Page Ref: 425

42) An isograft is a tissue graft donated by:
   A) an unrelated person  
   B) a parent  
   C) a different animal species  
   D) the same person  
   E) an identical twin  
   Answer: E  
   Diff: 2  Page Ref: 427

43) Which one of the following is NOT a type of immunosuppressive therapy given after surgery to prevent rejection of a graft:
   A) corticosteroids  
   B) radiation  
   C) antiproliferative drugs  
   D) gamma globulin  
   E) immunosuppressive drugs  
   Answer: D  
   Diff: 2  Page Ref: 429
44) With immediate hypersensitivity, the antibody class that binds to mast cells and basophils that trigger the release of histamine and other chemicals is:

A) IgM  
B) IgA  
C) IgD  
D) IgG  
E) IgE

Answer: E

Diff: 2    Page Ref: 422–423

45) Allergic contact dermatitis following skin contact with poison ivy would normally lead to:

A) immediate hypersensitivity  
B) acute hypersensitivity  
C) delayed hypersensitivity  
D) anaphylactic shock  
E) immunodeficiency

Answer: C

Diff: 2    Page Ref: 431

46) The relatively common autoimmune disease in which the thyroid gland produces excessive amounts of thyroxine is called:

A) multiple sclerosis  
B) Graves’ disease  
C) myasthenia gravis  
D) glomerulonephritis  
E) systemic lupus erythematosi

Answer: B

Diff: 2    Page Ref: 429

47) Which one of the following is NOT an autoimmune disease:

A) AIDS  
B) multiple sclerosis  
C) Graves’ disease  
D) type I diabetes mellitus  
E) rheumatoid arthritis

Answer: A

Diff: 2    Page Ref: 429

True/False

1) The flaplike minivalves of the lymph capillaries act like one-way swinging doors that allow lymph fluid to enter the lymph capillaries but not exit.

Answer: TRUE

Diff: 2    Page Ref: 404

2) The daughter cells of B cells, called plasma cells, release antibodies.

Answer: TRUE

Diff: 2    Page Ref: 418
3) Lymph in the right arm is returned to the heart via the right lymphatic duct.
Answer: TRUE
Diff: 2 Page Ref: 404

4) The thymus gland, found around the trachea, programs certain lymphocytes.
Answer: FALSE
Diff: 2 Page Ref: 408

5) The tonsils, spleen, thymus gland, and Peyer's patches are referred to as mucosa-associated lymphatic tissue (MALT).
Answer: FALSE
Diff: 2 Page Ref: 408

6) Natural killers are unique phagocytic defense cells that can kill cancer cells and virus-infected body cells well before the immune system is activated.
Answer: FALSE
Diff: 2 Page Ref: 410

7) Some pathologists consider limitation of joint movement to be an additional fifth cardinal sign of inflammation.
Answer: TRUE
Diff: 1 Page Ref: 412

8) The final disposal of cell debris as inflammation subsides is performed by neutrophils.
Answer: FALSE
Diff: 3 Page Ref: 412

9) The nonspecific defense by which complement proteins attach to sugars or proteins on the surface of foreign cells is called complement fixation.
Answer: TRUE
Diff: 1 Page Ref: 413

10) Chemicals secreted by white blood cells and macrophages exposed to foreign substances that can increase body temperature are called pyrogens.
Answer: TRUE
Diff: 1 Page Ref: 415

11) Fever is a systemic response triggered by pyrogens.
Answer: TRUE
Diff: 2 Page Ref: 415

12) Like all blood cells, lymphocytes originate from hemocytoblasts contained within red bone marrow.
Answer: TRUE
Diff: 3 Page Ref: 416

13) Macrophages arise from monocytes formed within the bone marrow.
Answer: TRUE
Diff: 2 Page Ref: 418
14) Extremely weakened pathogens that are still alive are attenuated.
   Answer: TRUE
   Diff: 2   Page Ref: 420

15) Artificially acquired passive immunity is conferred when one receives immune serum for poisonous snake bites.
   Answer: TRUE
   Diff: 3   Page Ref: 421

16) Antibodies are also referred to as immunoglobulins.
   Answer: TRUE
   Diff: 1   Page Ref: 421

17) There are three major immunoglobulin classes: IgM, IgA, and IgD.
   Answer: FALSE
   Diff: 2   Page Ref: 422

18) The antibody a mother passes to her fetus is IgM.
   Answer: FALSE
   Diff: 3   Page Ref: 422–423

19) The process that occurs when antibodies clump foreign cells is called agglutination.
   Answer: TRUE
   Diff: 2   Page Ref: 424

20) Memory cells are descendants of an activated B or T cell.
   Answer: TRUE
   Diff: 3   Page Ref: 427

21) An antibody is a substance capable of provoking an immune response.
   Answer: FALSE
   Diff: 2   Page Ref: 416

22) Tissue grafts harvested from an unrelated person are called xenografts.
   Answer: FALSE
   Diff: 1   Page Ref: 427

23) Allografts are tissue grafts taken from an unrelated person.
   Answer: TRUE
   Diff: 2   Page Ref: 427

24) Allergies, or hypersensitivities, are normal immune responses.
   Answer: FALSE
   Diff: 2   Page Ref: 430

25) Autoimmune diseases occur when the immune system loses its ability to tolerate self-antigens while still recognizing and attaching foreign antigens.
   Answer: TRUE
   Diff: 3   Page Ref: 429
26) Our immune system can be affected by severe stress.
   Answer: TRUE
   Diff: 1  Page Ref: 435

Matching

Match the following descriptions with the appropriate lymphoid organ or tissue:

1) Located on the left side of the abdominal cavity
   A) thymus gland  
   Diff: 1  Page Ref: 407  
   B) spleen

2) Trap and remove bacteria and pathogens entering the throat
   C) Peyer's patches  
   Diff: 2  Page Ref: 408  
   D) tonsils

3) Located overlying the heart
   Diff: 1  Page Ref: 408

4) Filters and cleanses the blood of bacteria, viruses, and other debris
   Diff: 2  Page Ref: 407-408

5) Located in the wall of the small intestines
   Diff: 1  Page Ref: 408

6) Located in the pharynx (throat)
   Diff: 1  Page Ref: 408

1) B  2) D  3) A  4) B  5) C  6) D
Match the following protective mechanism with its associated element:

7) Traps microorganisms in respiratory and digestive tracts
   Diff: 1 Page Ref: 409
   A) nasal hairs
   B) mucus
   C) acid mantle

8) Inhibits growth of bacteria and fungi in female reproductive tract
   Diff: 1 Page Ref: 409
   D) lacrimal secretions
   E) keratin

9) Contains lysozyme
   Diff: 2 Page Ref: 409
   F) cilia
   G) gastric juice

10) Provides resistance against acids, alkalis, and bacterial enzymes
    Diff: 1 Page Ref: 409

11) Filters and traps microorganisms within inhaled air
    Diff: 1 Page Ref: 409

12) Contains concentrated hydrochloric acid and protein-digested enzymes that destroy pathogens within the stomach
    Diff: 1 Page Ref: 409

13) Propels debris-laden mucus away from lower respiratory passages
    Diff: 1 Page Ref: 409

Match the following biological function with its antibody class:

14) Believed to be cell surface receptor of immunocompetent B cell
   Diff: 3 Page Ref: 422-423
   A) IgD
   B) IgG
   C) IgA

15) First immunoglobulin class released to plasma by plasma cells during primary response
   Diff: 3 Page Ref: 422-423
   D) IgM
   E) IgE

16) Main antibody of primary and secondary responses
   Diff: 3 Page Ref: 422-423
   D) IgM

17) Bathes and protects mucosal surfaces from attachment of pathogens
   Diff: 3 Page Ref: 422-423

18) Triggers the release of histamine
   Diff: 3 Page Ref: 422-423

19) Potent agglutinating agent
   Diff: 3 Page Ref: 422-423

20) Crosses placenta and provides passive immunity to fetus
   Diff: 3 Page Ref: 422-423


Essay

1) Explain the origin and pathway of lymph.
   Answer: Lymph fluid arises from blood plasma that has been forced out of the capillary beds by osmotic and hydrostatic pressures. The fluid left behind is called interstitial fluid. The interstitial fluid is then picked up by lymph capillaries, after which it is called lymph. Lymph is routed up the lymphatic vessels until it is finally returned to the venous system through either the right lymphatic duct or the thoracic duct.

   Diff: 2 Page Ref: 403-404
2) Describe the methods the body uses to help return lymph to the heart.
Answer: The return of lymph to the heart is aided by: 1. the milking action of the skeletal muscles, 2. pressure changes in the thorax during breathing, 3. smooth muscles in the walls of the larger lymphatics contract rhythmically.

Diff: 1   Page Ref: 404-405

3) Describe several of the protective chemicals produced by the skin and mucous membranes.
Answer: Skin produces acid secretions that inhibit bacterial growth, and sebum contains chemicals that are toxic to bacteria. Vaginal secretions are highly acidic. The stomach mucosa secretes hydrochloric acid and protein-digesting enzymes, both of which can kill pathogens. Saliva and tears contain lysozyme, an enzyme that destroys bacteria. Mucus is a sticky mucous membrane secretion that traps microorganisms.

Diff: 2   Page Ref: 409

4) Identify the four most common indicators and major symptoms of an acute inflammatory response and explain their origins.
Answer: The four most common indicators of the inflammatory response are redness, heat, swelling, and pain. Redness and heat are a result of dilation of blood vessels that increase blood flow to the injured area. Swelling occurs when increased permeability of the capillaries allows plasma to leak from the bloodstream into the tissue spaces. The excess fluid, or edema, triggers the activation of pain receptors in the area, accounting for the pain associated with an injury.

Diff: 2   Page Ref: 410-412

5) List and describe the cells and chemicals the body uses as its second line of defense.
Answer: 1. Phagocytes, such as neutrophils or macrophages, engulf foreign particles. These cells are in nearly every body organ and confront pathogens that make it through the surface membrane barriers.
2. Natural killer cells, found in blood and lymph, are lymphocytes. They can lyse and kill cancer cells and virus-infected body cells.
3. The inflammatory response is a nonspecific response that occurs when body tissues are injured.

Diff: 2   Page Ref: 409-411

6) Describe the four major types of transplant grafts.
Answer: Autografts are tissue grafts transplanted from one site to another within the same person. Isografts are tissue grafts harvested from a genetically identical person (identical twin). Allografts are tissue grafts harvested from an unrelated person. Xenografts are tissue grafts harvested from different animal species.

Diff: 2   Page Ref: 427

7) Explain three current theories that attempt to explain why self-tolerance breaks down in autoimmune disorders.
Answer: Inefficient lymphocyte programming is one theory that suggests self-reactive B or T cells escape to the rest of the body. Another theory is that self-proteins appear within the circulation that were not previously exposed to the immune system, thus initiating an immune response. These “hidden” antigens are found in sperm cells, the eye lens, and thyroid proteins. Another theory is that antibodies produced against foreign antigens cross-react with self-antigens such as when streptococcal bacteria cross-react with heart antigens causing rheumatic fever.

Diff: 3   Page Ref: 429