

Exam

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) How does normal microbial flora on the human body prevent infection? 1) _____
- A) Its presence stimulates lysozyme secretions.
 - B) Its presence stimulates acute phase reaction proteins.
 - C) Its secretions maintain a low pH inhibitory to most pathogens.
 - D) Its presence reduces nutrients and space needed for pathogens to grow.
 - E) All of the above.

Answer: D

- 2) Each chemical below is paired *correctly* with its antimicrobial effect *except* 2) _____
- A) interferon/activation of cellular immunity and inhibition of viral replication.
 - B) lactoferrin/binds complex carbohydrates (like lactose) so that organism can't utilize it.
 - C) fibronectin/when bound to bacterial cells walls, promotes phagocytosis.
 - D) transferrin/binds iron so that organisms can't utilize it.
 - E) lysozyme/degrades bacterial cell walls.

Answer: B

- 3) The granules in mature neutrophils contain all of the following *except* 3) _____
- A) transferrin.
 - B) alkaline phosphatase.
 - C) lysozyme.
 - D) gelatinase.
 - E) histamine.

Answer: E

- 4) The process by which neutrophils leave blood vessels, squeezing between the endothelial cells to enter the tissues, is called 4) _____
- A) phagocytosis.
 - B) margination.
 - C) chemotaxis.
 - D) diapedesis.
 - E) opsonization.

Answer: D

- 5) A clinical laboratory scientist observed a peripheral blood smear and noticed one to two pale blue inclusions in several neutrophils. Which of the following would be consistent with this observation? 5) _____
- A) C-reactive protein is increased.
 - B) Several neutrophils also have vacuoles.
 - C) Serum albumin and transferrin are decreased.
 - D) The total white blood cell count is high with an absolute neutrophilia.
 - E) All of the above.

Answer: E

- 6) All of the following are functions of monocytes/macrophages *except* 6) _____
A) lysis of host cells infected with virus. B) antigen presentation to T lymphocytes.
C) cytokine secretion. D) phagocytosis of debris.

Answer: A

- 7) Natural killer lymphocytes may be distinguished from other lymphocytes because they 7) _____
A) possess the CD56 and CD16 cell surface markers.
B) lack the CD3 cell surface marker.
C) are more likely to appear as larger lymphocytes with a few azurphilic granules.
D) lack immunoglobulin and specific antigen receptors.
E) All of the above.

Answer: E

- 8) Which cell type(s) below are associated with lysis of tumor cells? 8) _____
A) Monocyte/macrophages
B) Neutrophils
C) Lymphokine activated killer (LAK) lymphocytes
D) Eosinophils
E) All of the above

Answer: C

- 9) Each positive acute phase reactant below is paired *correctly* with its function *except* 9) _____
A) alpha-1-antitrypsin/neutralize elastase released by neutrophils.
B) complement/group of proteins that when activated can lyse target cells.
C) fibrinogen/activation of fibroblast cells.
D) haptoglobin/binds free hemoglobin and transports it to the liver.
E) C-reactive protein/opsonin and complement activation.

Answer: C

- 10) When an antibody is bound to an antigen, which complement path(s) is (are) activated? 10) _____
A) Mannose-binding lectin path B) Alternate path
C) Classic path D) All of the above

Answer: C

- 11) Each of the following is one of the four basic characteristics of inflamed tissue *except* 11) _____
A) pain. B) heat. C) swelling. D) bruising. E) redness.

Answer: D

- 12) How is increased tissue fluid in an inflamed site beneficial? 12) _____
A) It brings nutrients to white blood cells in the area.
B) It dilutes toxins that are present.
C) It brings humoral immune system components such as complement and antibodies.
D) It brings coagulation proteins for fibrin formation and localization of the problem.
E) All of the above.

Answer: E

- 13) All of the following are chemotactic compounds *except* 13) _____
A) cytokines released by activated white cells at an inflammatory site.
B) debris from damaged host cells.
C) complement C3b.
D) certain bacterial products.

Answer: C

- 14) Which item below is most resistant to phagocytosis? 14) _____
A) Red blood cell coated with antibody
B) Unencapsulated Gram positive rod
C) Fungal spore
D) Encapsulated Gram negative coccus
E) Dead neutrophil

Answer: D

- 15) Neutrophils have receptors for which portion of the antibody molecule? 15) _____
A) C5a
B) Fc (constant fragment)
C) Fab (antigen binding fragment)
D) Mannose-binding lectin (MBL)

Answer: B

- 16) The digestive enzymes of phagocytic cells are contained in the 16) _____
A) nucleus.
B) endoplasmic reticulum.
C) ribosomes.
D) Golgi apparatus.
E) granules.

Answer: E

- 17) Which cell(s) below is (are) capable of immunologic memory? 17) _____
A) Monocyte/macrophage
B) T lymphocyte
C) Neutrophil
D) NK lymphocyte
E) All of the above

Answer: B

- 18) What is the exact structure to which an antibody or T cell receptor will bind? 18) _____
A) Allergen
B) Immunogen
C) Epitope
D) Hapten
E) Antigen

Answer: C

- 19) Which immunoglobulin subclass below resides exclusively on the surface of B cells and serves a regulatory function? 19) _____
A) IgA
B) IgG
C) IgM
D) IgD
E) IgE

Answer: D

- 20) Which tissue(s) below is (are) considered primary lymphoid tissue? (Choose as many as apply.) 20) _____
- A) Thymus
 - B) Lymph nodes
 - C) Peyer's patches
 - D) Spleen
 - E) Bone marrow
- Answer: A, E
- 21) If a naive T cell does not encounter its corresponding antigen within a few days, what happens? 21) _____
- A) It expresses a new and different T cell antigen receptor.
 - B) It converts to a memory cell.
 - C) It converts to an effector cell.
 - D) It dies.
- Answer: D
- 22) Which statement below is TRUE regarding B lymphocytes? 22) _____
- A) B cells are taught to discriminate "self" antigens from "non-self" antigens in the thymus.
 - B) B cell antibody response is generally very effective against viruses contained within host cells.
 - C) When mature B lymphocytes are released from the bone marrow, they begin secreting antibody.
 - D) B memory cells can live for years and reactivate quickly if they encounter the same antigen.
 - E) All of the above.
- Answer: D
- 23) Which of the following can function as antigen presenting cells? 23) _____
- A) Dendritic cells
 - B) B cells
 - C) Macrophages
 - D) All of the above
- Answer: D
- 24) Which molecules on the cell surfaces of transplanted tissue are most important to match to the recipient to immediately prevent the recipient's T cells from recognizing the transplanted tissue as foreign? 24) _____
- A) Major histocompatibility complex, Class I
 - B) Major histocompatibility complex, Class II
 - C) CD8
 - D) CD3
 - E) CD4
- Answer: A
- 25) Which of the following is characteristic of the primary immune response (first encounter with an antigen) as compared with the secondary immune response (later encounter with the same antigen)? 25) _____
- A) More antibodies are produced in the primary exposure than the secondary exposure.
 - B) More IgM antibodies are produced.
 - C) Faster.
 - D) All of the above.
- Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

26) There are five basic steps of phagocytosis. List them and briefly describe them. 26) _____

Answer: Chemotaxis—phagocytes are chemically attracted to the site.

Attachment—phagocytes form an attachment between their membrane and the particle to be phagocytized.

Engulfment/ingestion—the membrane invaginates and the particle is taken within the cell, forming a body called the phagosome.

Digestion—granules within the phagocyte containing digestive enzymes fuse with the phagosome and release their contents.

Killing—particles are chemically digested and, if they are live microorganisms, killed.

27) Why do phagocytes dramatically increase metabolic rate and oxygen consumption when they begin phagocytosis? 27) _____

Answer: Many products of oxygen are powerfully antimicrobial, and phagocytes expend a great deal of energy producing these oxygen products. Glucose is broken down for energy and the production of lactic acid and hydrogen peroxide. The lactic acid contributes to an acidic environment in the phagosome. The hydrogen peroxide is catalyzed by myeloperoxidase and other enzymes to form peroxide anions (O_2^-), hydroxyl radicals (OH^-), and singlet oxygen, all of which are very damaging to microbes.

28) Outline the basic steps in the gene rearrangement necessary to produce the T cell antigen receptor and state how this contributes to the ability of T cells to respond to various antigens. 28) _____

Answer: The T cell antigen receptor contains two chains, alpha and beta or gamma and delta. A separate genetic locus exists for each chain. Each genetic locus is comprised of many V genes, J genes, and C genes. To produce a single chain, there is a random selection of one V gene, one J gene, and one C gene. The unused genes are spliced out, and the three selected genes are fused together in a permanent gene rearrangement. Since there are many genes to choose from and since selection is random, thousands of combinations are possible, and all of those combinations represent the ability to respond to a different antigen.

29) Briefly describe positive and negative selection of T cells in the thymus. 29) _____

Answer: T cells respond to antigen that is presented to them in conjunction with MHC antigens. Pre-T cells possess both the CD4 and the CD8 markers. First, a positive selection process is done in which only cells that can bind to MHC survive. Cells that cannot bind to MHC cannot react to antigen, so they are killed. Second, a negative selection process is done to prevent reaction against self-antigens. Any remaining T cells that bind strongly to MHC antigens are killed as they might react against self-tissues. What remains are T cells that bind weakly to MHC antigens, but if a second antigen is presented with the MHC, then the bond becomes stronger and the T cell is activated. T cells that bind to MHC Class I molecules retain the CD8 receptor, and T cells that bind to MHC Class II molecules retain the CD4 receptor.

30) How does a T cytotoxic lymphocyte recognize that a host cell is infected with a virus? 30) _____
Answer: Within a host cell that is infected with virus, the viral proteins are digested and conjugated with MHC Class I molecules to be expressed on the surface of the host cell. CD8+ T cytotoxic cells have receptors for the MHC Class I molecule. CD8+ T cytotoxic cells that also have the T cell antigen receptor for the viral antigen presented will bind to both viral and MHC antigens and be stimulated to destroy the host cell.

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

31) Microbes and/or their products (endotoxins and lipopolysaccharides) are the underlying cause of all inflammations. 31) _____

Answer: True False

32) When the immune system initiates an inflammatory response, this is always beneficial to resolving the injury or infection. 32) _____

Answer: True False

33) The positive acute phase reactant responsible for binding and inactivating certain drugs is alpha-1 acid glycoprotein. 33) _____

Answer: True False

34) T lymphocytes can react directly against foreign antigens they encounter. For example, if they encounter a bacterium, they will be stimulated to cytotoxic activity. 34) _____

Answer: True False

35) A mature T helper cell should possess CD2, CD3, and CD4. 35) _____

Answer: True False

36) Fibronectin, C-reactive protein, antibodies, and complement fragment C3b can all function as opsonins. 36) _____

Answer: True False

37) The cytokine that activates macrophages, inhibits viral replication, and increases MHC Class I expression is interferon. 37) _____

Answer: True False

38) Specialized antigen-presenting cells such as macrophages, dendritic cells, and B cells are the only cells to possess class II MHC antigens, while almost all of the remaining nucleated cells in the body possess class I MHC antigens. 38) _____

Answer: True False

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

39) The process by which certain substances function to attract leukocytes to an tissue where they're needed is called _____. 39) _____

Answer: chemotaxis

40) In an inflammatory reaction, increased vascular permeability causes escape of the fluid into the tissues resulting in _____.

Answer: swelling or edema

41) The two cell types that are capable of attacking host cells that are infected with virus are _____ and _____.

Answer: natural killer (NK) cells and T cytotoxic cells

42) If a lymphocyte possesses the markers CD2, CD3, and CD8, it is probably a _____.

Answer: T cytotoxic/suppressor cell

43) If complement is activated because mannose-binding lectin in the plasma attaches to specific carbohydrate structures on a microbe, this is called the _____ pathway of complement activation.

Answer: mannose-binding lectin (MBL)