

***Campbell's Biology: Concepts and Connections, 7e (Reece et al.)***  
**Chapter 24 The Immune System**

24.1 Multiple-Choice Questions

1) The body's innate defenses against infection include

- A) several nonspecific antibodies.
- B) barriers such as dead skin cells and mucus.
- C) increased production of certain hormones and changes in microcirculation.
- D) memory cells.

Answer: B

Topic: 24.1

Skill: Knowledge/Comprehension

2) Which of the following wander through the interstitial fluid and consume any bacteria and virus-infected cells they encounter?

- A) erythrocytes
- B) leukocytes
- C) macrophages
- D) interferons

Answer: C

Topic: 24.1

Skill: Knowledge/Comprehension

3) Natural killer cells

- A) are phagocytes that attack and kill pathogenic microorganisms.
- B) attack virus-infected cells by releasing chemicals that lead to cell death.
- C) tag pathogenic microorganisms with antibodies.
- D) "eat" microorganisms that have been tagged with antibodies.

Answer: B

Topic: 24.1

Skill: Knowledge/Comprehension

4) What substance, produced by virus-infected cells, diffuses to neighboring cells to help them fight a viral infection?

- A) lysozyme
- B) interferon
- C) histamine
- D) interleukin-2

Answer: B

Topic: 24.1

Skill: Knowledge/Comprehension

5) A researcher who detects a higher-than-normal amount of interferon in a laboratory rat would correctly conclude that

- A) the rat has, or recently had, a viral infection.
- B) cancerous cells are present in the rat.
- C) the rat's diet is deficient in calcium.
- D) monocytes are differentiating into macrophages in the rat's bloodstream.

Answer: A

Topic: 24.1

Skill: Application/Analysis

6) Some complement proteins

- A) induce antibody formation by phagocytic cells.
- B) help trigger the inflammatory response.
- C) are released by natural killer cells to attack cancer and virus-infected cells.
- D) replace T cells in the cell-mediated response.

Answer: B

Topic: 24.1

Skill: Knowledge/Comprehension

7) Which of the following helps activate our nonspecific (innate) defense system?

- A) active immunity
- B) inflammation
- C) passive immunity
- D) mobilization of erythrocytes

Answer: B

Topic: 24.2

Skill: Knowledge/Comprehension

8) When you cut yourself, the damaged cells immediately release chemical alarm signals, such as

- A) interferon.
- B) complement.
- C) histamine.
- D) antihistamine.

Answer: C

Topic: 24.2

Skill: Application/Analysis

9) Which of the following is an immediate effect of histamine release?

- A) dilation of local blood vessels
- B) blocking of a response to ragweed pollen
- C) conversion of histamine to histidine
- D) increase in blood pressure

Answer: A

Topic: 24.2

Skill: Knowledge/Comprehension

- 10) The major result of the inflammatory response is to
- A) initiate the production of antibodies.
  - B) remove contaminating microorganisms and initiate repair of damaged tissues.
  - C) initiate cell-mediated immune responses.
  - D) initiate the production of killer cells.

Answer: B

Topic: 24.2

Skill: Knowledge/Comprehension

- 11) Bacterial infections can cause a serious, potentially fatal systemic inflammatory response called
- A) anaphylaxis.
  - B) pelvic inflammatory disease.
  - C) septic shock.
  - D) pneumonia.

Answer: C

Topic: 24.2

Skill: Knowledge/Comprehension

- 12) The human lymphatic system consists of all of the following structures *except* the
- A) thymus.
  - B) tonsils.
  - C) spleen.
  - D) pancreas.

Answer: D

Topic: 24.3

Skill: Knowledge/Comprehension

- 13) The two main functions of the lymphatic system are
- A) coagulating blood and fighting infections.
  - B) producing hormones that regulate the immune system and coagulating blood.
  - C) producing hormones that regulate the immune system and fighting infections.
  - D) returning tissue fluid to the circulatory system and fighting infections.

Answer: D

Topic: 24.3

Skill: Knowledge/Comprehension

- 14) A molecule that can elicit an adaptive immune response is called
- A) a complement.
  - B) an interferon.
  - C) an antibody.
  - D) an antigen.

Answer: D

Topic: 24.4

Skill: Knowledge/Comprehension

15) Antibodies are

- A) amino acids.
- B) lipids.
- C) carbohydrates.
- D) proteins.

Answer: D

Topic: 24.4

Skill: Knowledge/Comprehension

16) One kind of vaccine consists of

- A) buffered antibodies.
- B) B cells.
- C) a harmless variant strain of a disease-causing microbe.
- D) antibiotics.

Answer: C

Topic: 24.4

Skill: Knowledge/Comprehension

17) Which of the following diseases cannot currently be prevented by vaccination?

- A) AIDS
- B) polio
- C) measles
- D) tetanus

Answer: A

Topic: 24.4

Skill: Knowledge/Comprehension

18) The transfer of antibodies in breast milk to an infant is an example of \_\_\_\_\_ immunity.

- A) nonspecific
- B) passive
- C) humoral
- D) active

Answer: B

Topic: 24.4

Skill: Knowledge/Comprehension

19) Passive immunity depends upon

- A) a person's own immune system producing antibodies.
- B) antibodies made by another organism.
- C) antibody-producing cells from another organism.
- D) antigens from a person's own body.

Answer: B

Topic: 24.4

Skill: Knowledge/Comprehension

20) Which of the following cell types is responsible for the humoral immune response?

- A) B cells
- B) neutrophils
- C) natural killer cells
- D) macrophages

Answer: A

Topic: 24.5

Skill: Knowledge/Comprehension

21) Which of the following statements about the humoral immune response is *true*?

- A) The humoral immune response defends against bacteria and viruses by activating T cells.
- B) The humoral immune response defends primarily against bacteria and viruses present in body fluids.
- C) The humoral immune response plays a major role in protecting the body from cancerous cells.
- D) The humoral immune response is the result of macrophages producing antibodies.

Answer: B

Topic: 24.5

Skill: Application/Analysis

22) Which of the following cell types is responsible for the cell-mediated immune response?

- A) T cells
- B) B cells
- C) leukocytes
- D) natural killer cells

Answer: A

Topic: 24.5

Skill: Knowledge/Comprehension

23) The adaptive immune system is capable of mounting specific responses to particular microorganisms because

- A) lymphocytes are able to change their antigen specificity as required to fight infection.
- B) stem cells determine which type of B and T cells to make.
- C) the body contains an enormous diversity of lymphocytes, each with the ability to respond to a different antigen.
- D) stem cells make different antigen receptors depending on the invading microorganism.

Answer: C

Topic: 24.5

Skill: Knowledge/Comprehension

24) Which of the following statements regarding antigens and antibodies is *false*?

- A) An antibody usually recognizes and binds to an antigenic determinant.
- B) A single antigen may stimulate the immune system to make several distinct antibodies to it.
- C) Most antigens are proteins or large polysaccharides on the surfaces of viruses or foreign cells.
- D) Each antibody has only one antigen-binding site.

Answer: D

Topic: 24.6

Skill: Knowledge/Comprehension

25) A primary immune response is

- A) the immune response elicited by the primary antigen of a disease-causing microorganism.
- B) the immune response elicited by the primary antibodies of a disease-causing microorganism.
- C) the immune response elicited by the first exposure of lymphocytes to a particular antigen.
- D) the immune response elicited by the first exposure of memory cells to a particular antigen.

Answer: C

Topic: 24.7

Skill: Knowledge/Comprehension

26) Clonal selection

- A) determines the pool of mature leukocytes that will be stimulated by macrophages.
- B) requires the activation of natural killer cells.
- C) describes the proliferation of B and T lymphocytes after they have been activated by an antigen.
- D) requires the presence and activation of complement.

Answer: C

Topic: 24.7

Skill: Knowledge/Comprehension

27) When a B cell first interacts with its particular antigen, the B cell

- A) dies after destroying the antigen.
- B) engulfs the antigen and digests it.
- C) differentiates and develops into a clone of antibody-producing effector cells.
- D) alters the chemical configuration of the antigen.

Answer: C

Topic: 24.7

Skill: Knowledge/Comprehension

28) Which of the following choices best describes a plasma cell?

- A) It is a differentiated T cell.
- B) It is a differentiated B cell.
- C) It responds to an antigen and differentiates into a B cell.
- D) It is produced during a primary immune response, persists, and multiplies in response to a reappearance of the antigen.

Answer: B

Topic: 24.7

Skill: Knowledge/Comprehension

29) The secondary immune response occurs when memory cells bind to

- A) hormones.
- B) antibodies.
- C) antigens.
- D) plasma cells.

Answer: C

Topic: 24.7

Skill: Knowledge/Comprehension

30) Which of the following distinguishes the secondary immune response from the primary immune response?

- A) The primary response is specific; the secondary one is not.
- B) The secondary response is faster and stronger.
- C) The primary response involves B cells; the secondary one involves T cells.
- D) The secondary response allows additional antigens to be recognized faster.

Answer: B

Topic: 24.7

Skill: Knowledge/Comprehension

31) Which of the following statements about antibodies is *false*?

- A) Antibody molecules are constructed from four polypeptide chains.
- B) Antibodies recognize and bind to particular antigens.
- C) The polypeptide chains of an antibody molecule have both a V (variable) region and a C (constant) region.
- D) The antibodies of mammals can be divided into two major classes.

Answer: D

Topic: 24.8

Skill: Knowledge/Comprehension

32) Antibody molecules may function by causing the

- A) destruction of complement proteins.
- B) agglutination of viruses or bacteria.
- C) solubilization of viruses or bacteria.
- D) crystallization of antigenic particles.

Answer: B

Topic: 24.9

Skill: Knowledge/Comprehension

33) The complement system can be activated by

- A) inflammatory mediators.
- B) antigen-antibody complexes.
- C) B cell plasma membrane.
- D) T cells.

Answer: B

Topic: 24.9

Skill: Knowledge/Comprehension

34) Monoclonal antibodies are produced

- A) by cells that are formed when a B cell is fused to a tumor cell.
- B) when a female is pregnant.
- C) when an animal is infected by a single type of pathogen.
- D) by cells that are formed when a B cell is fused to a T cell.

Answer: A

Topic: 24.10

Skill: Knowledge/Comprehension

35) Which of the following statements regarding monoclonal antibodies is *false*?

- A) Monoclonal antibodies are used in some home pregnancy tests.
- B) Monoclonal antibodies can be used to bind toxins to tumor cells.
- C) Monoclonal antibodies can be used to diagnose some sexually transmitted diseases.
- D) Monoclonal antibodies include several different antibodies that all bind to one antigen.

Answer: D

Topic: 24.10

Skill: Knowledge/Comprehension

36) The basic function of activated T cells is to battle

- A) pathogens in blood or lymph.
- B) pathogens in interstitial fluid.
- C) pathogens that have already entered body cells.
- D) chemical mediators of immunity.

Answer: C

Topic: 24.11

Skill: Knowledge/Comprehension

37) When an antigen-presenting cell interacts successfully with a helper T cell, the antigen-presenting cell secretes a signal molecule that assists in the activation of the helper T cell. This signal molecule is

- A) interferon.
- B) complement.
- C) interleukin-1.
- D) perforin.

Answer: C

Topic: 24.11

Skill: Knowledge/Comprehension

38) What type of cell helps to stimulate B cells to produce antibodies?

- A) plasma cell
- B) cytotoxic T cell
- C) helper T cell
- D) macrophage

Answer: C

Topic: 24.11

Skill: Knowledge/Comprehension

39) Which of the following is an effect of interleukin-2?

- A) stimulating helper T cells to divide
- B) stimulating mast cells to release histamine
- C) stimulating antigen-presenting cells
- D) modulating macrophage phagocytosis

Answer: A

Topic: 24.11

Skill: Knowledge/Comprehension



40) After binding to an infected cell, the cytotoxic T cell

- A) releases interleukin-1.
- B) becomes a phagocytic cell.
- C) neutralizes the infecting bacteria or viruses.
- D) releases a protein called perforin.

Answer: D

Topic: 24.12

Skill: Knowledge/Comprehension

41) \_\_\_\_\_ can destroy infected cells.

- A) Macrophages
- B) Plasma cells
- C) B cells
- D) Cytotoxic T cells

Answer: D

Topic: 24.12

Skill: Application/Analysis

42) Which of the following statements about HIV is *false*?

- A) The genome of HIV consists of RNA.
- B) HIV attacks mast cells.
- C) New HIV are produced inside helper T cells.
- D) Some drugs have proven effective in combating the spread of HIV from mothers to their children.

Answer: B

Topic: 24.13

Skill: Knowledge/Comprehension

43) Which of the following types of cells does HIV preferentially infect?

- A) cytotoxic T cells
- B) natural killer cells
- C) helper T cells
- D) memory cells

Answer: C

Topic: 24.13

Skill: Knowledge/Comprehension

44) Which of the following statements about AIDS is *true*?

- A) The AIDS vaccine can prevent the spread of HIV.
- B) There is now a treatment for AIDS that is simple and effective.
- C) Using condoms during sex prevents the spread of the virus that causes AIDS.
- D) AIDS patients live no longer than 2 to 3 years.

Answer: C

Topic: 24.13

Skill: Knowledge/Comprehension

- 45) HIV is a virus that is particularly difficult to eradicate
- A) because of its DNA genome.
  - B) because it rarely mutates.
  - C) because it mutates to produce new drug-resistant strains.
  - D) due to its small size.

Answer: C

Topic: 24.14

Skill: Knowledge/Comprehension

- 46) Why has it been so difficult for researchers to develop effective antivirals for HIV?
- A) because the virus is able to produce DNA as an intermediate in viral replication
  - B) because HIV has a high mutation rate
  - C) due to the damaged helper T cells that are targets for HIV
  - D) because HIV is a sexually transmitted viral disease

Answer: B

Topic: 24.14

Skill: Knowledge/Comprehension

- 47) \_\_\_\_\_ genes are responsible for coding for self-proteins.

- A) STR
- B) MHC
- C) RFLP
- D) PCR

Answer: B

Topic: 24.15

Skill: Knowledge/Comprehension

- 48) Which of the following diseases is thought to be an autoimmune disease?

- A) cancer of the bone marrow
- B) insulin-dependent diabetes mellitus
- C) measles and mumps
- D) duodenal ulcer

Answer: B

Topic: 24.16

Skill: Knowledge/Comprehension

- 49) What type of immune response is always disadvantageous to a person?

- A) inflammatory
- B) humoral
- C) autoimmune
- D) complement-mediated

Answer: C

Topic: 24.16

Skill: Knowledge/Comprehension

50) Which of the following compounds is produced and secreted by mast cells during an allergic reaction?

- A) interferon
- B) allergens
- C) histamine
- D) perforin

Answer: C

Topic: 24.17

Skill: Knowledge/Comprehension

51) Anaphylactic shock is an example of an

- A) autoimmune disease.
- B) immunodeficiency disease.
- C) allergic response.
- D) acquired autoimmune disease.

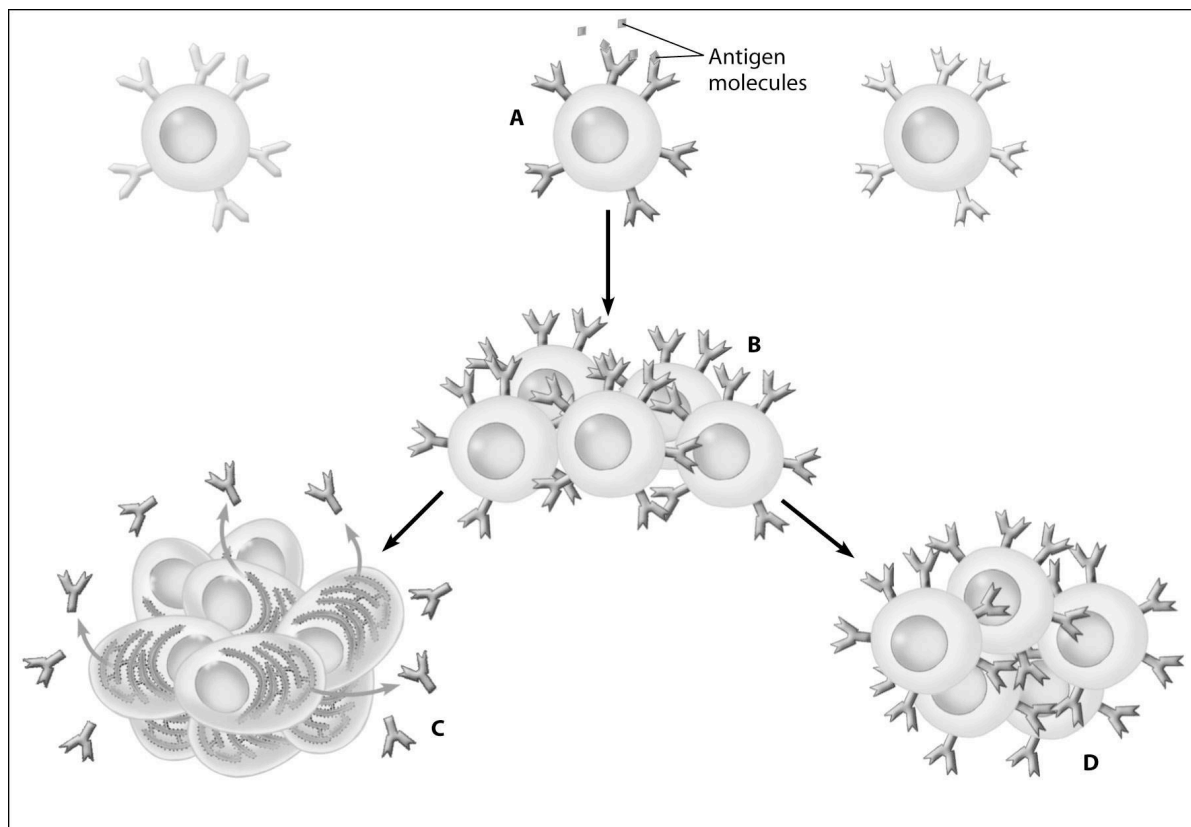
Answer: C

Topic: 24.17

Skill: Knowledge/Comprehension

24.2 Art Questions

1) Which part of this figure shows an active plasma B cell?



A) part A

B) part B

C) part C

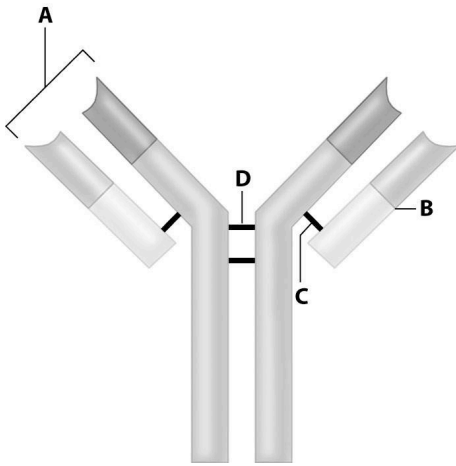
D) part D

Answer: C

Topic: 24.7

Skill: Knowledge/Comprehension

2) Where is the antigen-binding site of this antibody?



- A) site A
- B) site B
- C) site C
- D) site D

Answer: A

Topic: 24.8

Skill: Knowledge/Comprehension

### 24.3 Scenario Questions

*After reading the paragraph, answer the question(s) that follow.*

To protect U.S. soldiers serving overseas, each soldier receives vaccinations against several diseases, including smallpox, before deployment. Following intelligence about an imminent smallpox threat, the Army wants to ensure that soldiers stationed in Iraq are fully protected from exposure to the disease, so all the soldiers in the threat zone are given a second vaccination against smallpox.

1) The first vaccination provides immunity because

- A) a localized inflammatory response is initiated.
- B) the vaccine contains manufactured antibodies against smallpox.
- C) antigenic determinants in the vaccine activate B cells, which form plasma cells as well as memory cells.
- D) the vaccine contains antibiotics and other drugs that kill the smallpox virus.

Answer: C

Topic: 24.7

Skill: Application/Analysis

2) The second vaccination is beneficial because

- A) it contains plasma cells that survive longer than 4-5 days.
- B) it stimulates production of a higher concentration of antibodies in the bloodstream.
- C) it requires two injections to stimulate antibody formation.
- D) it keeps previously produced plasma cells circulating in the bloodstream.

Answer: B

Topic: 24.7

Skill: Application/Analysis