

## Chapter 1 Overview of the Immune System

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1. Which is the best definition of “immunity”?
  - A. The state of having been exposed to a pathogen repeatedly
  - B. The state of being resistant to reinfection with a pathogen
  - C. When an individual has never been exposed to a pathogen
  - D. When the immune system is activated
  - E. When physical barriers are not enough to prevent infection

**Answer: B**

**Section: A Historical Perspective**

**Difficulty: 1**

**Hint: Vaccines can induce immunity.**

2. What happens to a pathogen as it becomes attenuated?
  - A. It becomes more dangerous to the host.
  - B. It gets smaller.
  - C. It has weakened virulence.
  - D. It becomes older.
  - E. All of the above

**Answer: C**

**Section: A Historical Perspective**

**Difficulty: 2**

**Hint: Attenuated viruses are used as vaccines.**

3. Which of the following is the BEST example of herd immunity?
  - A. A child infected with measles travels from Germany to the United States. Several babies contract the disease, but the outbreak is largely contained due to vaccinations.
  - B. Certain populations of cattle are less susceptible to infection with encephalitis because of their genetic makeup.
  - C. Once a certain threshold of individuals has been infected with a novel human pathogen, it is unlikely that any more will be.
  - D. Geese and chickens are infected with different strains of influenza because they express different receptors on their cell surface.
  - E. When infection spreads through a population, certain individuals generate stronger immune responses than others.

**Answer: A**

**Section: A Historical Perspective**

**Difficulty: 2**

**Hint: The herd protects the individual.**

4. Which of the following diseases does NOT currently have an effective vaccine?

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- A. Chicken pox
- B. Polio
- C. HIV
- D. Small pox
- E. Diphtheria

**Answer: C**

**Section: A Historical Perspective**

**Difficulty: 1**

**Hint: Most vaccines protect almost everyone from infection.**

5. Effectors of the humoral immune system are known as:

- A. antibodies.
- B. immunoglobulin.
- C. complement.
- D. B cells.
- E. All of the above

**Answer: E**

**Section: A Historical Perspective**

**Difficulty: 1**

**Hint: There is a cellular and a humoral component to the adaptive immune response.**

6. Which of the following cell types are lymphocytes?

- A. Macrophages
- B. Mast cells
- C. Neutrophils
- D. Erythrocytes
- E. T cells

**Answer: E**

**Section: A Historical Perspective**

**Difficulty: 1**

**Hint: lymphocytes are involved in adaptive immunity.**

7. Which of the following is TRUE about antigens?

- A. They are always derived from pathogens.
- B. They are always proteins.
- C. They are recognized by T cells or B cells.
- D. They must be microbial in origin.
- E. They usually cause cellular damage.

**Answer: C**

**Section: A Historical Perspective**

**Difficulty: 1**

**Hint: There are many kinds of antigens.**

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8. Two main early theories were proposed to explain how antigen-specific antibodies develop: the instructional theory and the selective theory. How did the two differ? Which was ultimately shown to be CORRECT?

**Answer:** The selective theory says that, when an antigen receptor binds with an antigen, the cell becomes activated (or the cell is selected to proliferate and secrete more copies of the receptor). The instructional theory says that the antigen receptor molds itself to the antigen. The selective theory was shown to be correct.

**Section: A Historical Perspective**

**Difficulty: 3**

**Hint: There is a cellular and a humoral component to the adaptive immune response.**

9. Which of the following is a fungal pathogen?

- A. *Vibrio cholerae*
- B. *Leishmania major*
- C. Poliovirus
- D. *Candida albicans*
- E. *Bordetella pertussis*

**Answer: D**

**Section: Important Concepts for Understanding the Mammalian Immune Response**

**Difficulty: 1**

**Hint: Yeasts are fungi.**

10. Which of the following cell types is MOST commonly associated with recognizing antigens found inside of cells?

- A. Macrophages
- B. B cells
- C. Th cells
- D. CTL
- E. Antibodies

**Answer: D**

**Section: Important Concepts for Understanding the Mammalian Immune Response**

**Difficulty: 1**

**Hint: Viruses are found inside of cells.**

11. Which of the following classes of cell surface receptors are directly encoded in the germline?

- A. TCR
- B. BCR
- C. PRR
- D. Antibodies
- E. All of the above

**Answer: C**

**Difficulty: 1**

**Section: Important Concepts for Understanding the Mammalian Immune Response**

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**Hint: Some receptors are randomly generated rather than encoded in the germline.**

12. What is the central mechanism for establishing self-tolerance?

- A. Self-reactive T cells and B cells are killed during development.
- B. Individuals that have immune systems that respond to self-antigens do not survive to reproduce.
- C. Immune cells that react to self-antigens are turned off when they recognize self-tissues.
- D. Certain immune suppressive cytokines are maintained in tissues to dampen auto reactive immune responses.
- E. Peripheral tissues have mechanisms to kill T or B cells that respond to them.

**Answer: A**

**Section: Important Concepts for Understanding the Mammalian Immune Response**

**Difficulty: 1**

**Hint: Central tolerance develops as cells are maturing.**

13. Complete the following table comparing and contrasting innate and adaptive immune responses.

	Innate Immunity	Adaptive Immunity
Is mediated by what cells?		
What do they recognize?		
How are the receptors encoded?		
Why can't they control all infections alone?		
What do they do in response to antigen?		

**Answer:**

	Innate Immunity	Adaptive Immunity
Is mediated by what cells?	Macrophages, NK cells, neutrophils, mast cells eosinophils	T cells and B cells
What do they recognize?	Pathogen patterns	Specific epitopes

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How are the receptors encoded?	Germline	Rearranged gene segments
Why can't they control all infections alone?	Pathogens evolve escape mechanisms	Takes too long to develop
What do they do in response to antigen?	Engulf and destroy, induce inflammation	Produce antibodies, kill infected cells

### Section: Important Concepts for Understanding the Mammalian Immune Response

**Difficulty: 3**

**Hint: Review Table 1-4.**

14. What are the hallmarks of inflammation? Describe the physical characteristics of someone experiencing an inflammatory response.

**Answer:** Redness, swelling, heat, pain. Someone experiencing inflammation might have localized swelling and redness or itching, or may be experiencing faintness due to a lowering of blood pressure if more severe.

### Section: Important Concepts for Understanding the Mammalian Immune Response

**Difficulty: 2**

**Hint: Many people experience inflammation in response to an insect bite.**

15. Which of the following BEST describes chemokines?

- A. Membrane receptors that detect the presence of soluble messengers in the environment
- B. Soluble proteins that recruit specific cells to an area
- C. Chemical messengers that induce cell differentiation
- D. Transcription factors that induce the expression of genes involved in cell adhesion
- E. Adhesion molecules that bind to the inside of blood vessels

**Answer: B**

### Section: Important Concepts for Understanding the Mammalian Immune Response

**Difficulty: 2**

**Hint: Chemokines are a specific kind of cytokine.**

16. Which of the following statements BEST differentiates innate and adaptive immune responses?

- A. Innate responses are stronger during the primary and less important during the secondary response, while adaptive responses are less robust during primary responses and stronger during secondary responses.
- B. Innate responses are weaker during the primary and more robust during the secondary response, while adaptive responses are stronger during the primary and weaker during secondary responses.
- C. Innate responses are slower and weaker than adaptive responses.
- D. Adaptive responses are slower and weaker than innate responses.
- E. Adaptive responses are required for effective immune responses, while innate responses are not required.

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**Answer: A**

**Section: Important Concepts for Understanding the Mammalian Immune Response**

**Difficulty: 2**

**Hint: Innate and adaptive responses are intertwined.**

17. True or False? The innate and adaptive immune responses largely work independently of one another.

**Answer: False**

**Section: Important Concepts for Understanding the Mammalian Immune Response**

**Difficulty: 2**

**Hint: How are adaptive responses initiated?**

18. How do memory cells develop?

- A. Upon reinfection, memory centers in the brain send signals to the bone marrow to induce T-cell and B-cell differentiation.
- B. T cells and B cells from the primary response persist and become reactivated.
- C. Innate cells are trained to activate new T cells and B cells more quickly with secondary infection.
- D. T cells and B cells from the primary infection slowly mutate their receptors over time, priming themselves for the secondary response.
- E. Innate cells modify their cell surface receptors to prepare for reinfection.

**Answer: B**

**Section: Important Concepts for Understanding the Mammalian Immune Response**

**Difficulty: 2**

**Hint: Memory cells are derived from effector cells.**

19. Which of the following is the BEST example of a hypersensitivity reaction?

- A. T cells responding vigorously to the flu virus
- B. B cells failing to respond to HIV allowing it to replicate out of control
- C. Inflammation of the airways in response to pollen
- D. Anemia as a result of iron deficiency
- E. T cells attacking the myelin sheath of nerves resulting in paralysis.

**Answer: C**

**Section: The Good, Bad, and Ugly of the Immune System**

**Difficulty: 2**

**Hint: Hypersensitivity reactions occur in response to common, benign antigens.**

20. The hygiene hypothesis posits that there is a connection between environmental conditions and certain inappropriate immune responses. If you were a supporter of the hygiene hypothesis, what recommendations would you make to keep people healthier?

**Answer:** Expose children to more common antigens found in dirt and in the outdoors. Reduce use of antimicrobials.

**Section: The Good, Bad, and Ugly of the Immune System**

**Difficulty: 3**

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**Hint: This hypothesis suggests that hygienic conditions have caused immune responses to become skewed toward allergy.**

21. HIV disease is a/an:

- A. autoimmune disease.
- B. hypersensitivity disease.
- C. immunodeficiency.
- D. genetic disorder.
- E. allergic reaction.

**Answer: C**

**Section: The Good, Bad, and Ugly of the Immune System**

**Difficulty: 1**

**Hint: People with HIV disease get sick more often than usual.**

22. Predict the outcome of being immunosuppressed as it relates to the development of cancer.

- A. Immunosuppressed individuals are at lower risk of cancer because cytokines produced by the immune system induce cancer.
- B. Immunosuppressed individuals are at lower risk of cancer because they are more likely to contract infectious diseases.
- C. Immunosuppressed individuals are at higher risk of cancer because the immune system recognizes and destroys cancerous cells.
- D. Immunosuppressed individuals are at higher risk of cancer because they bear a higher load of microbes that damage host tissues.
- E. None of the above.

**Answer: C**

**Section: The Good, Bad, and Ugly of the Immune System**

**Difficulty: 3**

**Hint: T cells can recognize modified host proteins.**

23. What occurs when someone receives a tissue transplant from an unrelated individual?

- A. The host's lymphocytes enter the tissues and become suppressed.
- B. The host's lymphocytes enter the tissues and become activated.
- C. The host's lymphocytes that react to the tissue graft are deleted in the thymus.
- D. The donor's lymphocytes suppress the host's lymphocytes, allowing for graft survival.
- E. The donor's lymphocytes destroy the host's immune system.

**Answer: B**

**Section: The Good, Bad, and Ugly of the Immune System**

**Difficulty: 3**

**Hint: People receiving transplants are often put on immunosuppressive drugs.**

24. Which of the following is TRUE?

- A. Vaccines cause autism.
- B. Vaccines cause obesity.

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- C. Vaccines cause cancer.
- D. Vaccines cause diabetes.
- E. None of the above

**Answer: E**

**Section: A Historical Perspective**

**Difficulty: 1**

**Hint: The Lancet article was retracted.**

25. Conditions in which the immune system attacks self-antigens are known as:

- A. autoimmunity.
- B. immune deficiency.
- C. hypersensitivities.
- D. neuroplasias.
- E. None of the above

**Answer: A**

**Section: The Good, Bad, and Ugly of the Immune System**

**Difficulty: 2**

**Hint: People with HIV disease get sick more often than usual.**