

MULTIPLE CHOICE

1. Which action is a purpose of the inflammatory process?
 - a. To provide specific responses toward antigens
 - b. To lyse cell membranes of microorganisms
 - c. To prevent infection of the injured tissue
 - d. To create immunity against subsequent tissue injury

ANS: C

If the epithelial barrier is damaged, then a highly efficient local and systemic response (inflammation) is mobilized to limit the extent of damage, to protect against infection, and to initiate the repair of damaged tissue. The response to a specific offending agent is the function of the adaptive immune response. Lysosomes lyse cell membranes. Immunity against a subsequent tissue injury occurs through the action of B cells and T cells.

PTS: 1 DIF: Cognitive Level: Remembering

2. How do surfactant proteins A through D provide innate resistance?
 - a. Initiate the complement cascade.
 - b. Promote phagocytosis.
 - c. Secrete mucus.
 - d. Synthesize lysosomes.

ANS: B

The lung produces and secretes a family of glycoproteins, collectins, which includes surfactant proteins A through D and mannose-binding lectin. Collectin binding facilitates macrophages to recognize the microorganism, enhancing macrophage attachment, phagocytosis, and killing. The complement cascade occurs during the inflammatory phase. These proteins do not secrete mucus or synthesize lysosomes.

PTS: 1 DIF: Cognitive Level: Remembering

3. Which secretion is a first line of defense against pathogen invasion that involves antibacterial and antifungal fatty acids, as well as lactic acid?
 - a. Optic tears
 - b. Oral saliva
 - c. Sweat gland perspiration
 - d. Sebaceous gland sebum

ANS: D

Sebaceous glands in the skin secrete sebum that is made up of antibacterial and antifungal fatty acids and lactic acid that provide the first-line barrier against pathogen invasion. Perspiration, tears, and saliva contain an enzyme (lysozyme) that attacks the cell walls of gram-positive bacteria.

PTS: 1 DIF: Cognitive Level: Remembering

4. Which bacterium grows in the intestines after prolonged antibiotic therapy?
 - a. *Lactobacillus*
 - b. *Candida albicans*
 - c. *Clostridium difficile*
 - d. *Helicobacter pylori*

ANS: C

Prolonged antibiotic treatment can alter the normal intestinal flora, decreasing its protective activity and leading to the overgrowth of other microorganisms, such as the bacterium *C. difficile* in the colon. *C. albicans* can overgrow in the vagina but does not usually cause intestinal issues. *Lactobacillus* and *Helicobacter* also do not produce intestinal overgrowth problems with antibiotic use.

PTS: 1 DIF: Cognitive Level: Remembering

5. What causes the edema that occurs during the inflammatory process?
 - a. Vasodilation of blood vessels
 - b. Increased capillary permeability
 - c. Endothelial cell expansion
 - d. Emigration of neutrophils

ANS: B

The increased flow and capillary permeability result in a leakage of plasma from the vessels, causing swelling (edema) in the surrounding tissue and is solely responsible for inflammation-induced edema. Vasodilation (increased size of the blood vessels) causes slower blood velocity and increases blood flow to the injured site. Endothelial cell contraction (not expansion) leads to increased capillary permeability. Emigration of neutrophils to the area of infection/injury leads to increased destruction of the offending agent.

PTS: 1 DIF: Cognitive Level: Remembering

6. What process causes heat and redness to occur during the inflammatory process?
- Vasodilation of blood vessels
 - Platelet aggregation
 - Decreased capillary permeability
 - Endothelial cell contraction

ANS: A

The increased blood flow as a result of vasodilation and increasing concentration of red cells at the site of inflammation cause locally increased warmth and redness. Platelet aggregation is important in the clotting cascade. Decreased capillary permeability would affect local edema. Endothelial cell contraction leads to increased capillary permeability and the formation of edema.

PTS: 1 DIF: Cognitive Level: Remembering

7. What does activation of the classical pathway begin with?
- Viruses
 - Antigen-antibody complexes
 - Mast cells
 - Macrophages

ANS: B

Activation of the *classical pathway* begins only with the activation of protein C1 and is preceded by the formation of a complex between an antigen and an antibody to form an antigen-antibody complex (immune complex). Infection with a virus can lead to the start of the inflammatory process, but is not the specific activation factor. Mast cells release the contents of their granules to initiate synthesis of other mediators of inflammation among other actions. Macrophages are one cell type involved in phagocytosis.

PTS: 1 DIF: Cognitive Level: Remembering

8. What plasma protein system forms a fibrinous meshwork at an inflamed site?
- Complement
 - Coagulation
 - Kinin
 - Fibrinolysis

ANS: B

The coagulation (clotting) system is a group of plasma proteins that form a fibrinous meshwork at an injured or inflamed site. This protein system (1) prevents the spread of infection to adjacent tissues, (2) traps microorganisms and foreign bodies at the site of inflammation for removal by infiltrating cells (e.g., neutrophils and macrophages), (3) forms a clot that stops the bleeding, and (4) provides a framework for future repair and healing. The complement system, kinins, and fibrinolysis do not form a fibrinous meshwork at an inflamed site.

PTS: 1 DIF: Cognitive Level: Remembering

9. Which component of the plasma protein system tags pathogenic microorganisms for destruction by neutrophils and macrophages?
- Complement cascade
 - Coagulation system
 - Kinin system
 - Immune system

ANS: A

C3b (a component of the complement cascade) adheres to the surface of a pathogenic microorganism and serves as an efficient opsonin. Opsonins are molecules that *tag* microorganisms for destruction by cells of the inflammatory system, primarily neutrophils and macrophages. The other options do not accurately identify a component capable of tagging pathogenic microorganisms.

PTS: 1 DIF: Cognitive Level: Remembering

10. What is the vascular effect of histamine released from mast cells?
- Platelet adhesion
 - Initiation of the clotting cascade
 - Vasodilation
 - Increased endothelial adhesiveness

ANS: C

Histamine, when released from mast cells, causes vasodilation. It does not cause platelet adhesion, initiation of the clotting cascade, or increased endothelial adhesiveness.

PTS: 1 DIF: Cognitive Level: Remembering

11. What is an outcome of the complement cascade?
- Activation of the clotting cascade
 - Prevention of the spread of infection to adjacent tissues
 - Inactivation of chemical mediators such as histamine
 - Lysis of bacterial cell membranes

ANS: D

The complement cascade can be activated by at least three different means, and its products have four functions: (1) anaphylatoxic activity, resulting in mast cell degranulation, (2) leukocyte chemotaxis, (3) opsonization, and (4) cell lysis. The complement cascade does not activate the clotting cascade, prevent spread of infection, or inactivate chemical mediators.

PTS: 1 DIF: Cognitive Level: Remembering

12. What is the function of opsonization related to the complement cascade?
- To tag pathogenic microorganisms for destruction by neutrophils and macrophages
 - To process pathogenic microorganisms so that activated lymphocytes can be created for acquired immunity
 - To destroy glycoprotein cell membranes of pathogenic microorganisms
 - To promote anaphylatoxic activity, resulting in mast cell degranulation

ANS: A

Opsonins are molecules that tag microorganisms for destruction by cells of the inflammatory system (opsonization), primarily neutrophils and macrophages. Opsonization does not process pathogenic microorganisms, destroy glycoprotein cell membranes, or promote anaphylatoxic activity.

PTS: 1 DIF: Cognitive Level: Remembering

13. In the coagulation (clotting) cascade, the intrinsic and the extrinsic pathways converge at which factor?
- XII
 - VII
 - X
 - V

ANS: C

The coagulation cascade consists of the extrinsic and intrinsic pathways that converge only at factor X.

PTS: 1 DIF: Cognitive Level: Remembering

14. Which chemical interacts among all plasma protein systems by degrading blood clots, activating complement, and activating the Hageman factor?
- Kallikrein
 - Histamine
 - Bradykinin
 - Plasmin

ANS: D

Only plasmin regulates clot formation by degrading fibrin and fibrinogen, and it can activate the complement cascade through components C1, C3, and C5. Plasmin can activate the plasma kinin cascade by activating the Hageman factor (factor XII) and producing prekallikrein activator.

PTS: 1 DIF: Cognitive Level: Remembering

15. How does the chemotactic factor affect the inflammatory process?
- By causing vasodilation around the inflamed area
 - By stimulating smooth muscle contraction in the inflamed area
 - By directing leukocytes to the inflamed area
 - By producing edema around the inflamed area

ANS: C

Two chemotactic factors, neutrophil chemotactic factor (NCF) and eosinophil *chemotactic factor of anaphylaxis* (ECF-A), are released during mast cell degranulation. NCF attracts neutrophils (a type of leukocytes), and ECF-A attracts eosinophils to the site of inflammation. The other options do not accurately describe the affect chemotactic factors have on the inflammatory process.

PTS: 1 DIF: Cognitive Level: Remembering

16. What effect does the process of histamine binding to the histamine-2 (H₂) receptor have on inflammation?
- Inhibition
 - Activation
 - Acceleration
 - Termination

ANS: A

Binding histamine to the H₂ receptor is generally antiinflammatory because it results in the suppression of leukocyte function. Binding to H₂ receptors does not cause activation, acceleration, or termination of the inflammatory process.

PTS: 1 DIF: Cognitive Level: Remembering

17. Frequently when H₁ and H₂ receptors are located on the same cells, they act in what fashion?
- Synergistically
 - Additively
 - Antagonistically
 - Agonistically

ANS: C

Both types of receptors are distributed among many different cells and are often present on the same cells and may act in an antagonistic fashion. For instance, neutrophils express both types of receptors, with stimulation of H₁ receptors resulting in the augmentation of neutrophil chemotaxis and H₂ stimulation resulting in its inhibition. The two receptors do not act synergistically, additively, or agonistically.

PTS: 1 DIF: Cognitive Level: Remembering