Chapter 1: Immunology: Basic Principles and Applications in the Blood Bank

MULTIPLE CHOICE

1. Select the cell involved in acquired immunity.
   a. Neutrophils
   b. Platelets
   c. Lymphocytes
   d. Red cells
   ANS: C
   Lymphocytes have specific receptors that recognize previously encountered antigens.
   DIF: Level 2

2. What cells are also known as antigen-presenting cells?
   a. Neutrophils
   b. Macrophages
   c. Lymphocytes
   d. Platelets
   ANS: B
   Macrophages engulf and present peptides to lymphocytes.
   DIF: Level 1

3. Select the term that is associated with the B-cell response to antigens.
   a. Humoral immunity
   b. Cellular immunity
   c. Innate immunity
   d. Nonspecific immunity
   ANS: A
   B cells produce antibody, a humoral response.
   DIF: Level 2

4. Select the cell involved in the clearance of viral infected cells, tumor cells, and foreign-tissue grafts.
   a. CD8 cells
b. T helper cells
c. CD4 cells
d. B cells

ANS: A

CD8\(^+\), or cytotoxic T cells, remove damaged, infected, or foreign cells.

DIF: Level 1

5. Which of the following is responsible for the activation of the classic pathway of complement?
   a. Bacteria
   b. Foreign proteins
   c. Virus
   d. Antibody bound to antigen

ANS: D

An antigen-antibody complex activates the classical complement cascade, whereas bacterial membranes activate the alternative pathway.

DIF: Level 1

6. The major histocompatibility complex is located on chromosome 6 and is important in all the following immune functions except:
   a. recognition of nonself.
   b. graft rejection.
   c. hemolysis.
   d. coordination of cellular and humoral immunity.

ANS: C

The major histocompatibility complex codes for molecules on all nucleated tissues and cells to allow for immune recognition and response to foreign antigens.

DIF: Level 2

7. Human leukocyte antigen antibodies are often stimulated following a patient’s repeated transfusions of platelets. This poor response to platelet transfusion is known as:
   a. nonresponders.
   b. refractoriness.
   c. immune activation.
   d. responders.

ANS: B

Repeated platelet transfusions that contain leukocytes can increase the immune response to human leukocyte antigen and decrease the effectiveness of platelet transfusion.
8. In a lymphocytotoxicity test, cells that take on the dye:
   a. do not recognize a human leukocyte antigen.
   b. recognize a red cell antibody.
   c. are not affected by complement.
   d. are recognized by a specific antibody.

   ANS: D
   A specific antigen-antibody complex in the lymphocytotoxicity test is detected by membrane damage, which allows the cells to become permeable to dye.

DIF: Level 2

9. In a serologic test, the term prozone is also known as:
   a. equivalence.
   b. antigen excess.
   c. antibody excess.
   d. serum-to-cell ratio.

   ANS: C
   Antibody excess is termed prozone, often leading to a false-negative reaction.

DIF: Level 1

10. What is the potential effect in a tube agglutination test if a red cell suspension with a concentration greater than 5% is used?
   a. False negatives
   b. False positives
   c. Hemolysis
   d. No effect

   ANS: A
   Antigen excess is termed postzone and will lessen the reaction.

DIF: Level 3

11. After adding antigen and antibody to a test tube, one large agglutinate was observed. How should this reaction be graded?
   a. 2+
   b. 3+
   c. 4+
   d. 0

   ANS: C
   One large agglutinate is graded a 4+ reaction.

DIF: Level 2
12. Select the portion of the antibody molecule that imparts the antibody’s unique class function.
   a. Constant region of the heavy chain  
   b. Constant region of the light chain  
   c. Variable region of the heavy chain  
   d. Variable region of the light chain  

   ANS: A  
   The heavy-chain constant region has the function of the class.  

   DIF: Level 1  

13. What portion of the antibody molecule binds to receptors on macrophages and assists in the removal of antibody bound to red cells?
   a. Fab fragment  
   b. Hinge region  
   c. Fc fragment  
   d. J chain  

   ANS: C  
   The Fc portion of the antibody binds to the macrophage, which then carries the antigen-antibody complex to the spleen for removal.  

   DIF: Level 1  

14. Select the region of the antibody molecule responsible for imparting unique antibody specificity.
   a. Variable region  
   b. Constant region  
   c. Hinge region  
   d. Fc fragment  

   ANS: A  
   The variable region is the unique antigen binding site that gives each antibody its specificity.  

   DIF: Level 1  

15. What immunoglobulin class is capable of crossing the placenta?
   a. IgM  
   b. IgA  
   c. IgE  
   d. IgG  

   ANS: D  
   Only IgG can cross the placenta as a result of IgG receptor binding cites on placental cells.
16. What immunoglobulin class reacts best by antiglobulin testing?
   a. IgM
   b. IgA
   c. IgE
   d. IgG

   ANS: D
   The antiglobulin test detects IgG antibodies on red cells.

   DIF:  Level 1

17. What immunoglobulin class reacts best at room temperature at immediate spin?
   a. IgM
   b. IgA
   c. IgE
   d. IgG

   ANS: A
   IgM is a large immunoglobulin with multiple binding sites that is detectable at room temperature and the immediate spin phase.

   DIF:  Level 2

18. Which of the following red cell antigens do proteolytic enzymes destroy?
   a. Rh system antigens
   b. Antigens Fy\(^a\) and Fy\(^b\) in the Duffy system
   c. Antigens in the Kidd system
   d. Lewis system antigens

   ANS: B
   Proteolytic enzymes such as ficin will destroy some antigens on red cells such as Fy\(^a\) and Fy\(^b\) M,N,S.

   DIF:  Level 1

19. The purpose of adding antibody-sensitized red cells following the antiglobulin test is to:
   a. make sure a weak antibody reaction was not missed.
   b. confirm positive reactions.
   c. check that the wash procedure was sufficient to remove unbound antibodies.
   d. check that sufficient incubation took place.

   ANS: C
   Antibody-sensitized red cells (check cells) are IgG-coated cells that will detect unbound antihuman globulin following proper washing techniques.
DIF:  Level 2

20. An antibody with a specificity other than to one’s own cells or tissue that is stimulated by transfusion or pregnancy is termed an:
   a. autoantibody.
   b. isoantibody.
   c. alloantibody.
   d. immunogen.

   ANS:  C
   Alloantibodies are antibodies produced from exposure to foreign cells through transfusion or pregnancy.

DIF:  Level 1

21. Which of the following will cause an antigen to elicit a greater immune response?
   a. Small antigen size
   b. Composed largely of carbohydrates
   c. Size greater than 10,000 daltons
   d. Similarity to the host

   ANS:  C
   Antigens will elicit a better immune response if they are larger than 10,000 daltons, are foreign to the host, and are made of proteins.

DIF:  Level 1

MATCHING

Select the antiglobulin test that best fits the description below.

a. Indirect antiglobulin test
b. Direct antiglobulin test
c. Both the direct and indirect antiglobulin test

1. Incubation step is not necessary
2. Requires washing the cells several times before the addition of antihuman globulin reagent
3. Tests for certain clinical conditions such as hemolytic disease of the newborn and autoimmune hemolytic anemia
4. Detects IgG or complement-coated red cells

1. ANS:  B DIF:  Level 2
2. ANS:  C DIF:  Level 2
3. ANS:  B DIF:  Level 2
4. ANS:  C DIF:  Level 2