Chapter 2: Blood Banking Reagents: Overview and Applications
Test Bank

MULTIPLE CHOICE

1. Select the test that uses IgG-sensitized red cells (check cells).
   a. Antiglobulin test
   b. D-antigen typing
   c. Rh-antigen typing
   d. B-antigen detection

   ANS: A
   The antiglobulin test requires the use of IgG-sensitized cells to verify that a negative reaction was not caused by improper washing, omitting the antiglobulin reagent, or reagent problems.

   DIF: Level 1 REF: p. 47

2. Select the method that uses a dextran-acrylamide matrix.
   a. Solid-phase red cell adherence
   b. Microplate
   c. Gel technology
   d. Tube techniques

   ANS: C
   The dextran-acrylamide gel matrix traps agglutinated cells, making antigen-antibody reactions visible.

   DIF: Level 1 REF: p. 49

3. What reagent contains antibodies to multiple antigenic epitopes?
   a. Polyclonal-based
   b. Monoclonal-based
   c. Heterophile antibody-based
   d. Alloantibody-based

   ANS: A
   Polyclonal reagents contain antibodies to more than one antigen specificity.

   DIF: Level 1 REF: p. 33

4. The evidence for reagent red cell deterioration may include which of the following?
   a. Spontaneous agglutination
   b. Significant hemolysis
   c. Loss of agglutination strength over time
   d. All of the above

   ANS: D
   Each observation listed may indicate a reagent red cell problem that could lead to false reactions.

   DIF: Level 2 REF: p. 32

5. Reagent antibodies prepared from human sources are:
   a. unsafe.
   b. too low in potency to be effective.
   c. polyclonal in specificity.
   d. preferred because of their lower cost.

   ANS: C
   Human-derived antisera have antibodies to more than one specificity and meet Food and Drug Administration guidelines for potency and safety.

   DIF: Level 1 REF: p. 33

6. Monoclonal antibodies are prepared in:
   a. vitro.
   b. vivo.
   c. laboratory animals.
   d. humans.

   ANS: A
   Monoclonal antibodies are prepared from antibody-producing B lymphocytes and myeloma cells in a hybridoma that is cultured in vitro.

   DIF: Level 1 REF: p. 33

7. Which of the following is *not* an advantage of using a monoclonal antibody over a polyclonal antibody?
   a. There are very few variations between lots.
   b. There are no contaminating antibodies.
   c. Direct agglutination is usually faster.
   d. All variations of the antigen can be detected.

   ANS: D
   Antigen variations, such as the partial D phenotype, may be missed by some monoclonal D antibodies.

   DIF: Level 2 REF: p. 34

8. Product limitations and technical considerations for each reagent can be found in the:
   a. standard operating procedure.
   b. product insert.
   c. Food and Drug Administration code of regulations.
   d. AABB standards.

   ANS: B
   The product insert outlines the technical considerations, procedural guidelines, and product limitations for each reagent.

   DIF: Level 1 REF: p. 32

9. Solid-phase red cell adherence used for antibody detection has an advantage over tube testing because:

a. there is no washing involved.
b. incubation time is not necessary.
c. the endpoint is more clearly defined.
d. indicator cells (IgG-coated cells) are not necessary.

ANS: C
Well-defined endpoints make reading results more consistent and reliable.

DIF: Level 2 REF: p. 52

10. Which of the following statements is true regarding IgG-sensitized red cells?
a. They must be used to confirm a negative antiglobulin tube test.
b. They must be used to confirm a positive antiglobulin test.
c. They must be used to confirm a direct antiglobulin test that was negative with anti-C3d.
d. They should be used only with the indirect antiglobulin test.

ANS: A
IgG-sensitized red cells are used as a control for false-negative antiglobulin tests.

DIF: Level 2 REF: p. 47

11. The gel technology method uses a concentration of red cells that is:
a. higher than tube techniques.
b. lower than tube techniques.
c. the same as the 3% to 5% requirement for tube testing.
d. variable according to the test performed.

ANS: B
The gel method uses a 0.8% suspension of red cells.

DIF: Level 1 REF: p. 50

12. The antiglobulin test was performed using gel technology. A button of cells was observed at the bottom of the microtube following centrifugation. This result indicates a:
a. problem with the card.
b. negative reaction.
c. strong positive reaction.
d. failure to wash correctly.

ANS: B
Red cells that are not trapped by the antihuman globulin reagent will travel unimpeded through the length of the tube.

DIF: Level 3 REF: p. 51

13. Which of the following statements is true regarding high-protein anti-D reagents?
a. They have been largely replaced with low-protein monoclonal reagents.
b. They contain approximately 20% bovine albumin.
c. They may increase the possibility of a false-positive reaction, requiring the use of a control.
d. All of the above are true.

ANS: D
High-protein anti-D reagent requires the use of a control to verify that positive reactions are the result of an antigen-antibody reaction and not agglutination caused by the reagent additive. For this reason, the use of monoclonal anti-D is more commonly used.

DIF: Level 2 REF: p. 36

14. How would you interpret the results if both the anti-D reagent and the Rh control were 2+ agglutination reactions?
    a. D-positive
    b. D-negative
    c. Unable to determine without further testing
    d. Depends on whether the sample was from a patient or a blood donor

ANS: C
The Rh control should be negative for the test to be valid.

DIF: Level 2 REF: p. 36

15. Which red cells are used to screen for antibodies in donor samples?
    a. Screening cells (two vials)
    b. Pooled screening cells
    c. Panel cells
    d. Screening cells (three vials)

ANS: B
Pooled screening cells are acceptable for screening antibodies in donor samples.

DIF: Level 2 REF: p. 39

16. Polyspecific antihuman globulin contains:
    a. anti-IgG.
    b. anti-C3b and anti-C3d.
    c. anti-IgG and anti-C3d.
    d. anti-IgG and anti-IgM.

ANS: C
Polyspecific antihuman globulin contains specificities to the heavy chain IgG and complement component, C3d.

DIF: Level 1 REF: p. 45

17. The indirect antihuman globulin test is incubated at what temperature?
    a. 22° C
    b. 37° C
    c. 4° C
    d. 56° C

ANS: B
Incubation takes place at body temperature, which is 37° C.

DIF: Level 1 REF: p. 43

18. Why is incubation omitted in the direct antihuman globulin test?
    a. The direct antiglobulin test can be used in an emergency to replace the indirect test.
    b. Incubation will cause hemolysis.
    c. The antigen-antibody complex has already formed in vivo.
    d. IgM antibodies are detected in the direct antiglobulin test.

    ANS: C
    Incubation of the antigen-antibody complex essentially has taken place within the patient (or donor), making additional incubation in the tube unnecessary.

    DIF: Level 2 REF: p. 42

19. In the solid-phase red cell adherence test, a negative test would appear as:
    a. a button of cells on the bottom of the well.
    b. adherence of cells along the sides and bottom of the wells.
    c. hemolysis of red cells.
    d. a line of cells along the top of the well.

    ANS: A
    Indicator cells added in the final step that do not adhere to the wells have not reacted with the antibody and therefore will form a button on the bottom of the well.

    DIF: Level 1 REF: p. 53

20. Following centrifugation of the gel card, red cells are observed to be evenly dispersed throughout one of the microtubes. This reaction could be graded as a:
    a. 4+.
    b. 3+.
    c. 2+.
    d. 1+.

    ANS: C
    A 2+ reaction is demonstrated with red cells throughout the microtube.

    DIF: Level 2 REF: p. 51

21. 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 REF: p. 40

22. 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 REF: p. 48

23. 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 REF: p. 47

24. Polyethylene glycol is a reagent that can be added to the screen or panel in order to:
a. enhance detection of IgM antibodies.
b. eliminate the reactivity of certain antigen.
c. increase the avidity of IgG antibodies.
d. eliminate the need for washing in the indirect antiglobulin test.

ANS: C
Polyethylene glycol (PEG) concentrates antibodies and increases the rate of antibody uptake, increasing the avidity of IgG antibody reactions.

DIF: Level 2 REF: p. 48

25. Rouleaux is a false-positive reaction that would *not* likely be observed during which of the following tests?
a. Immediate spin antibody screen
b. Weak D test
c. Reverse typing in the ABO test
d. ABO forward typing

ANS: B
Rouleaux are caused by an elevated protein level or IV solutions and cause cells to appear agglutinated. A procedure involving washing, such as the direct or indirect antiglobulin test, would not be affected by this because saline would eliminate the excess proteins.

DIF: Level 3 REF: p. 37

MATCHING

Select the reagent from the list below and match it to the routine blood banking procedure.
a. Panel cells
b. Screening cells

c. A_1 and B cells
d. ABO antisera
e. Lectins

1. Reagent derived from plants used to distinguish group A_1 from group A_2 red cells
2. Reagent used to determine the ABO antigenic composition of a patient's red cells
3. Reagent to detect the presence of red cell antibodies and B cells
4. Reagent to identify the specificity of a red cell antibody antisera
5. Reagent used in the identification of ABO antibodies

1. ANS: E DIF: Level 2
2. ANS: D DIF: Level 2
3. ANS: B DIF: Level 2
4. ANS: A DIF: Level 2
5. ANS: C DIF: Level 2

Select the antiglobulin test that best fits the descriptions below. A selection may be used more than once.

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

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

6. ANS: B DIF: Level 2
7. ANS: C DIF: Level 2
8. ANS: B DIF: Level 2
9. ANS: C DIF: Level 2