Blood Typing
Laboratory Exercise 40

Background

Blood typing involves identifying protein substances called antigens that are present in red blood cell membranes. Although there are many different antigens associated with human red blood cells, only a few of them are of clinical importance. These include the antigens of the ABO group and those of the Rh group. To determine which antigens are present, a blood sample is mixed with blood-typing sera that contain known types of antibodies. If a particular antibody contacts a corresponding antigen, a reaction occurs, and the red blood cells clump together (agglutination). Thus, if blood cells are mixed with serum containing antibodies that react with antigen A and the cells clump together, antigen A must be present in those cells.

Materials Needed

Textbook
ABO and Rh blood-typing kit

For Demonstration:
Disposable slide
Alcohol prep pad
Sterile blood lancet
Stirring sticks
Anti-A serum
Anti-B serum
Anti-D serum
Adhesive bandage

Purpose of the Exercise

Determine the ABO blood type of a blood sample and observe an Rh blood-typing test.
**Procedure**

2. Perform the ABO blood type test and the Rh blood type test using the blood-typing kit. To do this, follow these steps:
   a. Obtain a disposable slide with three “wells” for the blood.
   b. Place a small drop of blood in each of the three areas.
   c. Add a drop of anti-A serum to the well marked with an A, add a drop of anti-B serum to the well marked with a B, and add a drop of anti-D serum to the well marked with an Rh. 
      *(Avoid contaminating the serum. Do not touch the blood with the serum while it is in the dropper. Allow the serum to fall from the dropper to the blood.)*
   d. Use the color-coded stirring sticks to stir the blood and serum samples. **Do not cross-contaminate the samples** by stirring more than one sample with the same stick. *(The blue stick is for sample A, the yellow stick is for sample B, and the white stick is for sample Rh.)*
   e. Examine the samples for clumping of blood cells (agglutination) after about 2 minutes. *(Note that the anti-D serum and blood mixture may take longer and the agglutinations may be much smaller than those of anti-A and anti-B.)*
   f. Use table 40.1 and figure 40.2 as an aid in interpreting the test results.
   g. Dispose of all materials as directed by the instructor.
3. Complete Part B and Part D of the laboratory report.

**Table 40.1**

**Possible Reactions of ABO Blood-Typing Sera**

<table>
<thead>
<tr>
<th>Reactions</th>
<th>Blood Type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anti-A Serum</strong></td>
<td><strong>Anti-B Serum</strong></td>
</tr>
<tr>
<td>Agglutinations</td>
<td>No agglutinations</td>
</tr>
<tr>
<td>No agglutinations</td>
<td>Agglutinations</td>
</tr>
<tr>
<td>Agglutinations</td>
<td>Agglutinations</td>
</tr>
<tr>
<td>No agglutinations</td>
<td>No agglutinations</td>
</tr>
</tbody>
</table>
**Figure 40.2** Four possible results of the ABO test.

<table>
<thead>
<tr>
<th>Blood being tested</th>
<th>Serum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type AB (contains antigens A and B); agglutinates with both sera</td>
<td>Anti-A; Anti-B</td>
</tr>
<tr>
<td>Type B (contains antigen B); agglutinates with anti-B serum</td>
<td></td>
</tr>
<tr>
<td>Type A (contains antigen A); agglutinates with anti-A serum</td>
<td></td>
</tr>
<tr>
<td>Type O (contains no antigens); no agglutination occurs</td>
<td></td>
</tr>
</tbody>
</table>

**Critical Thinking Application**

Which ABO and Rh blood type is pictured below? ________________________
Part A

Complete the following statements:

1. The antigens of the ABO blood group are located in the ________________.

2. The blood of every person contains one of (how many possible?) __________ combinations of antigens.

3. Type A blood contains antigen _______________.

4. Type B blood contains antigen _______________.

5. Type A blood contains antibody ________________ in the plasma.

6. Type B blood contains antibody ________________ in the plasma.

7. Persons with ABO blood type ___________ are often called universal recipients.

8. Persons with ABO blood type ___________ are often called universal donors.

9. Although antigens are present at the time of birth, antibodies usually do not appear in the blood until the age of _________________.

Part B

Answer the following questions for your ABO blood type:

1. What was the ABO type of the blood tested?

2. What ABO antigens are present in the red blood cells of this type of blood?

3. What ABO antibodies are present in the plasma of this type of blood?

4. If a person with this blood type needed a blood transfusion, what ABO type or types of blood could be received safely?

5. If a person with this blood type was serving as a blood donor, what ABO blood type or types of blood could receive the blood safely?
Part C

Complete the following statements:

1. The Rh blood group was named after the ____________________.
2. Of the antigens in the Rh group, the most important is ____________________.
3. If red blood cells lack Rh antigens, the blood is called ____________________.
4. Rh antibodies form only in persons with _________________ type blood in response to special stimulation.
5. If an Rh-negative person who is sensitive to Rh-positive blood receives a transfusion of Rh-positive blood, the donor’s cells are likely to ________________.
6. An Rh-negative woman, who might be carrying an _________________ fetus, is given an injection of RhoGAM to prevent erythroblastosis fetalis.

Part D

Answer the following questions for your Rh blood type:

1. What was the Rh type of the blood tested?
2. What Rh antigen is present in the red blood cells of this type of blood?
3. What Rh antibody is normally present in the plasma of this type of blood?
4. If a person with this blood type needed a blood transfusion, what type of blood could be received safely?
5. If a person with this blood type was serving as a blood donor, a person with what type of blood could receive the blood safely?