

Name _____ Period: ___ Date: _____

Ms. Randall A & P

Lab activity: Blood Typing and Immunity

Background:

Blood typing involves identifying the antigens present on red blood cells (RBC) membranes. Although many different antigens exist on human RBCs, those of clinical importance include A, B and Rh antigens.

A person normally produces antibodies against those antigens not present on their RBCs but does not produce antibodies against those that are present. Thus, a person with antigen A has anti-B antibodies in their blood. In the United States, 45% of the population is type O, 39% is type A, 12% is type B, and 4% is type AB.

Blood type is determined by multiple alleles IA, IB and i. IA and IB are co-dominant and both are dominant over i. Genotypes IA IA and IAi result in blood type A. Genotypes IB IB and IB i result in blood type B. When both IA and IB are present, the blood type is AB. When both alleles are i, the blood type is O.

Table 1: ABO System (fill in this table)

Blood Type	Antigens on Erythrocytes	Antibodies in Plasma	Can Receive Blood Cells from Groups:	Can Give Blood Cells to Groups:
A				
B				
AB				
O				

Blood typing is performed with antiserum-blood serum that contains specific antibodies. For ABO blood typing, antibodies against A and B antigen (these antibodies are also called anti-A and anti-B antibodies) are used. If clumping or clotting occurs in the test blood upon exposure to the A antibodies (anti-A serum), the blood contains the A antigen. If clumping occurs in the test blood upon exposure to the B antibodies (anti-B serum), the blood contains the B antigen. If clotting occurs with both A and B antibodies (anti-A and anti-B sera), the type is AB, and if no clumping occurs with either serum type, the type is O.

Another antigen found on human RBCs is the Rh factor. An individual who lacks factor is designated as Rh-. As a result, a person could be A+ or A-. Anti-Rh antibodies are produced upon exposure and sensitization to Rh antigens. An Rh- mother carrying an Rh+ child may experience this exposure during birth when some of the baby's blood may enter the mother's bloodstream. The mother will then produce anti-Rh antibodies. This produces a potentially hazardous situation for a future Rh+ fetus carried by an Rh- mother. If the mother's blood contains anti-Rh antibodies, they can pass through the placenta and destroy the red blood cells in her baby's blood.

Table 2 Agglutination Reactions of ABO Blood-Typing Sera (Fill in this table).

Blood type			Reaction		
Draw a red blood cell of this "type"	A/B/O	+/-	A antibodies (Anti-A serum)	B antibodies (Anti-B serum)	Rh antibodies (Anti-D serum)
	Type A	+			
	Type A	-			
	Type B	+			
	Type B	-			
	Type AB	+			
	Type AB	-			
	Type O	+			
	Type O	-			

Activity: Determining Blood Type for 4 Unknown Samples

Two women have given birth in the hospital. Both are new moms and are being cared for by new nurses. In an unprecedented mix up, the new nurses are unsure about which baby belongs to which mom. Because both babies have already had blood drawn for testing, the nurses decide to use blood type to identify which babies goes with which mom. They are hoping their blood typing efforts will reveal a definitive relationship.

Objective: To perform standard tests used for blood type identification and determine which baby belongs with each mom.

Materials:

- sample 1: Bertha
- sample 2: Baby 1
- sample 3: Gertrude
- sample 4: Baby 2
- Anti-A serum
- Anti-B serum
- Anti-D serum (Anti Rh)
- Blood typing tray
- Toothpicks (for mixing)

Procedure:

1. Gather a complete set of blood typing materials.
2. Using the dropper vial, place a drop of the first synthetic blood sample in each well of the blood typing tray. Replace the cap on the dropper vial. Always replace the cap on one vial before opening the next vial to prevent cross contamination.
3. Add a drop of synthetic anti-A (blue) to the well labeled A. Replace the cap.
4. Add a drop of synthetic anti-B serum (yellow) to the well labeled B. Replace the cap.
5. Add a drop of synthetic anti-Rh serum (clear) to the well labeled Rh. Replace the cap.
6. Using a different toothpick for each well (blue for anti-A, yellow for anti-B, white for anti-Rh), gently stir the synthetic blood and anti-serum drops for 30 seconds.
7. Carefully examine the thin films of liquid mixture left behind. If a film remains uniform in appearance, there is no agglutination. If the sample appears granular or coagulated, agglutination has occurred.
8. Record your observations in the following table, and indicate the blood type of the individual.
9. Repeat steps 1 through 7 for synthetic blood samples 2, 3, and 4.

	<i>Data:</i> Anti A	<i>Data:</i> Anti B	<i>Data:</i> Anti D (Rh)	<i>Conclusion:</i> BLOOD TYPE
Bertha				
baby 1				
Gertrude				
Baby 2				

Analysis:

1. Gertrude's husband has blood type B⁺
What baby belongs to which woman? How do you know?
2. What are the possible blood types for Bertha's husband? How do you know?
3. Both Bertha and Gertrude are first time mothers. Could either of them have blood type related issues with future children? Explain.