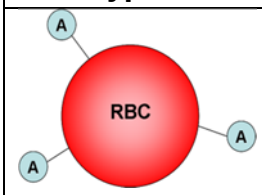
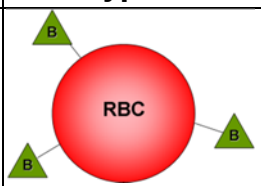
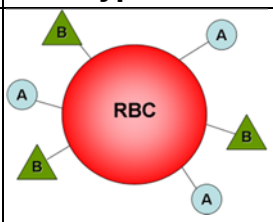
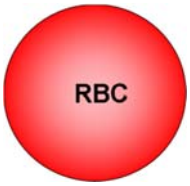
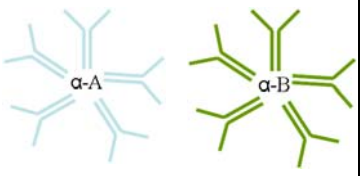
ABO and Rh blood groups

"Why can we donate blood to some people but not to others?"

Model 1: Blood Surface Antigens and Plasma Antibodies

Type A	Type B	Type AB	Type O
			
Surface antigen A	Surface antigen B	Surface antigens A & B	Neither A or B antigens
			
Anti-B antibodies	Anti-A antibodies	Neither anti-A or anti-B antibodies	Both anti-A and anti-B antibodies

Critical Thinking Questions

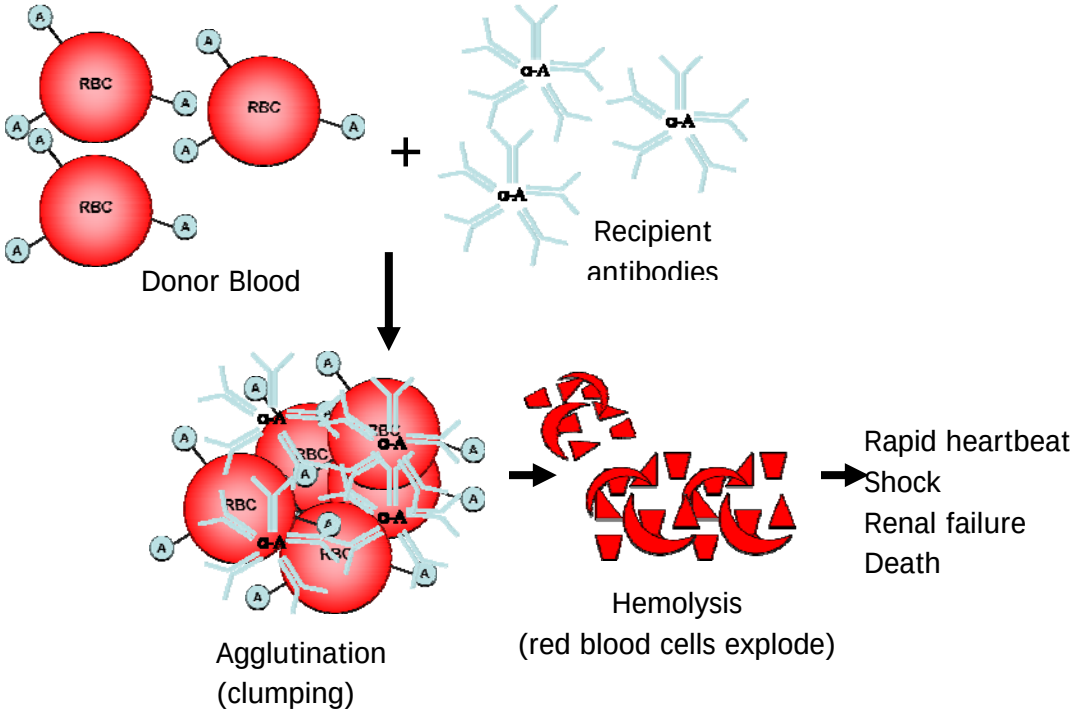
1. If Dr. Brown has type A blood, what cell-surface marker proteins or **antigens** does he have on his red blood cells (RBC)?

2. Looking at the bottom half of the model, what antibodies are likely present in Dr. Brown's blood?

3. Dr. Mrs. Brown has type O blood, according to the model what surface antigens does she have on her red blood cells?

4. What antibodies are likely present in her blood?

Model 2: ABO mis-match reaction



Critical Thinking Questions

5. What is the blood type of the donor?

6. What is the blood type of the recipient?

7. What reaction occurs between the donor's red blood cells and the recipient's opposing antibodies?

    a. What process follows agglutination?

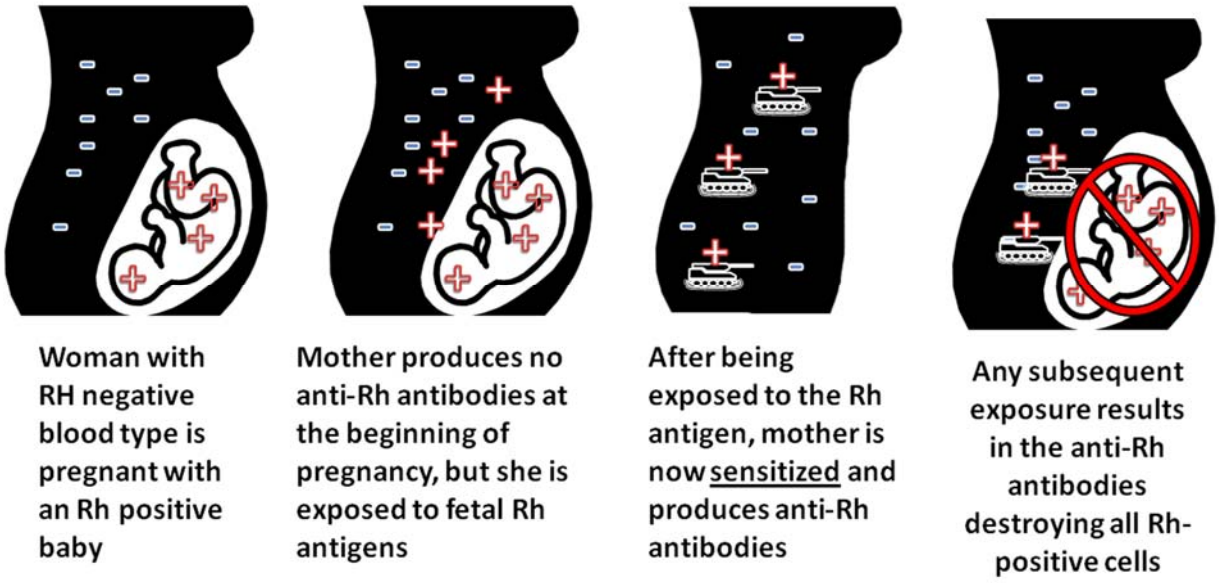
8. Blood mis-matches can result in a condition called **Acute Hemolytic Reaction**. What are the symptoms of this reaction?

9. Would agglutination have occurred if the recipient was given type O blood cells?

    a. Provide a consensus explanation for your answer.

Memorization fact: In addition to ABO, there is another component of blood type – the **Rh factor**. People who posses Rh antigens are referred to as Rh positive (e.g. O+ have nether A or B but they do have Rh), people without Rh antigens are Rh negative (A- would have the A antigen but not B or Rh).

Model 3: Erythroblastosis faetalis (a disease in which a pregnant woman's anti-Rh antobodies destroy fetal red blood cells and typically results in miscarriage).



Critical Thinking Questions:

10. Dr. Brown has the blood type A negative. According to the model and the memorization fact, to what antigen does the word "negative" refer?

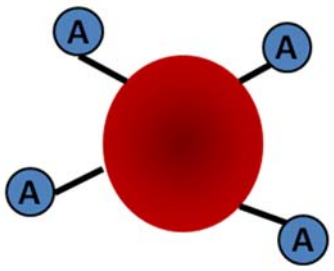
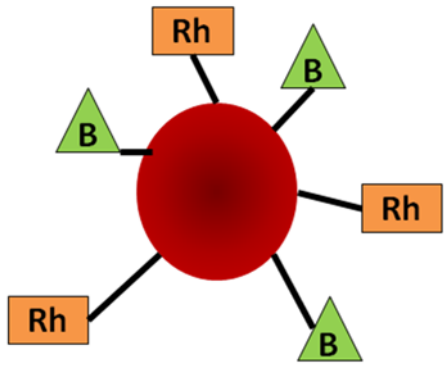
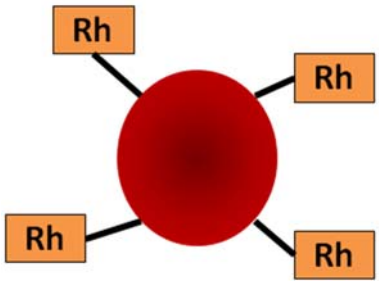
11. Compare the first pregnancy with the second, does it appear that the first baby was affected by the mother's immune system? What triggers the mother's sensitivity to the Rh antigen?

12. Based on the model, if Dr. Brown has never been exposed to the Rh antigen, what do you think will happen if he is transfused with A positive blood?

13. What will happen if he is transfused with A+ blood a second time?

Exercises:

1. Using the cartoons below, write out the complete blood type (ABO and Rh) for each picture indicated.

		
Blood type:	Blood type:	Blood type:

2. Fill in the table for the indicated blood type, use an X to indicate if that particular presence is present in the indicated blood type (see example for type A- blood):

Blood type	A antigens	anti-A antibodies	B antigens	anti-B antibodies	Rh antigens	Can receive a donation from
A-	X			X		A-, O-
A+						
B-						
B+						
AB-						
AB+						
O-						
O+						

2. After filling in the table above, which blood type can be considered the universal donor?

3. Likewise, which can be considered the universal recipient?