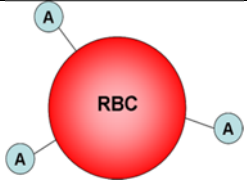
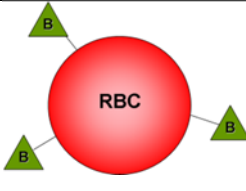
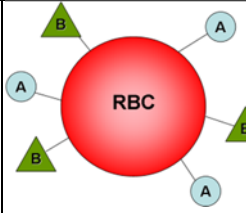
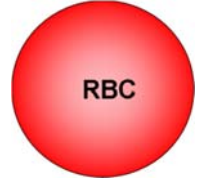
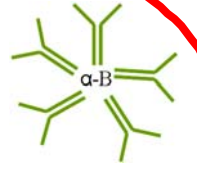

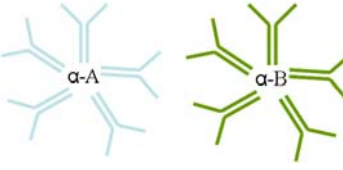


# ABO and Rh blood groups

"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
 <p>Surface antigen A</p>	 <p>Surface antigen B</p>	 <p>Surface antigens A &amp; B</p>	 <p>Neither A or B antigens</p>
 <p>Anti-B antibodies</p>	 <p>Anti-A antibodies</p>	<p>Neither anti-A or anti-B antibodies</p>	 <p>Both anti-A and anti-B antibodies</p>

## 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)?

**A** antigens

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

**anti-B** **α-B**

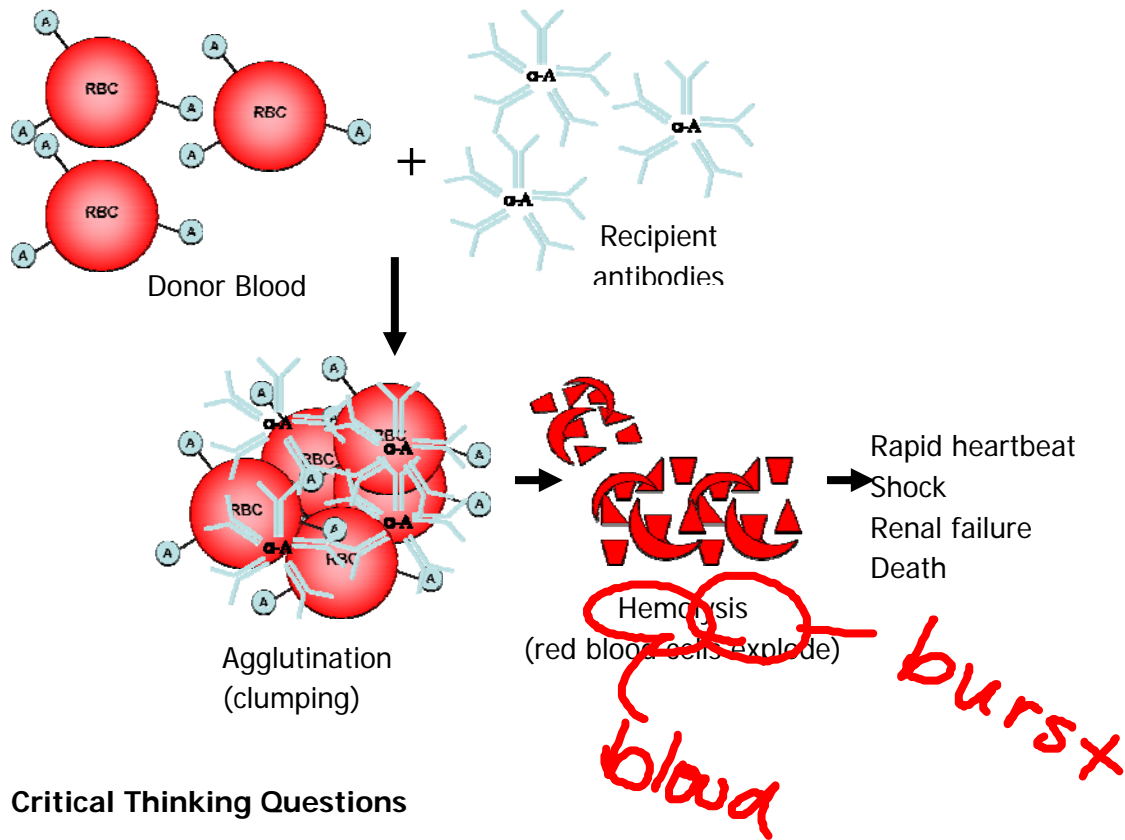
3. Dr. Mrs. Brown has type O blood, according to the model what surface antigens does she have on her red blood cells?

**no antigens**

4. What antibodies are likely present in her blood?

**αA, αB**

**Model 2: ABO mis-match reaction**



**Critical Thinking Questions**

5. What is the blood type of the donor?

*A*

6. What is the blood type of the recipient?

*B*

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

*agglutination*

a. What process follows agglutination?

*hemolysis*

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

*heart ↑, shock, kidney failure ↓ die*

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

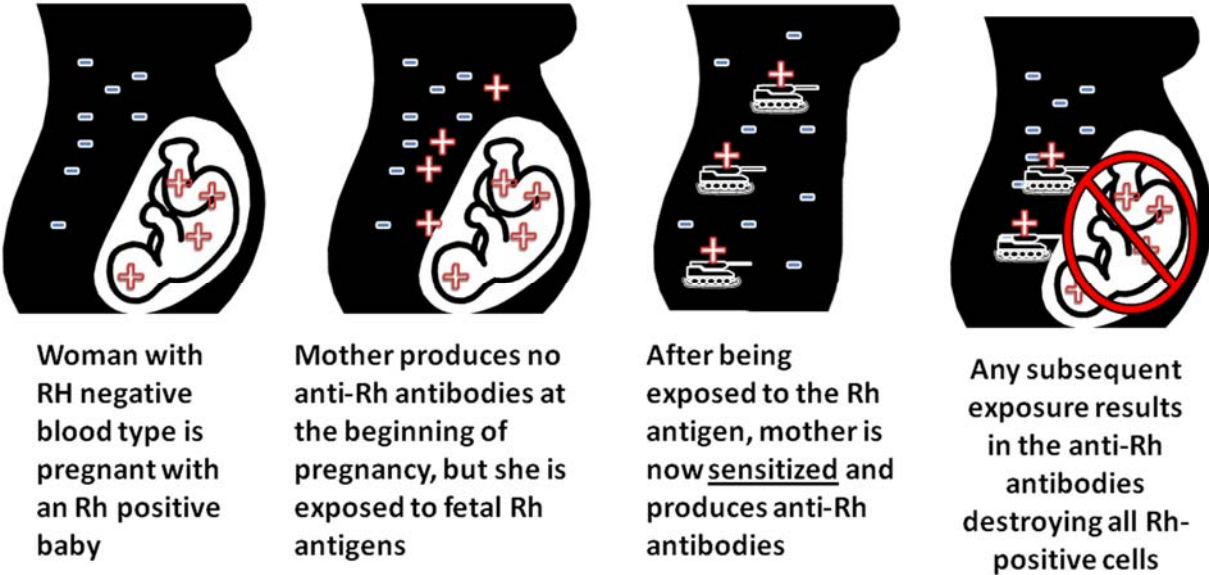
*No*

a. Provide a consensus explanation for your answer.

*• Blood type O doesn't have antigens for the anti-A to fight against*

**Memorization fact:** In addition to ABO, there is another component of blood type – the **Rh factor**. People who possess Rh antigens are referred to as Rh positive (e.g. O+ have neither 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 foetalis** (a disease in which a pregnant woman's anti-Rh antibodies 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?

Rh factor

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?

1st baby fine

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?

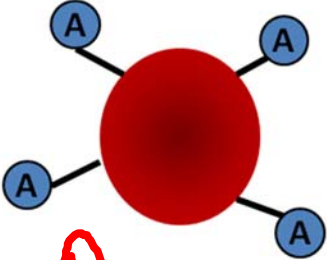
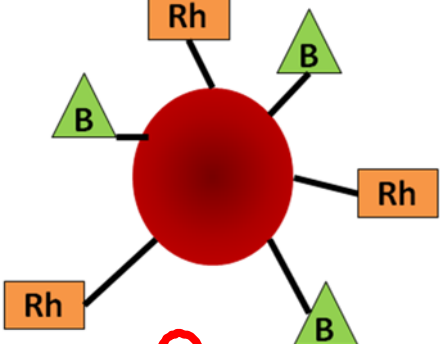
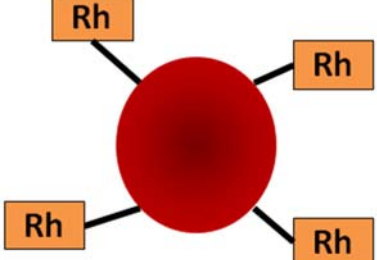
A-ve      A+ve → agglutination + hemolysis

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

- more dramatic agglutination

**Exercises:**

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

		
<p style="color: red; font-size: 2em; font-weight: bold;">A-</p>	<p style="color: red; font-size: 2em; font-weight: bold;">B+</p>	<p style="color: red; font-size: 2em; font-weight: bold;">O+</p>
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+	X			X	X	O-, A+, A-, O+
B-		X	X			B-, O-, A-, O+
B+		X	X		X	B+, B-, O+, O-
AB-	X		X			A-, B-, O-, AB-
<b>AB+</b>	X		X		X	A-, A+, B-, B+, AB-, AB+
O-		X		X		O-
O+		X		X	X	O-, O+

antigen  
↓  
⊙

O-, A+, A-, O+  
B-, O-, A-, O+  
B+, B-, O+, O-  
A-, B-, O-, AB-  
A-, A+, B-, B+, AB-, AB+  
O-  
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?

O-  
AB+