# Will It Clump?

Investigate ABO matches for packed red cell transfusions

**HS-AP8-2** "Conduct an investigation to learn about the ABO blood type. Discuss how the surface-antigens and plasma antibodies allow and/or disallow for certain blood transfusions."

NAME _____ DATE _____

## 1 READ AND MARK

Read it twice

**YOUR JOB** Underline each blood type's red cell antigens, circle its plasma antibodies, and number the steps of the test. Use your marks to decide whether a recipient's plasma would react with donor cells.

### A Test Before Transfusion

1. A hospital cannot judge a red blood cell transfusion by the color of blood. In the ABO system, red cells may carry A antigens, B antigens, both, or neither on their surfaces. These patterns name the four types: A has A antigens, B has B antigens, AB has both, and O has neither. Antigens are molecules the immune system can recognize. For a packed red cell transfusion, the key question is whether a recipient's plasma will attack antigens on the donor's red cells. The ABO label alone does not tell the whole story; plasma matters too.

2. Plasma contains antibodies that can bind to unfamiliar ABO antigens. Type A plasma has anti-B antibodies, type B plasma has anti-A antibodies, type AB plasma has neither, and type O plasma has both anti-A and anti-B. When an antibody binds a matching antigen on a red cell, cells can clump together, a reaction called agglutination. Such a reaction can lead to dangerous destruction of transfused cells. A safe ABO match avoids donor red cell antigens that the recipient's plasma antibodies would recognize. Compatibility here concerns packed red cells, not a transfusion of donor plasma.

3. To investigate a possible match without exposing a patient, a lab can mix a small sample of donor red cells with recipient plasma in a labeled test well. A second well with saline instead of plasma can help show how the cells look without antibody binding. After mixing, the lab checks for visible clumps. Clumping signals that an antibody in the plasma recognized a donor cell antigen, so that ABO pairing should be rejected. No clumping supports ABO compatibility for the tested samples, but other checks still matter. Hospitals also check the Rh factor and follow additional safety procedures.

## 2 ANSWER WITH EVIDENCE

Use the passage

1. Type A packed red cells are mixed with type B recipient plasma. Predict whether the cells will clump, and identify the antibody and antigen involved.

2. Type O packed red cells are mixed with type A recipient plasma. Predict the result and explain it using antigens and antibodies.

3. Could type AB recipient plasma accept type B packed red cells based on ABO matching? Explain your decision.

4. Type AB donor cells clump in type O recipient plasma but not in saline. What does this comparison show about the proposed transfusion?

## 3 YOUR TURN

Your own words

Design a simulated test of type A packed red cells with type A and type O recipient plasma. Describe the test wells and a saline control, predict each result, and use antigens and antibodies to explain which transfusion the ABO results would support.

# Will It Clump?



## PART 1 · READ AND MARK

Underline each blood type's red cell antigens, circle its plasma antibodies, and number the steps of the test. Use your marks to decide whether a recipient's plasma would react with donor cells. Accept any marking that follows this job and points at the right text.

## PART 2 · ANSWERS

| # | QUESTION | ANSWER |
|---|---|---|
| 1 | Type A packed red cells are mixed with type B recipient plasma. Predict whether the cells will clump, and identify the antibody and antigen involved. | **They will clump. The recipient's anti-A antibodies bind to A antigens on the donor cells.** |
| 2 | Type O packed red cells are mixed with type A recipient plasma. Predict the result and explain it using antigens and antibodies. | **They should not clump. Type A plasma has anti-B antibodies, but type O donor cells have neither A nor B antigens.** |
| 3 | Could type AB recipient plasma accept type B packed red cells based on ABO matching? Explain your decision. | **Yes. Type B cells have B antigens, but type AB plasma has no anti-B antibodies to bind them.** |
| 4 | Type AB donor cells clump in type O recipient plasma but not in saline. What does this comparison show about the proposed transfusion? | **The recipient's anti-A and anti-B antibodies can bind the donor cells' A and B antigens. The lack of clumping in saline supports that plasma antibodies caused the reaction, so this ABO pairing should be rejected.** |

## PART 3 · YOUR TURN (SAMPLE ANSWER)

I would place type A donor red cells in three labeled wells, adding type A plasma to one, type O plasma to another, and saline to the control. I predict no clumping with type A plasma because its anti-B antibodies cannot bind the donor cells' A antigens. I predict clumping with type O plasma because its anti-A antibodies can bind those A antigens. The saline well should not clump. These ABO results would support the transfusion to the type A recipient, but not to the type O recipient.

Accept equivalent explanations that correctly match recipient antibodies to donor red cell antigens. No clumping supports ABO compatibility only; it does not establish that all transfusion safety checks have been met.