Blood Bank Decisions

Use antibody tests to trace ABO transfusion compatibility.

HAP.9.2 "Distinguish the cellular difference between the ABO blood groups and investigate blood type differences utilizing antibodies to determine compatible donors and recipients."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline what each reagent result reveals about red blood cells, circle statements about antibodies in plasma, and number each patient's and donor's test results. Use your marks to compare donor cells with patient plasma.

A Decision at the Blood Bank

1. At a hospital blood bank, a technician checks whether donated red blood cells can enter a patient's circulation safely. ABO letters describe molecules called antigens on the surface of red blood cells. Type A cells carry A antigens, type B cells carry B antigens, type AB cells carry both, and type O cells carry neither. Plasma, the liquid around these cells, contains antibodies that can attach to unfamiliar ABO antigens. A person's plasma contains anti-A antibodies if their red cells lack A antigens, and anti-B antibodies if their red cells lack B antigens. These patterns help explain dangerous transfusion reactions.

2. To find a blood type, a technician mixes separate drops of a person's red cells with anti-A and anti-B testing reagents. Clumping with a reagent means its matching antigen is present on those cells; no clumping means that antigen is absent. For a packed red cell transfusion, the key question reverses direction: could antibodies in the patient's plasma attack antigens on the donor's cells? Such an attack can make cells clump and break apart. In this investigation, every patient and donor is Rh-negative. Real blood banks also check other blood groups and perform a crossmatch before transfusion.

3. At the testing bench, patient Nia's cells clump with anti-A but not anti-B. Patient Omar's cells clump with both reagents. Donor 1's cells clump only with anti-B, while donor 2's cells do not clump with either reagent. Donor 3's cells clump with both reagents. The technician must infer each sample's antigens before considering a donation. A label alone cannot show whether a patient's antibodies would attack a donor's cells. The goal is to identify which red cell surfaces are safe for a particular patient's plasma, rather than to match letters by appearance.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do Nia's and Omar's red blood cell surfaces differ? Use their test results as evidence.

2. What is donor 1's ABO type? Could Nia receive donor 1's red cells? Explain using antigens and antibodies.

3. Which of the three donors could give packed red cells to Omar under the conditions in the passage? Explain.

4. Compare donors 2 and 3 for Nia. Which one's red cells could she receive, and what makes the other donation unsafe?

3 YOUR TURN

Your own words

Invent a patient and donor with an ABO pairing not used by a patient and donor at the testing bench. In four or five sentences, give each person's results with anti-A and anti-B, identify their ABO types, describe the donor's antigens and the patient's plasma antibodies, and decide whether the donor's red cells are ABO-compatible.

ANSWER KEY

Blood Bank Decisions

PART 1 · READ AND MARK

Underline what each reagent result reveals about red blood cells, circle statements about antibodies in plasma, and number each patient's and donor's test results. Use your marks to compare donor cells with patient plasma. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do Nia's and Omar's red blood cell surfaces differ? Use their test results as evidence.	**Nia's cells have A antigens only because they clump only with anti-A. Omar's cells have both A and B antigens because they clump with both reagents.**
2	What is donor 1's ABO type? Could Nia receive donor 1's red cells? Explain using antigens and antibodies.	**Donor 1 is type B. Nia cannot receive these cells because her anti-B antibodies would attack their B antigens.**
3	Which of the three donors could give packed red cells to Omar under the conditions in the passage? Explain.	**All three donors could give red cells to Omar. His type AB cells have both antigens, so his plasma has neither anti-A nor anti-B antibodies to attack the donated cells.**
4	Compare donors 2 and 3 for Nia. Which one's red cells could she receive, and what makes the other donation unsafe?	**Nia could receive donor 2's type O cells, which have no A or B antigens. Donor 3's type AB cells have B antigens that Nia's anti-B antibodies would attack.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The patient's cells do not clump with anti-A or anti-B, so the patient is type O. The donor's cells clump with both reagents, so the donor is type AB. The donor's red cells have A and B antigens, while the patient's plasma has anti-A and anti-B antibodies. The donor's red cells are not ABO-compatible because the patient's antibodies could attack both antigens.

Assess packed red cell compatibility from donor cell antigens and patient plasma antibodies, not from donor plasma. Answers may note that actual transfusions require additional testing.