

Blood Group Genetics with Synthetic Blood Kit

You are a blood geneticist at a medical laboratory and are often called upon to serve as an expert witness in court cases. Your help is needed to resolve a case involving a disputed inheritance.

Here are the facts: John and Andrea Dean, an elderly couple, went to an attorney to make their will. For many years, John and Andrea had visited flea markets and yard sales looking for antique toys and other items that they collected. They wished to leave all their possessions to their only child, Marline.

When Marline had her parents' collection appraised, she was shocked to discover that the collections were worth over \$300,000. At this point, Daryl, a man from another state, demands to be included in the will. He claims that Andrea had become pregnant in high school while she and John were dating, and that Andrea's parents sent her to another state, where she gave birth to a son. Daryl claims to be that son. John and Andrea deny his allegations.

Knowing that the blood groups are inherited, you decide to try solving the case by typing the blood of John, Andrea, Marline and Daryl. Go to your workstation where you will find the blood samples and materials for ABO blood group testing. Use the following instructions.

Procedure:

1. Using the dropper vial, place a drop of John's blood in each well of the blood typing slide. Replace the cap on the dropper vial. Always replace the cap on one vial before opening the next vial to prevent cross contamination.
2. Add a drop of synthetic anti-A (blue) to the well labeled A. Replace the cap.
3. Add a drop of synthetic anti-B (yellow) to the well labeled B. Replace the cap.
4. Using a different color mixing stick for each well (blue for anti-A, yellow for anti-B), gently stir the synthetic blood and anti-serum drops for 30 seconds. Rinse each mixing stick after each use to avoid contamination of your samples and inaccurate results.
5. 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, agglutination has occurred. Determine the blood type of the sample using the chart below. Answer YES or NO as to whether agglutination occurred in each sample. A positive agglutination reaction indicates the blood type.
6. Record the results for John's blood sample in the data table below.
7. Thoroughly rinse the blood typing slide, and then repeat steps 1 through 6 for the other blood samples.

Data Table:

Create a data table in your lab notebook where you can write whether you have agglutination from the anti-A or anti-B serum for each individual. Include a row for the genotype.

Analyze:

Answer the following questions using complete sentences in your lab notebook.

1. What is John's Genotype?
2. What is Marline's Genotype?
3. What is Andrea's blood type?
4. Knowing Andrea's blood type and John and Marline's genotypes, what is Andrea's genotype?
5. Now create a Punnett square to show the possible genotypes for John and Andrea's children.
6. Using the Punnett square, give the possible blood types (phenotypes) of John and Andrea's children.
7. Based on your results, could Daryl be John and Andrea's son?
8. How do you know this? (As an expert witness, you will have to defend your finding in a court of law)