Blood Typing: Laboratory Report

Introduction

This lab report is about blood typing. Blood typing as the name implies is simply a system or method of knowing the type of blood one has. The purpose of blood typing is to identify the blood group/type that may be safe for blood transfusion into patients with different ABO type. Prior knowledge of one's blood group or type is very important for an emergency blood transfusion. Another reason for blood typing is to see if one's red blood cells (RBC) has a substance known as Rh factor (inherited protein) on the surface. The result of the Rh factor could be positive (+) or negative (-).

Back in the days, blood transfusion procedures were risky until Karl Landsteiner came into the picture. Karl Landsteiner (Australian Biologist in 1900) discovered the four major types of human blood groups. According to opentextbc.ca chapter 18-The Cardiovascular System: Blood by Rice University, physicians did not know that the cause of death after blood transfusion among patients was because the donated blood infused into patients was not compatible with the patients' blood until Karl's discovery. Therefore, matching donor/patient's blood type became possible for the very first time after Karl's discovery. The four major blood group or type discovered are; Type A, Type B, Type AB and Type O (ABO blood type). According to My Virtual Medical Center (https://www.myvmc.com/anatomy/blood-types-blood-group/), "an individual's ABO blood type is determined by the hereditary presence or absence of the antigens or agglutinogens (a harmful substance that enters the body, common cold virus is an example) A or B on the surface of the red blood cells (RBC). Antibodies (also known as an agglutinins-immune defense against antigens) as of the ABO group appear in the plasma 2-8 months after birth mainly in response to the bacteria that inhabit the intestines. However, antibodies cross-react with RBC antigens that are different to those present on the individual's own red blood cells. This cross-reaction can be fatal and therefore has great significance in blood transfusions."

According to an article on blood typing on Berkeley Wellness' website, the ABO blood group comes from a gene that has three variation: Type A blood with A antigens, type B blood with B antigens, Type AB blood which is not very common in the US has both the A and B antigens and type O blood has neither (very common in the US).

Hypothesis: Four different blood types will be successfully determined using the antibodies A, B, and Rh serum. Antibodies will surely meet red blood cells sample that was provided by the instructor and blood type A, B, AB and O will be correctly identified. Homogenous and cloudy results will indicate that the result is positive (Positive Agglutination) or no reaction at all (no agglutination).

Materials

The materials used for this experiment were: 4 Blood typing slides with 3 wells on each slide and 12 Toothpicks to mix the blood.

Shared Materials

The group share the following materials: 4 Names (People-Mr. Smith, Mr. Jones, Mr. Green and Ms. Brown). 4 blood samples were shared among the group: Blood sample, Blood sample, Blood sample E and Blood sample F. 3 Simulated Serum were also shared: Simulated Anti-A Serum, Simulated Anti-B Serum and Simulated Anti-Rh Serum.

Methods/Procedures

The group labelled the 4-blood typing slide; Slide #1: Mr. Smith (blood sample A), Slide #2: Mr. Jones (blood sample G), Slide #3: Mr. Green (blood sample E) and Slide #4: Ms. Brown (blood sample F).

Three drops of Mr. Smith's blood were placed in each of the A, B and Rh wells of slide #1. Three drops of Mr. Jone's blood were placed in each of the A, B and Rh wells of slide #2. Three drops of Mr. Green's blood were placed in each of the A, B and Rh wells of slide #3. Three drops of Ms. Brown's blood were placed in each of the A, B and Rh wells of slide #4. Placed three drops of the simulated anti-A serum in each A well of the four slides. Placed three drops of the simulated anti-B serum in each B well of the four slides. Placed three drops of the simulated anti-Rh serum in each Rh well of the four slides. Three toothpicks were obtained per blood typing slide. Stirred each of the wells with a separate clean toothpick for about 30 seconds. Splattering the simulated blood was avoided by not pressing too hard on the typing tray. Observed each of the slides and recorded our observations. (See Table 1 below). To confirm agglutination, the group tried reading text through the mixed blood samples. If the group cannot read the text through the mixed sample, it is a positive agglutination reaction. A negative reaction means no agglutination. All materials were properly disposed according to the teacher's instruction.

Note that we only did blood typing experiment in the lab (Part A). Part B experiment (blood cell count) was not done. Therefore, no measurement was taking. There was no calculations either.

Results

Group's results from blood typing experiment.

- Anti-A Serum / Anti-B Serum / Anti-Rh Serum / Blood Type
    - Mr. Smith No Agglutination / Agglutination / No Agglutination / B- (B negative)
    - Mr.Jones Agglutination / Agglutination / Agglutination / AB+ (AB positive)
    - Mr. Green Agglutination / No Agglutination / No Agglutination / A– (A negative)
    - Ms. Brown No Agglutination / No Agglutination / No Agglutination / O- (O negative)

Blood Typing Key (Used in class for blood typing experiment).

Sample Anti-A Serum / Anti-B Serum / Anti-Rh Serum / Blood Type

- A: No Agglutination / Agglutination / No Agglutination / B-
- B: Agglutination / Agglutination / No Agglutination / AB-

- C: No Agglutination / Agglutination / Agglutination / B+
- D: No Agglutination / No Agglutination / Agglutination / O+
- E: Agglutination / No Agglutination / No Agglutination / A-
- F: No Agglutination / No Agglutination / No Agglutination / O-
- G: Agglutination / Agglutination / Agglutination / AB+
- H: Agglutination / No Agglutination / Agglutination / A+

Note that no agglutination means there was no reaction when a specific anti serum was added to the blood sample. Group's picture results from blood typing experiment below;

Discussion

According to Table 1 (Group's results from the experiment), we successfully identified four blood group/type using three antibodies (anti-A serum, anti-B and anti-Rh serum). The above results support the hypothesis because we were able to correctly identify the four patients' blood type. Some of the blood sample reacted when they met the antibodies (positive agglutination) and were homogeneous and cloudy while some didn't react at all (no agglutination).

Blood typing key containing blood sample A to H was used in class to correctly match the individual's blood group/type (see Table 2 above). According to the observation, Mr. Smith's blood sample A had no reaction when mixed with Anti-B serum and Anti-Rh serum but had a positive reaction when mixed with Anti-B (positive agglutination). According to Table 2 (blood typing key provided for this experiment), Mr. Smith's (blood sample A) blood type is B- (B negative) if there was no reaction when mixed with Ant-A and Anti-Rh but has a reaction when mixed with Anti-B. Therefore, the result showed that Mr. Smith's blood type was correctly identified as B-.

Mr. Jones' blood sample G had a positive reaction (positive agglutination) when mixed with Anti-A, Anti-B and Anti-Rh. Therefore, Mr. Jones blood type was correctly matched as AB+ according to Table 2 (blood typing key). Mr. Green's blood sample E had a positive reaction when mixed with Anti-A and no reaction when mixed with Anti-B and Anti-Rh. Mr. Green' blood type was correctly matched as type A- (Table 2). Ms. Brown's blood sample F had no reaction at all when mixed with Anti-A, Anti-B and Anti-Rh (no agglutination on all of them). Ms. Brown's blood type was correctly matched as type O- according to table 2 (blood typing key). In conclusion, we were able to learn how to correctly match the patients' blood type/group using antibodies.

References:

1. Open Text BC by Rice University on Blood Typing https://opentextbc.ca/anatomyandphysiology/chapter/18-6-blood-typing/
2. My Virtual Medical Center https://www.myvmc.com/anatomy/blood-types-blood-group/
3. My Medline Plus An article about blood typing. https://medlineplus.gov/ency/article/003345.htm