



## Human Blood typing: ABO and Rh factor

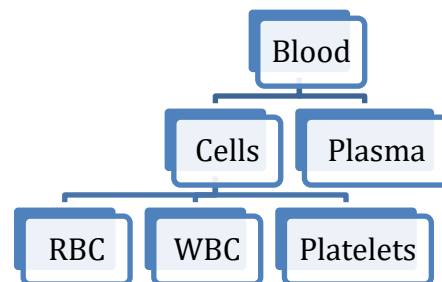
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### Introduction

The blood is a liquid connective tissue containing two major components: cells (red blood cells (RBC), white blood cells (WBC) and platelets) and fluid (plasma). The plasma is composed of clotting protein fibrinogen and serum. The clumping or agglutination of RBC takes place due to the antigen-antibody (Ag-Ab) response which is first of all discovered by Karl Landsteiner in 1900 (*Verma & Agarwal, 2009*).



### Aim

To determine the distribution of ABO blood group and Rh factor among the pupils.

### Objective

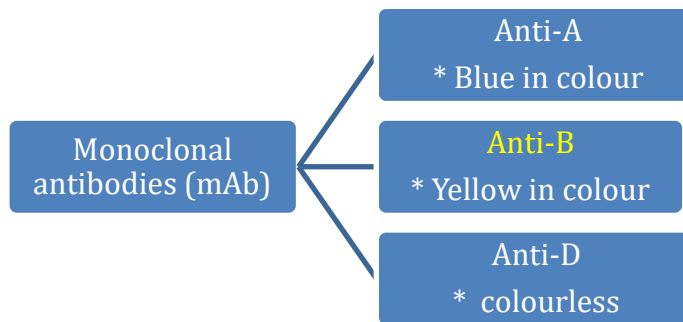
With the help of this testing, the scholar will learn various types of blood groups and the importance of matching the blood groups of the donor and recipient in blood transfusion cases.

## Materials Required

Human blood, Monoclonal Antibodies (Anti-A, B and D), Blood Lancet, Alcohol swabs, Tooth picks, Sterile cotton balls, clean glass slide, Dropper, Ice tray, Biohazard disposal container, Compound Microscope.

## Principle

Blood groups of recipient and donor regulates the victory of a blood transfusion. The ABO and Rh factor are looked at while conducting the assessment.



All the colour codes are universal standards. When the mAb are added one by one to wells that contain the blood, if the RBCs in that particular sample carry the corresponding antigen, clumps can be noticed in the corresponding wells. A drop of blood is left without adding any of the antibodies; it is used as a control in the experimentation. The mAb should be stored in an ice box.

## ABO Blood Grouping System

According to the ABO blood group system there are four different kinds of blood groups: A, B, AB and O (null).

**Table: ABO Blood Group**

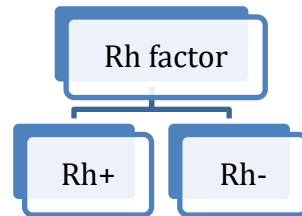
Blood groups	Ag	Ab for Ag	Phenotype	Genotype	Transfusions accepted from
A	A	B	A	$I^A I^A$ (or) $I^A i$	A / O
B	B	A	B	$I^B I^B$ (or) $I^B i$	B / O
AB	A & B	None	AB	$I^A I^B$	A, B, AB / O
O	None	A & B	O	$i i$	O

*Note: I – Isoglutinin; Ag – Antigen; Ab - Antibody*

## Allele

- It is one of two / more, forms of the same gene at the same place on a chromosome.
- For example: ABO blood grouping

## Rh factor



- Rh factor is protein.
- Weiner Levine *et al.*, discovered another interesting blood antigen in human which is identical to the Ag found in *Rhesus monkey* and designated it as Rh.
- Rh factor is found on the RBC's surface in most individuals.
- Like A and B, this is also an Ag and those who have it are called Rh+. Those who lack the antigen on the surface of RBCs are called Rh-.
- A person with Rh- blood does not have Rh antibodies naturally in the blood plasma. But a person with Rh- blood can develop Rh antibodies in the blood plasma if he or she receives blood from a person with Rh+ blood, whose Rh antigens can trigger the production of Rh antibodies (as the immune system is triggered by the presence of an unknown antigen in the system).
- A person with Rh+ blood can receive blood from a person with Rh- blood without any problems.

## Procedure (“Rapid Slide Test”)

1. Set the working table with all the materials essential.
2. Remember to place the mAb kit in an Ice tray.
3. Open an alcohol swab and rub it at the finger tip area (Dispose of the swab).
4. Open the Lancet.
5. Prick the finger tip with the Lancet (Discard the Lancet).
6. Take a clean microscopic slide.
7. Draw three circles on slide.

8. As blood starts oozing out, make a drop fall on the three depressions of the microscopic slide (please maintain the control).
9. Place a cotton ball at the site where it was punctured.
10. Take the **Anti-A (blue)** bottle, resuspend the content and use the dropper to place a drop of the mAb in the 1<sup>st</sup> spot. Place the bottle back in refrigerator.
11. Take the **Anti-B (yellow)** bottle, use the dropper to place a drop of the mAb in the 2<sup>nd</sup> spot. Place the bottle back in icebox.
12. Take the Anti-D (colorless) bottle, place a drop of the mAb in the 3<sup>rd</sup> spot. Place the bottle back in fridge.
13. Take a tooth pick and mix the content in each well. Throw away the tooth pick after using in one well (take a new one for the next).
14. After mixing, wait for a while to observe the result.

### Precautions

- Microscope Slide should be hygienic.
- Finger should be properly sterilized.
- Mix the antigen – antiserum immediately
- Drop all the things, including the microscopic slide into the biohazard disposal container after observing the result.
- Blood grouping Kit must be used carefully.
- Care is required at each stage of the experiment.

### Reference

Verma P S and Agarwal V K 2009 Genetics (9<sup>th</sup> edition), S.Chand

Antibody / Immunoglobulin / Agglutinins / Ab:

- It is a molecule
- It is synthesized by an animal response to the presence of antigens (Ag).