

BLOOD GROUPS AND RH FACTOR:**PRINCIPLE:**

The surfaces of the red cell membrane contain a variety of genetically determined antigens, called isoantigens or agglutinogens, while the plasma contains antibodies (agglutinins), which occurs as a result of antigen-antibody reaction. The antigen-antibody reaction also activates the complement system that releases proteolytic enzymes (the lytic complex) which ruptures the red cells and releases hemoglobin.

APPARATUS AND MATERIALS:

1. The equipments: • Lancet, or test tube filled with blood • Sterile cotton • Alcohol • Stick.
2. Anti-A serum: these antibodies are also called anti-A or alpha (α) agglutinins. Anti-A serum can also be obtained from a person with blood group B, the anti-A serum is tinted blue.
3. Anti-B serum: these antibodies are also called anti-B or beta (β) agglutinins. Anti-B serum can also be obtained from a person with blood group A, the anti-B serum yellow.
4. Anti-D (anti-Rh) serum: these antibodies are also called anti-D agglutinins, the anti-D serum is colorless.

PROCEDURE:

1. Using 3 slides, put on 1st slide the “anti-A”, 2nd slide the “anti-B”, and 3rd slide the “anti-D”.
2. Add a drop of blood on anti-A, one drop on anti-B, and one drop on anti-D sera.
3. Mix the anti-sera and blood, gently by stick (toothpick).
4. Wait for 8–10 minutes, then inspect the 3 antisera-red cell mixtures, with the naked eye to see whether agglutination (clumping and hemolysis of red cells) has taken place or not.

OBSERVATIONS:

Relevance blood transfusion is a life-saving procedure in all cases of severe blood loss and life-threatening anemia. However, blood can only be given after blood grouping which is an essential requirement before blood is given to any individual.

In addition to the antigens of the ABO system, the red cells of 80–85% of humans also contain an additional antigen, called Rh antigen (or Rh factor). The Rh factor is so named because Landsteiner and Wiener discovered this antigen in the Rhesus monkey in 1940. They injected the red blood cells of Rhesus monkeys into rabbits. The rabbits' immune system reacted by forming antibodies against rhesus red cells, and when the rabbit's plasma was tested against human red cells, agglutination occurred in 80–85% of individuals.

Persons whose red cells contain this additional antigen are called “Rh positive” (Rh+ ve) while those who lack this antigen are called (Rh– ve). There are several varieties of Rh antigen: C, D, E, c, d, and e—but the D antigen is the most common, and antigenically, the most potent.

Clinical significance of Rh factor although there are no natural anti-Rh antibodies, and they never develop spontaneously, they can be produced only in Rh –ve persons. This can happen in either of 2 ways:

1. In transfusions: a Rh –ve person is given Rh +ve blood, the newly donated red cells will be agglutinated and hemolysed.
2. In pregnancy: a Rh –ve mother carries a Rh +ve fetus, cause agglutination and hemolysis. The clinical condition that develops in the fetus is called “hemolytic disease of the newborn, or “erythroblastosis fetalis”.

What is meant by the terms universal donor and universal recipient?

Since type O persons do not have either A or B antigens on their red cells, they are called “universal donors” because their blood can, theoretically, be given to all 4 blood types. Type AB persons are called “universal recipients” because they do not have circulating agglutinins in their plasma and can, therefore, receive blood of any type.

Blood group	Antigen on Surface of RBC	Antibody in Serum	Can donate blood to	Can receive blood from
A	A	Antibody b	A, AB	A, O
B	B	Antibody a	B, AB	B, O
AB (universal acceptor)	A and B	Nil	AB	A, B, AB, O
O (universal donor)	Nil	Both Antibody a and Antibody b	A, B, AB, O	O