**THE DETERMINATON OF THE ABO AND RH (D) BLOOD GROUPS**

When blood transfusions from one person to another were first attempted, immediate or delayed agglutination and hemolysis of the red blood cells (RBC) often occurred, resulting in typical transfusion reactions that frequently led to death. Soon it was discovered that the bloods of different people have different inheritable antigenic and immune properties so that antibodies in the plasma of one blood will react with antigens on the surfaces of the RBC of another blood type. Fifteen well defined systems of antigens are recognized, but only the ABO and Rh system are of major clinical importance; the others are of less importance because the antigens are weak ones and/ or because the corresponding antibodies are not present normally or occur only following multiple transfusions, or because when present they usually react only at low temperature.

**The ABO Blood Group system**

There are four main blood groups, which are:-A, B, AB and 0 based on the presence or absence of the two antigens (Agglutinogen), A and B on the surface of RBC.

The serum of a group 0 person normally contain anti A and anti B; that of a group A person contain anti B; that of a group B person contain anti A; and that of a group AB person contains neither anti A nor anti B.

**Blood groups**

**A**

**B**

**AB**

**O**

**Antigens (in Red blood cells)**

**A**

**B**

**A+B**

**neither A nor B**

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**Antibodies (Agglutinins)**

**(present in serum)**

**anti-B**

**anti-A**

**none**

**anti-A+ anti-B**

The determination of the ABO groups of red cells depends upon testing them with known anti-A and anti-B sera, the presence or absence of agglutinogen indicating the group of each cell sample, thus if agglutination occurs with neither serum (anti-A or anti -B ) the red cells contain neither A nor B agglutinogen and the blood is of group 0, if it occurs only with anti-A serum the cells contain A agglutinogen and the blood is of group A, only with anti-B serum the cells contain B agglutinogen and the blood is of group B, if there is agglutination with both sera, both agglutinogens are present and the blood is of group AB.

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| **Blood group** | **Reaction with Anti-A** | **Reaction with anti-B** | **agglutinins {present in serum)** |
| **A** | **+** | **—** | **anti-B** |
| **B** | **—** | **+** | **anti-A** |
| **AB** | **+** | **+** | **Neither** |
| **0** | **\_** | **\_** | **anti -A and anti-B** |

**The Rhesus Blood Group system**

Besides the A and B agglutinogens, human red cells carry many other antigens. The only one which requires specific consideration in selecting blood for every transfusion is those of Rh system. The Rh agglutinogen was first discovered in the red cells of the rhesus monky, hence the name .It was later found in the red cells of 85% of people whom are called Rh + (positive) the remaining 15% Rh (negative) but their plasma normally does not contain the antibody (or agglutinin) for the Rh factor (It is present on the red cells of about 92% of the Iraqi people (Rh+ve) and absent from those of remaining 8%. If, however, a D-negative person (Rh-ve) receives one or more transfusions or injections of D-positive blood (Rh+ve), these will stimulate the production of anti-D in about 50% of cases. When a D-negative woman bears a D-positive foetus, in most cases where the mother produces anti-D, the antibody crosses the placenta and attaches it self to the foetal D-positive red cells, causing hemolytic disease of the fetus (erythroblastosis fetalis )

**Procedure**

The Slide method:-

(1)Divide a microscope slide into three areas A, B and D.

(2)Place one drop of anti-A serum, anti-B serum and anti-D serum in areas A,B and D divisions respectively .

(3)Prick a finger with a sterile lancet and removed the first drop of blood.

(4)Add one drop of blood into each division (A,B and D) next to the drop of test serum and mix them well with a glass rod or a clean match stick.

(5)After 2 minutes observe the area for the evidence of agglutination of the red cells (read microscopically)

(6)Find out the blood groups using the following table :-

**Blood group Anti-A Anti-B Anti-D**

**A + \_**

-

**B** **-**

**+**

**+**

**-**

**+**

**-**

**AB +**

**0 -**

**Rh+ (positive)**

**Rh- (Negative)**

**(+) indicates agglutination (-) means no agglutination**