

## Blood Transfusion

### Objectives:

- o List the blood components?
- o Define coombs' test?
- o Describe the direct antiglobulin test? And the significance of its positivity?
- o Describe the indirect antiglobulin test? And its main uses?
- o Describe cross matching?
- o Lists the tests that should be done to the recipient, and to the donor ?
- o List the early and late complication of blood transfusion?

## The antiglobulin (Coombs') test

The antiglobulin (Coombs') test is a fundamental and widely used test in both blood group serology and general immunology.

-Antihuman globulin Reagent ( AHG) is used.

--When AHG is added to human red cells coated with immunoglobulin or complement components, **agglutination of the red cells indicates a positive test**

The **antiglobulin test** may be either **direct or indirect.**

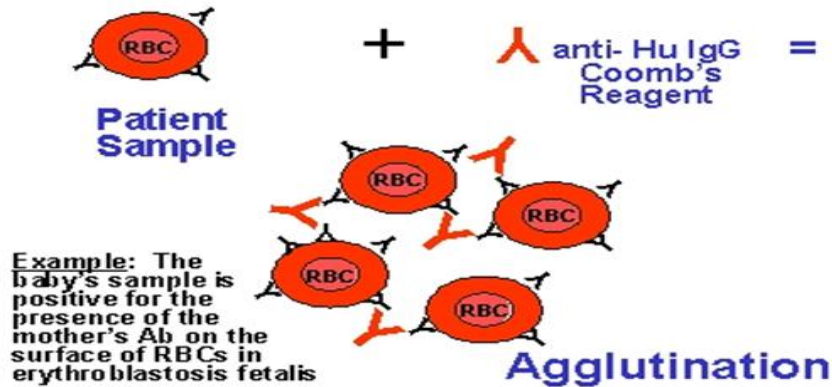
### **The direct antiglobulin test (DAT):**

It is used for detecting antibody or complement on the red cell surface where sensitization has occurred *in vivo*.

The AHG reagent is added to washed red cells and **agglutination** indicates a **positive test.**

**A positive test occurs in haemolytic disease of the newborn, Autoimmune or drug-induced immune haemolytic anaemia and haemolytic transfusion reactions.**

## DIRECT COOMB'S TEST



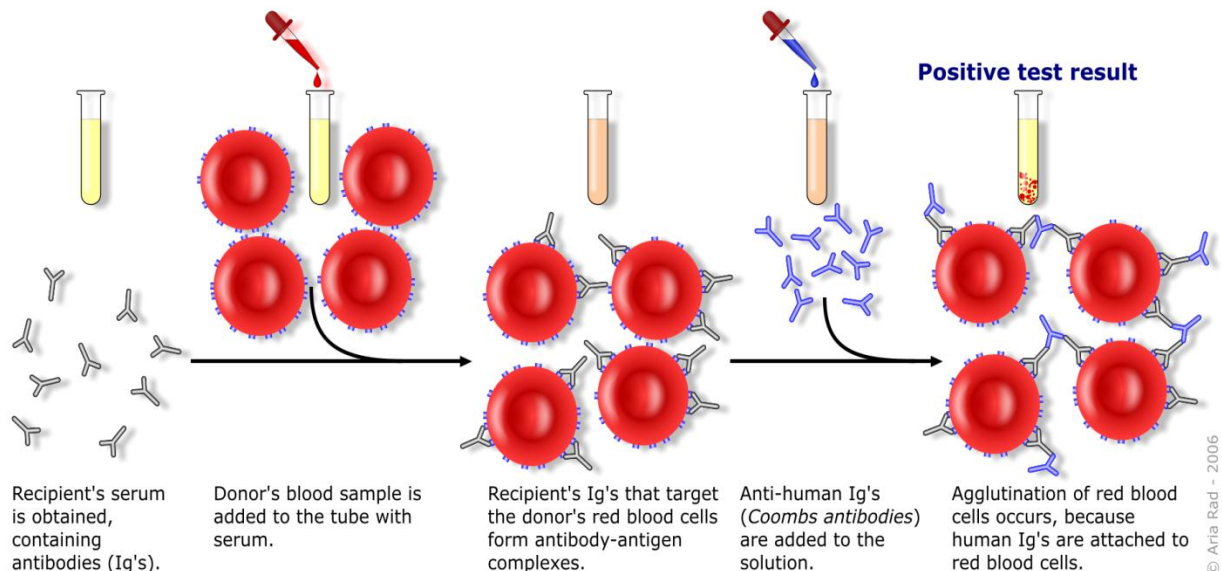
### The indirect antiglobulin test (IAT) :

It is used to detect antibodies that have coated the red cells *in vitro*.

It is a two-stage procedure:

the **first step** involves the incubation of test red cells with serum; In **the second step**, the red cells are washed and the AHG reagent is added

.Agglutination implies that the original serum contained antibody which has coated the red cells *in vitro*.



--This test is used as part of the routine antibody screening of the recipient's serum prior to transfusion and for detecting blood group antibodies in a pregnant woman.

## **Cross-matching and pre-transfusion**

### **Tests:**

A number of steps are taken to ensure that patients receive compatible blood at the time of transfusion.

#### **From the patient:**

1. The ABO and Rh blood group is determined.
2. Serum is screened for important antibodies by an indirect antiglobulin test .  
If a red cell alloantibody is discovered, donor blood is selected lacking the relative antigen.

#### **From the donor:**

Tests that must be done on donated blood units :

1. ABO & Rh grouping.
2. Test for Human immunodeficiency virus (HIV) 1 and 2
- 3.. Test for Hepatitis B virus (HBV) ,Hepatitis C virus (HCV).
4. Test for syphilis.
- 5.. Test for Cytomegalovirus (CMV)-for immunosuppressed recipients.
7. Test for Malaria-antibody screening of potentially expose Donors.
8. Test for Human T-cell leukaemia viruses (HTLV).

### **The cross-match:**

Donor cells tested against recipient serum and agglutination detected visually or microscopically after mixing and incubation at the appropriate temperature.

**--So agglutination indicates incompatible blood.**

### **+ Complications of blood transfusion:**

#### **+ ■ Early Complications**

1-**Immediate Haemolytic reactions:** usually a transfusion accident in which ABO- incompatible blood is transfused; can be fatal.

2. **Reactions caused by infected blood:** due to bacterial infection of red cells or platelets. It can cause shock & death.

3. **Febrile non-haemolytic transfusion reactions:** usually due to white cells antibodies.

4. **Allergic transfusion reaction :** hypersensitivity to donor plasma proteins.

5. **Circulatory overload.**

6. **Transfusion related acute lung injury:** caused by anti HLA-antibodies in donor plasma.

7. **Air embolism**

8. **Thrombophlebitis**

9. **Citrate toxicity**

10. **Hyperkalaemia**

11. **Clotting abnormalities:** in massive transfusion.

### **Delayed Complications:**

1. **Delayed Haemolytic reactions:** often due to Rh antibodies.

2. **Post transfusion purpura .**

3. **Transfusional iron overload:** due to chronic transfusion programmes

4. **Immune sensitization** e.g. to red cells, platelets or Rh D antigen

5. **Transmission of infection:**

Hepatitis B virus (HBV)

Hepatitis C virus (HCV)

Hepatitis D virus (HDV) (requires coinfection with HBV)

Human immunodeficiency virus (HIV) 1 + 2 (+ other subtypes)

Human T-cell leukaemia virus (HTLV) I + II

Human cytomegalovirus (CMV)

Malaria, syphilis, brucellosis.