# اسم المادة و الكورس

#### **COMPATIBILITY TESTING**



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الجانب النظري .... 3محاضرة رقم ...

Lecture No. . . . Theoretical

تدريسى المادة: .....الدكتور على عواد

#### **Overview**

- -Compatibility test
- -Cross match
- -Serological cross match

### compatibility testing

The serological tests that are done on the donor and recipient blood samples to see whether the chosen blood will be safe, beneficial and compatible.

\_The terms compatibility test and cross-match are sometimes used <u>interchangeably</u>, but they should be clearly differentiated. A cross-match is only one part of compatibility testing.

#### I. Testing the Donor Sample

- 1-. ABO grouping and Rh typing (including a test for weak D)
- 2. Tests intended to prevent disease transmission.
- 3. Screening tests for clinically significant unexpected antibodies to RBC antigens, this is done only for donors who have a history of transfusion or pregnancy. These tests would be encountered at time of donation, when unit requested, only forward grouping done.

#### II. Testing the Patient Sample

#### 1. ABO Grouping:

- Determining the patient's correct ABO group is the most critical pretransfusion serologic test.
- If the patient's ABO group cannot be satisfactorily determined and immediate transfusion is required, group O-packed RBCs should be used.

#### 2. Rh Typing:

• If the Rh type of the recipient cannot be determined and transfusion is essential, Rh-negative blood should be given. The test for weak D is unnecessary for recipients

#### 3. Antibody Screening:

• Serum or plasma of recipients must be tested for clinically significant 1 antibodies, if they reports history of sensitization.

#### III. Cross Match

The testing of the patient's serum with the donor RBCs to confirm their compatibility.

#### Two main advantages of the cross-match test:

- 1. It is a final check of compatibility between donor and patient.
- 2. It may detect the presence of an antibody in the patient's serum that will react with antigens on the donor RBCs that was not detected in antibody screening and vice versa. The current Standards state that (tests to detect ABO incompatibility are sufficient if no clinically significant antibodies were detected in the antibody screening process and if no historical record exists of clinically significant antibodies being detected).

#### . Serologic Cross match Tests

The serologic cross-match test consists of mixing the recipient's serum with donor RBCs. Several procedures can be used for serologic cross-match testing, including the immediate spin (IS) and antihumenglobulin (AHG) crossmatch. Crossmatch methods can generally be categorized by the test phase in which the procedure ends:

1) Immediate spin phase:- • The purpose of this phase is to detect the cold antibody (IgM) that's including expected ABO alloantibodies and unexpected cold-reacting antibody alloantibodies or autoantibodies.

### Alloantibody vs Autoantibody

Alloantibodies are the antibodies that work against alloantigens introduced to the body by transfusion or pregnancy

Autoantibodies are the antibodies that react with components of the body's own tissues and organs

WORK AGAINST

DEFINITION

Foreign antigens

Control of the Contro

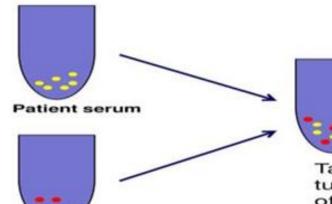
Self antigens

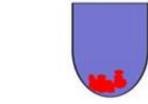
ANTIGENS

27/08/8815r RBC

Alloantigens

Self antigens





Take 2 drops of patient serum in a clean test tube to which add 1 drop of 5% suspension of donor red cells.

Centrifuge at 1000 RPM for one min and look for agglutination

2) 37°C incubation phase: - The purpose of this phase is to detect (IgG) antibody that react best at warm temperatures.

This phase done to increase the sensitivity between Ab-Ag reaction by incubation time and by adding **the enhancement media** which including:

<u>- Albumin:</u> - which is macromolecule that reduce the zeta potential (negative charge sounding RBCs), so allow antibody-coated cells to come into closer contact with each other so that aggregation occurs.

-<u>Low ionic strength solutions (LISS):-</u> which is low salt media contain 0.2% sodium chloride. These media reduce the zeta potential and make the environment low-ionic that lead to enhance antibody uptake by RBCs and allow incubation times to be decreased from 30 to minutes to 15 minutes.

<u>Polyethylene glycol (PEG):-</u> is a water-soluble linear polymer and is used as an additive to increase antibody uptake by RBCs antigen via removing the water molecules in the test environment to allow a greater probability of collision between antigen and antibody molecules.

<u>Proteolytic enzymes</u>: These enzymes possess the property to modify red cell membranes by removing the negatively charged molecules from the red cell membrane and denaturing certain antigenic determinants.

Enzymes that commonly used in **immunohematological** test include ficin & papain. Proteolytic enzymes are not used routinely in testing, which are a tool that can be useful to solve complex antibody identification problems.

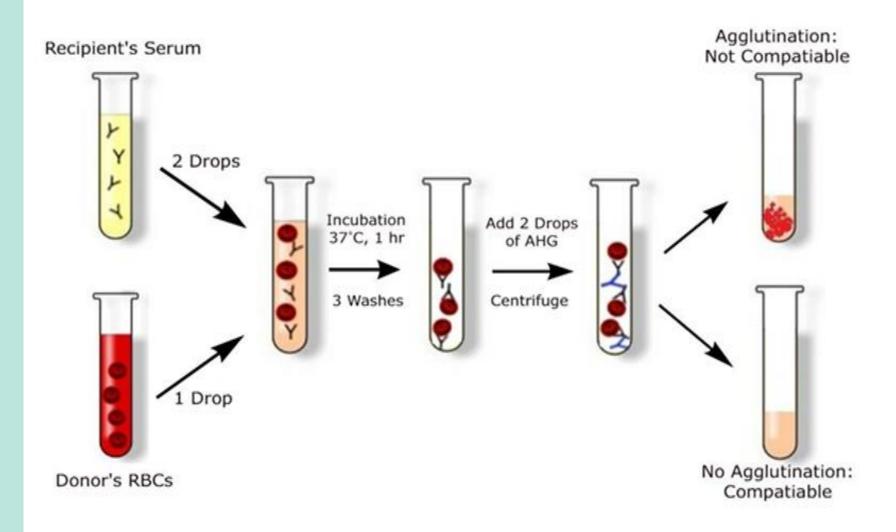
3- **Antiglobulin phase:-** The purpose of this phase is to detect the warm antibody (IgG) that's including unexpected warm-reacting antibody alloantibodies or autoantibodies by adding (AHG) reagent.

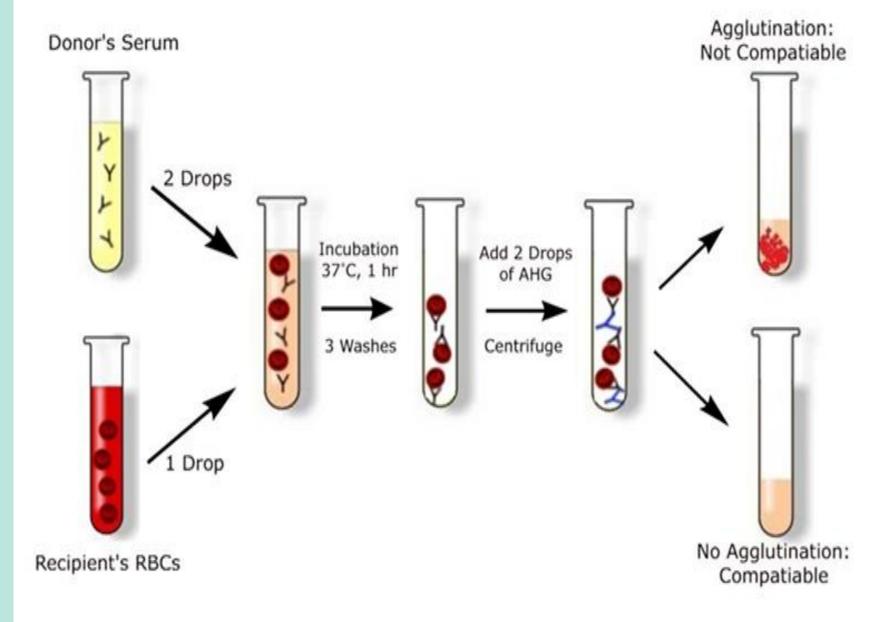
#### There are two types of cross matches:

A: Major Cross Match: It involves testing the donor's red cells with recipient's serum to determine the presence of any antibody which may cause hemolysis or agglutination of donor red cells. This is more important than minor cross match.

B: Minor Cross Match: It involves testing of donor's plasma with recipient's red cells to determine the presence of any antibody which may cause hemolysis or agglutination of recipient's red cells.

### **Major Cross match**





Compatible donor and recipient blood should show no agglutination in both major and minor cross match. Blood which shows incompatibility in major cross match should never be transfused, because the large plasma volume of the recipient blood containing antibodies can destroy the donor's red cells easily.

The minor incompatibility is <u>less important</u> because the donor's serum which contains the antibodies <u>is diluted in the recipient's own plasma</u>, making the antibodies very dilute and ineffective.

#### What are the causes of positive results in the serologic cross- match?

- 1) Incorrect ABO grouping of the patient or donor.
- 2) An alloantibody in the patient's serum reacting with the corresponding antigen on donor RBCs.
- 3) An autoantibody in the patient's serum reacting with the corresponding antigen on donor RBCs.

#### What are the causes of false positive results in the serologic crossmatch.?

- 1) Abnormalities in the patient's serum.
- 2) Contamination in the system.

## Any questions?

