

## MODULE

Hematology and Blood  
Bank Technique



Notes

13

# PRETRANSFUSION OR COMPATIBILITY TESTING

## 13.1 INTRODUCTION

Pretransfusion compatibility testing serves to select a compatible unit of blood for the recipient which when transfused does not cause any adverse effect. It ensures safe transfusion therapy.



## OBJECTIVES

After reading this lesson, you will be able to:

- describe the steps involved in pretransfusion testing
- explain the method of compatibility testing

## 13.2 STEPS INVOLVED IN COMPATIBILITY TESTING

### I. Receiving the sample of the patient in the blood bank

The sample of blood should be collected after proper identification of the recipient patient. The sample is sent to the blood bank in a clean, dry plain tube. The sample is labeled with the following information: name, age, sex, ward, bed number and hospital number. The sample must be collected by the doctor and adequately labeled.

Each sample is accompanied with a **blood request form**. Details such as name, age sex, hospital number, ward and bed number as also clinical details are mentioned on this form. The requisition form should contain the signature of the doctor requesting the blood along with the date.

## Pretransfusion or Compatibility Testing

If the patient has received blood transfusion in the past the blood group, presence of any irregular antibodies and any adverse effect after transfusion must be mentioned.

**The technician who receives the sample must ensure that the details on the form and the sample vial tally with each other.**

## II. ABO and Rh grouping

ABO and Rh grouping is performed on the recipient sample by standard techniques as described in the chapter on blood grouping. Tube technique or gel card method is used most often.

## III. Antibody screening of the recipient's serum

The patient's serum is screened for the presence of commonly encountered irregular antibodies. These unexpected or irregular antibodies are produced after transfusion or after pregnancy. Antibody screening is done by the following methods in order to detect all clinically significant antibodies.

- saline technique at room temperature
- enzyme technique
- indirect antiglobulin technique at 37°C

### Panel cells

For antibody screening the group O panel cells may be obtained commercially or by using pooled group O cells. These cells must carry the antigens of the common blood group systems like Rh, Kidd, Kell, Duffy, MNS, Lutheran and Lewis. This pooled group is tested against known antisera and if there is agglutination, these cells can be used for further antibody screening. The cell panel can be preserved for long periods by freezing in small aliquots after adding cryoprotective agents like glycerol. When needed, the aliquots can be thawed for screening.

While performing the test for screening antibodies, fresh serum of the patient is tested against panel cells (pooled or commercially obtained), patient's own cells (autocontrol) and cord cells (O group). A unit of blood whose red cells lack the corresponding antigen is then selected for transfusion in such a recipient.

If the specificity of the antibody cannot be ascertained and there is an urgent need for blood, the patient's serum should be cross matched with several units of the same ABO and Rh type as the patient to select compatible blood.

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### IV. Selection of blood

Donor blood on which ABO and Rh grouping and screening for various transfusion transmitted infections has been done is selected for transfusion.

#### Points to remember while selecting blood for transfusion:

- Blood of the same ABO group as the patient is preferred.
- If blood of the same ABO group is not available, alternate ABO group which are compatible may be transfused as shown below:

ABO group of patient	1 <sup>st</sup> choice	Alternative choice
A	A	O
B	B	O
AB	AB	A (preferred) or B
O	O	None

- In patients with blood group AB, if AB group blood is not available, it is preferable to give group A blood rather than group B blood as Anti-B in group A individuals is weaker than Anti –A in group B donors. If the patient needs more than one unit of blood in succession, it is advisable not to change from group A to group B blood or vice-versa.
- Bombay blood group patient should be given Oh blood only.

#### Selection based on Rh group

- Rh negative individuals must receive Rh negative blood only.
- For patients who already have Rh antibodies, select blood which lacks the corresponding Rh antigen.
- D<sup>u</sup> donor blood is considered Rh positive.
- D<sup>u</sup> recipient is treated as Rh negative.

### V. Compatibility testing

Though used interchangeably, cross matching is only a part of compatibility testing. Compatibility testing comprises of the following:

- Review of patient's transfusion history and records
- ABO & Rh testing of donor as well as the recipient
- Antibody screening of the recipient's and donor's serum
- Cross matching

## Pretransfusion or Compatibility Testing

The purpose of cross match is to exclude the presence of any antibody (autoantibody or alloantibody) in the recipient's serum that will react with donor cells when transfused. This includes

- (a) Major crossmatch is testing of recipient's serum with donor's red cells.
- (b) Minor crossmatch is testing of donor's serum with recipient's red cells. If the donor's serum has been screened for irregular antibodies with a panel of cells and no antibody has been detected, minor crossmatch can be excluded.

Compatibility tests are done to ensure safe blood transfusion

### Saline technique

This detects IgM antibodies in the recipient's serum that react at room temperature or lower against the donor red cells.

### Method

1. Put 2 drops of recipient serum in a labeled test tube.
2. Add 1 drop of 2-5% donor red cells suspended in saline to the tube.
3. Mix and incubate for 5-10min at room temperature.
4. Centrifuge at 1000rpm for 1min.
5. Observe for hemolysis or agglutination.
6. Confirm all negative results under the microscope.
7. Alternatively, the tube may be incubated for 30-60min at room temperature and the result read. Centrifugation is optional.

### Interpretation

Agglutination or hemolysis indicates incompatibility of donor and recipient blood.

### Limitation

The technique does not detect clinically significant IgG antibodies

### Note

- Immediate spin technique can be used in emergency
- As the technique does not detect IgG antibodies, it is inadequate as a complete compatibility test.
- Incubation improves the sensitivity of the test.

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### Antiglobulin compatibility testing

Indirect antihuman globulin test is the most widely used technique to detect compatibility between donor red cells and recipient serum. It detects IgG antibodies in the recipient serum which may react with the donor red cells.

#### Method

1. Place 2 drops of patient's serum in a labeled test tube.
2. Add 1 drop of 2-5% donor red cells suspended in saline to the tube.
3. Incubate at 37°C for 30-60min.
4. Centrifuge at 1000rpm for 1min.
5. Check for hemolysis or agglutination.
6. If there is no hemolysis or agglutination, wash the cells three times with normal saline decanting the supernatant after each wash.
7. Add 2 drops of polyspecific AHG serum.
8. Centrifuge at 1000rpm for 1minute.
9. Look for agglutination.
10. Add IgG coated red cells to negative AHG test.
11. Centrifuge and check for agglutination which must be present at this stage.
12. If there is no agglutination, the test is invalid.

#### Interpretation

Hemolysis or agglutination at any stage indicates incompatibility.

#### Note

- Saline and Antiglobulin crossmatch can be done in separate tubes.
- Alternatively, after centrifuging in saline technique (step5), the tube is incubated at 37°C for 30min and IAT is then done.
- Donor red cells can be pretreated with **enzyme such as papain** and then crossmatching done. It enhances agglutination.
- **Bovine albumin 22%** can be added to the serum cell mixture to increase sensitivity. It enhances agglutination.
- Suspension of donor red cells **in low ionic strength saline (LISS)** increases sensitivity. On reducing the ionic strength of saline, the number of ions which can form clouds around the antigen antibody molecules is reduced. This increases the binding of antigen and antibody to each other.



**Notes**

## VI. Labeling of blood bag and Issue of blood

On the unit of blood which has been crossmatched, a label containing the following information is attached

- Donor's identification number
- ABO and Rh group of donor
- Patient's name and hospital number
- ABO and Rh group of patient

### Crossmatch report

A crossmatch report is sent with the blood which is being issued which includes

- Donor's identification number
- ABO and Rh group of donor
- Expiry date
- Patient's name and hospital number
- ABO and Rh group of patient
- Interpretation of crossmatching results
- Date of issue of blood



### INTEXT QUESTIONS 13.1

1. In a patient with group AB, if AB blood is not available, it is preferable to use blood of group
  - (a) A
  - (b) B
  - (c) O
  - (d) Any of the above
2. A D<sup>u</sup> donor blood is considered
  - (a) Rh negative
  - (b) Rh positive
  - (c) Either
3. If group O blood is transfused to a patient with group A it is preferable to give
  - (a) Plasma
  - (b) Whole blood
  - (c) Packed red cells
  - (d) Any of the above

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### WHAT HAVE YOU LEARNT

- Compatibility testing is done to select a unit of blood for the recipient which does not cause any adverse effects. An adequately labeled sample is received in the blood bank along with a blood request form. The details on the form and the vial must tally with each other. ABO and Rh grouping and antibody screening is done on the recipient sample. A unit of blood is then selected and major cross matching (recipient serum tested with donor red cells) done. The unit is then issued along with a cross matching report.



### TERMINAL QUESTIONS

1. What are the steps involved in compatibility testing
2. Describe the methods of compatibility testing



### ANSWERS TO INTEXT QUESTIONS

#### 13.1

1. (a) A group
2. (b) Rh Positive
3. (c) Packed red cells