Practical Immunology

Lab 2

ABO Blood & Rh Grouping system

Objectives of Blood Group typing test:

- To determine the blood group according to the ABO system.

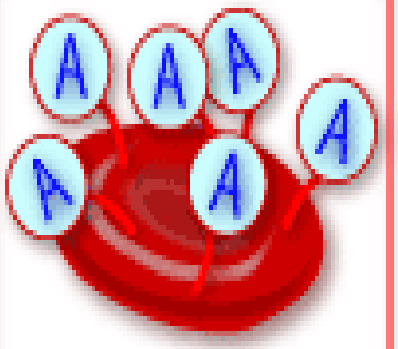
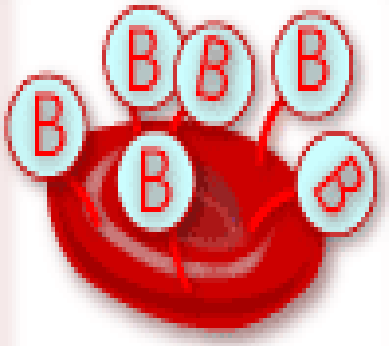
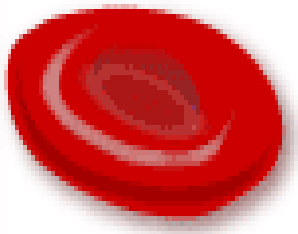
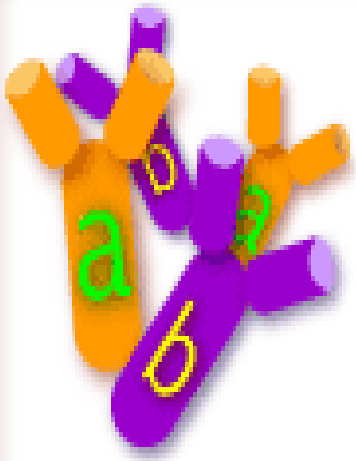
- To test for the availability of the Rh factor (D-antigen).

Blood Grouping

ABO Blood Group System

- Blood group antigens are actually **sugars** attached to the red blood cell.
- Individuals inherit a **gene** which codes for specific sugar(s) to be added to the red cell.
- The type of sugar added determines the blood group.

The ABO Blood System

Blood Type (genotype)	Type A (AA, AO)	Type B (BB, BO)	Type AB (AB)	Type O (OO)
Red Blood Cell Surface Proteins (phenotype)	 A agglutinogens only	 B agglutinogens only	 A and B agglutinogens	 No agglutinogens
Plasma Antibodies (phenotype)	 b agglutinin only	 a agglutinin only	NONE. No agglutinin	 a and b agglutinin

Slide Blood Typing

- Slide Blood Typing: very rudimentary method for determining blood groups.
- **CANNOT** be used for transfusion purposes as **false positives** and **negatives** occur.
  - A **"false positive"** is when agglutination occurs not because the antigen is present, but cells may already be clumped.
  - A "**false negative**" is one in which the cells are not clumped because there are too many cells or not enough reagent (Prozone or Post-zone phenomenon).

Slide Blood Typing

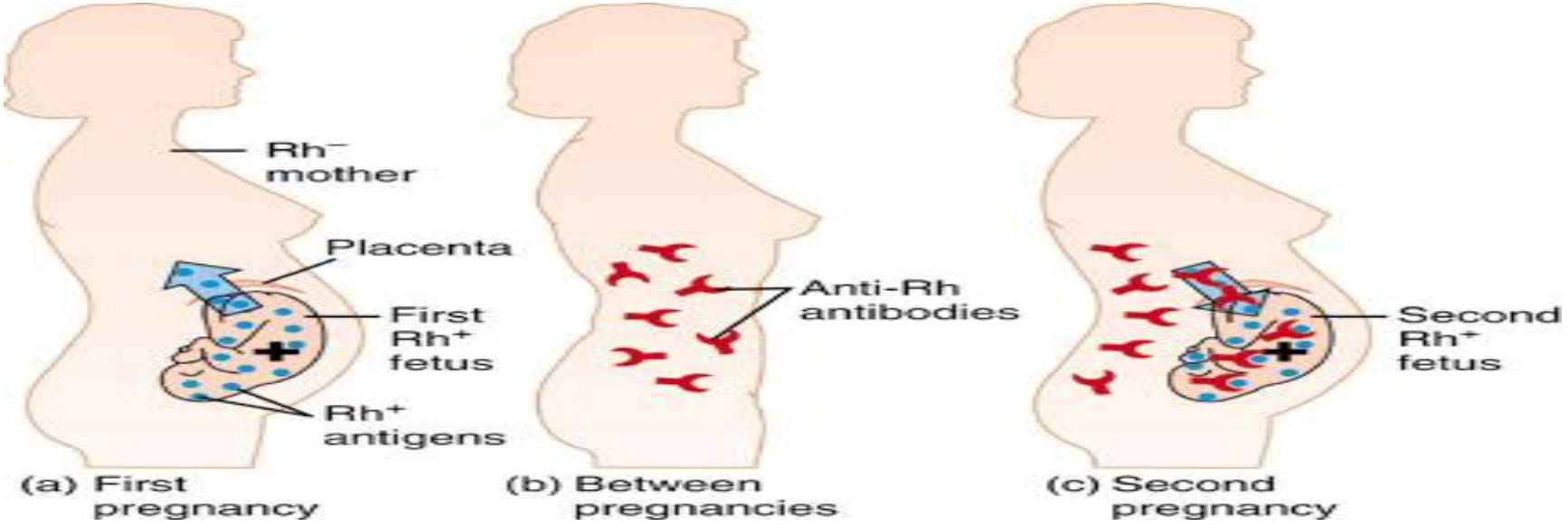
Blood Group	Antigens on cell	Antibodies in plasma	Transfuse with group
A	A	Anti-B	A or O
B	B	Anti-A	B or O
AB	A and B	none	AB, A, B or O
O	None	Anti-A & B	O

Rh system

- **Rh** or **D antigen** is clinically and medically important.
- Rh refers to the presence or absence of the D antigen on the red blood cell.
- Unlike the ABO blood group system, individuals who lack the D antigen do not naturally make antibodies.
- The D antigen is **very immunogenic**, individuals exposed to it will very likely make an antibody to it.
- For this reason, all individuals are typed for D antigen, if negative **must** receive Rh (D) negative blood.

Hemolytic Disease of The Newborn (HDN)

- Also called, Erythroblastosis Fetalis
- Mother is Blood type **Rh-**, Father and fetus are **Rh+**
- First pregnancy = sensitization at delivery due to hemorrhage
- Second pregnancy = Mother produce anti-Rh IgG antibodies that cross placenta to attack fetal RBCs leading to hemolysis



Rh (D) Antigen

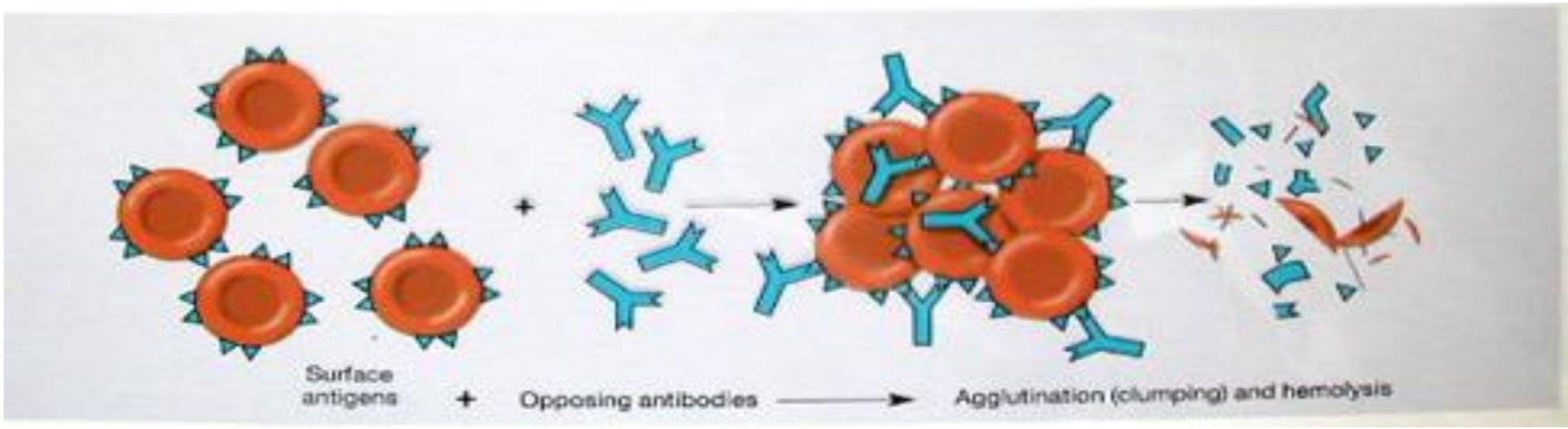
- This is why Rh negative women are given **RhoGAM** after birth of Rh positive baby.
- **RhoGAM**: an injectable drug containing antibodies (IgG) and this drug is used to:
  - ⇨ Kill any of the Rh+ red cells that have migrated into the mother's circulation.
  - ⇨ Protect a Rh+ fetus from antibodies in a Rh- mother’s blood.
  - ⇨ Prevent Rh allergy in the mother.

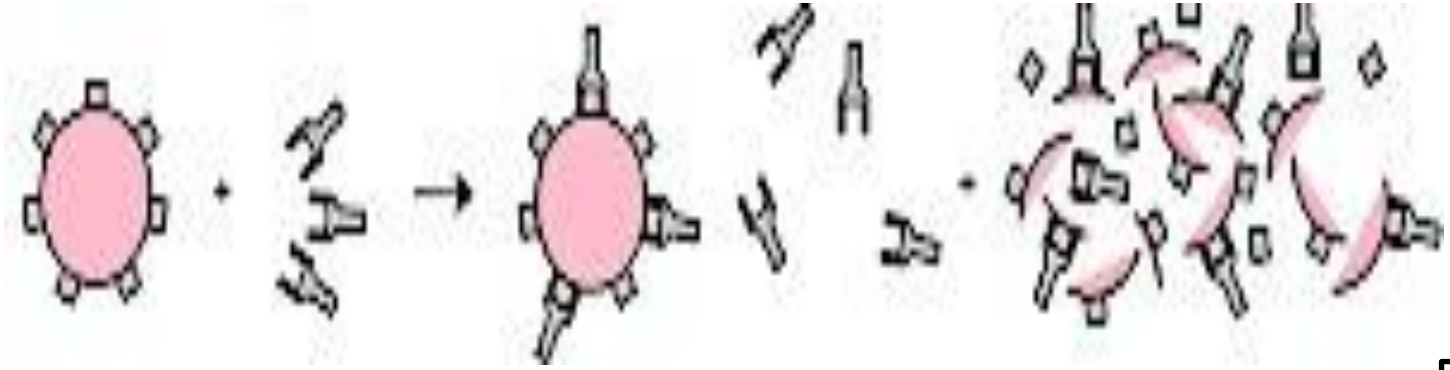
Blood Group Typing

Procedure:

1. The slide is divided into halves.
2. On one side, a drop of anti-A is adding, this will attach to and cause clumping of RBCs possessing the A antigen.
3. On the other side, a drop of anti-B is adding which will cause clumping of RBCs with the B antigen.
4. A drop of RBCs is adding to each side and mixed well with the reagent.
5. The slide is tilt back and forth for one minute and observed for agglutination (clumping) of the RBCs.

Principle of test





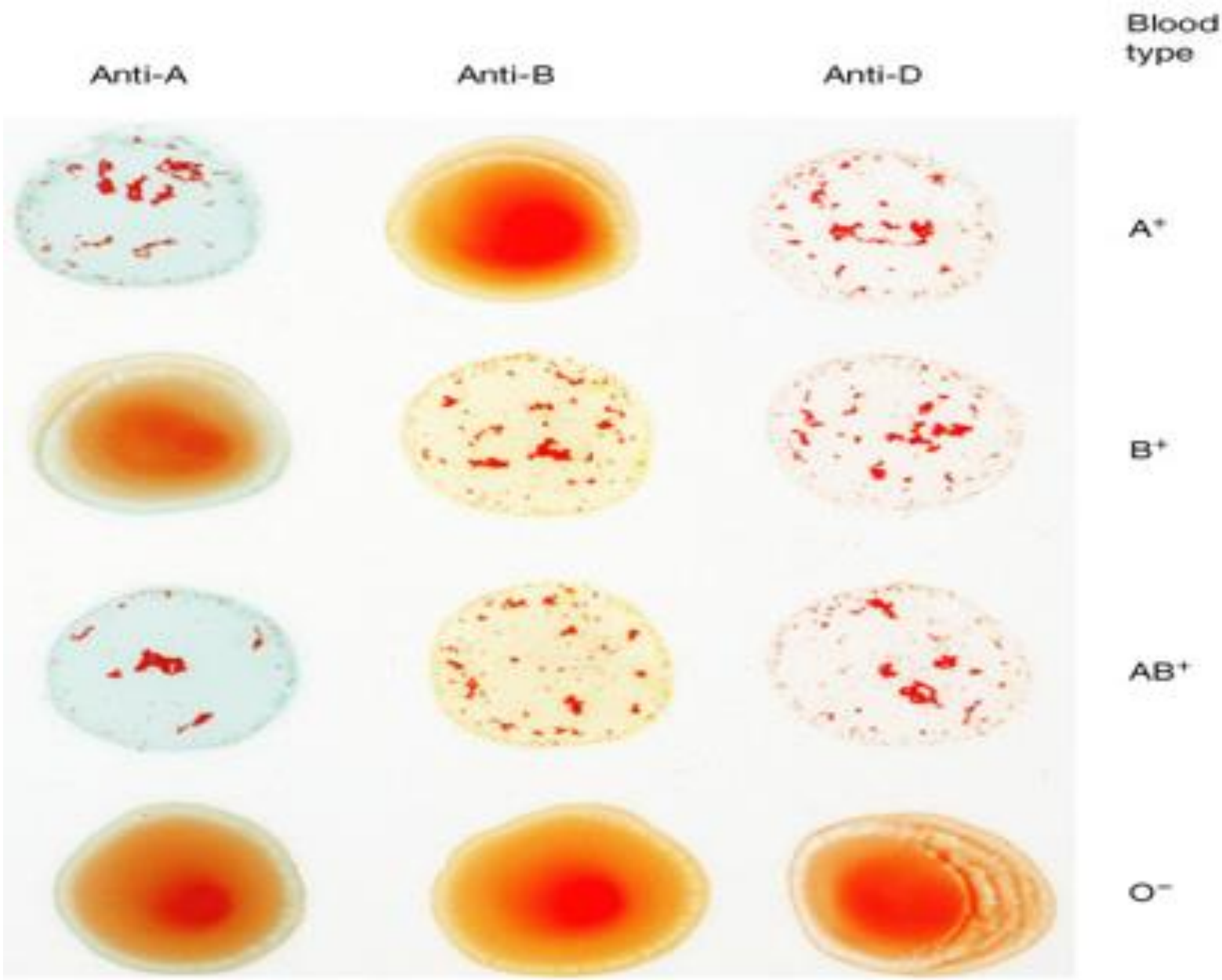
Type A blood gp

Anti A antibodies

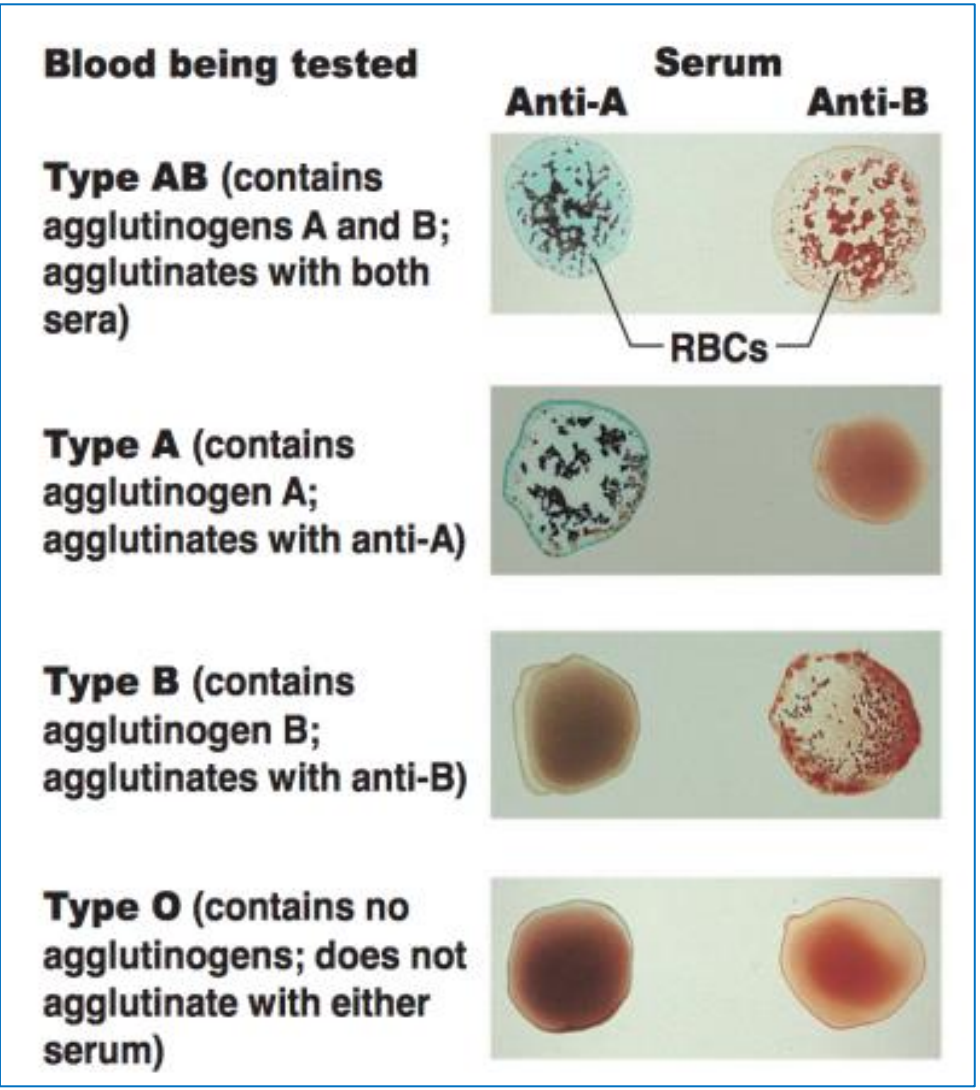
Agglutination

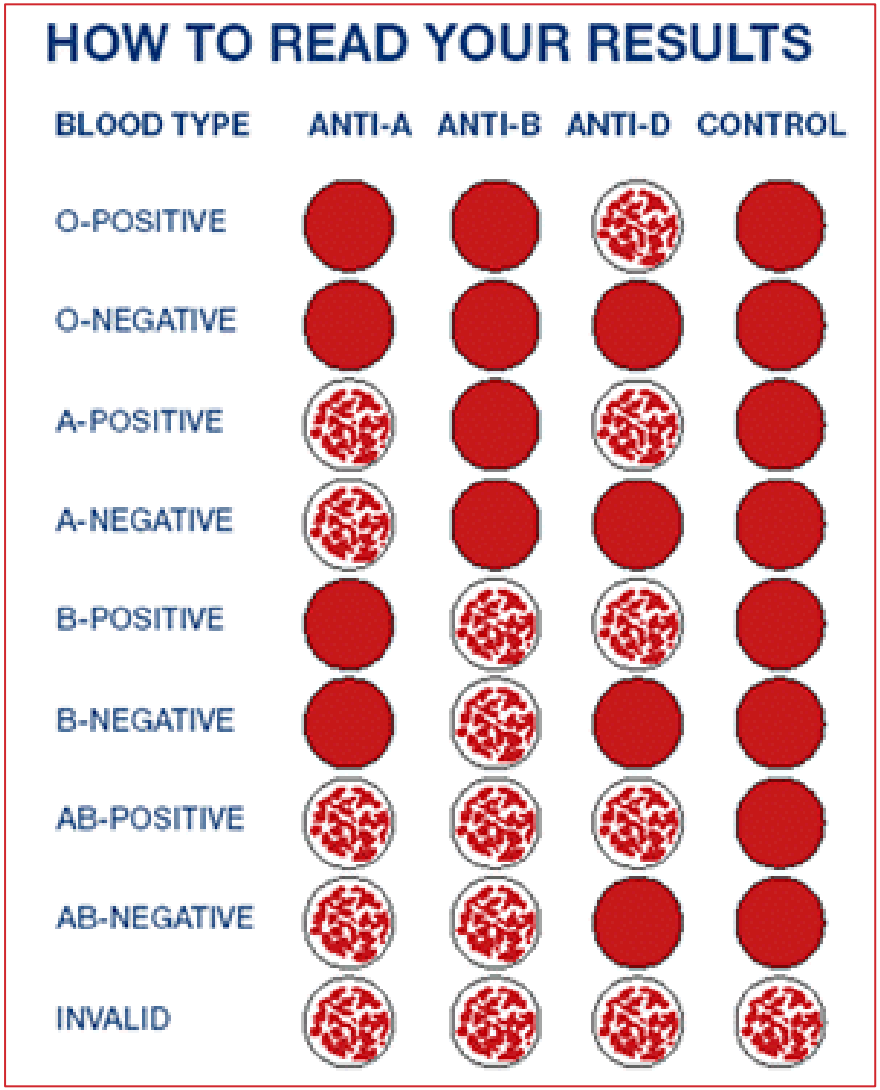
Hemolysis

Seen as the picture


Anti-A
Anti-B
Anti-D
Blood type
A+
B+
AB+
O−

RESULTS


Blood being tested
Serum
Anti-A
Anti-B
Type AB (contains agglutinogens A and B; agglutinates with both sera)
RBCs
Type A (contains agglutinogen A; agglutinates with anti-A)
Type B (contains agglutinogen B; agglutinates with anti-B)
Type O (contains no agglutinogens; does not agglutinate with either serum)


HOW TO READ YOUR RESULTS
BLOOD TYPE
ANTI-A
ANTI-B
ANTI-D
CONTROL
O-POSITIVE
O-NEGATIVE
A-POSITIVE
A-NEGATIVE
B-POSITIVE
B-NEGATIVE
AB-POSITIVE
AB-NEGATIVE
INVALID


WHO
WHAT
WHERE
WHEN
WHY
HOW
QUESTIONS
ANSWERS