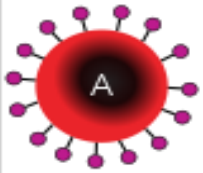
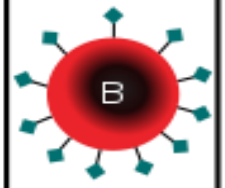
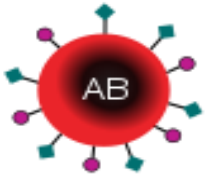
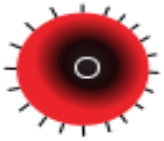
- Blood types or blood groups are classified according to the presence or absences of **Antibodies** or Inherited **Antigens** on the surface of Red Blood Cells (RBC).
- The Antigens may be proteins, carbohydrates, glycoproteins or glycolipids depending on the blood group system. Also they may be found on the surface of the tissues.

Serum: blood plasma without any clotting factors.

	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies in plasma	 Anti-B	 Anti-A	None	 Anti-A and Anti-B
Antigens in red blood cell	A antigen	B antigen	 A and B antigens	None

The ABO system

- There are four major groups of blood determined by the presence of absence of two antigens A and B on the surface of blood cells:

Group A: has A antigen on RBC and B antibody in plasma.

Group B: has B antigen on RBC and A antibody in plasma.

Group AB: has both A and B antigens on RBC but neither antibodies in plasma. **(Universal recipient)**

Group O: has neither A and B antigens on RBC but have both A and B antibodies in plasma.

The Rh system

- **The Rh antigens or D antigens** are trans- membrane proteins exposed on the surface of RBC, they transport Carbon dioxide and ammonia across the plasma membrane beside their role in blood transfusion. They are also determine the risk of hemolytic disease of the new born (erythroblastosis fetalis).
- **The Rh name** come from the Rhesus monkeys in which they were first discovered. The Rh antigens may be positive or negative.
- The hemolytic condition occurs when there is incompatibility between the blood type of mother and the fetus.
- When the incompatibility is detected the mother receives an injection at the 28 week and at birth to avoid the development of antibodies towards the fetus.

Blood Type	Donate Blood To	Receive Blood From
A+	A+ AB+	A+ A- O+ O-
O+	O+ A+ B+ AB+	O+ O-
B+	B+ AB+	B+ B- O+ O-
AB+	AB+	Everyone
A-	A+ A- AB+ AB-	A- O-
O-	Everyone	O-
B-	B+ B- AB+ AB-	B- O-
AB-	AB+ AB-	AB- A- B- O-

Blood type	Antigens	Antibodies	Genotype
A	Anti-A	Ab. B	$I^A I^A$ or $I^A i$
B	Anti-B	Ab. A	$I^B I^B$ or $I^B i$
AB	Ab. A&B	Neither	$I^A I^B$
O	Neither	Both A & B	ii

Exercises

1- A man with A blood type married to a women with O blood type what are the possible genotypes of the offspring?

2- Do matting between right handed man with O blood type his father was left handed and left handed woman with B blood type. Right handed is dominant .