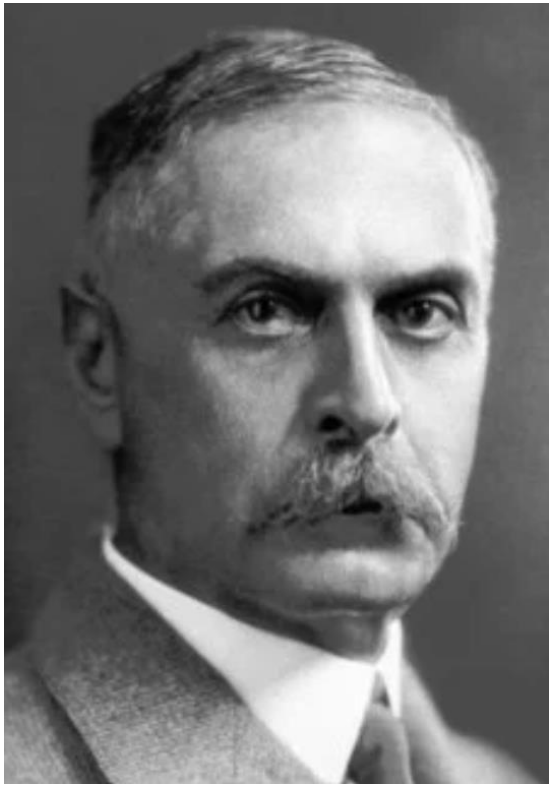
BLOOD

By

SOURAV GUHA

Blood group



- Discoverd by Karl Landsteiner in 1901
- Given Nobel Prize in 1930 in Physiology and medicine
- Discoverd ABO Blood group system

Points to be remembered

- **Antigens are present on the surface of RBC.**
- **Antigens are also called Agglutinogens**
- **Two types : A & B**

Points to be remembered

- **Antibodies are present in Plasma**
- **Antibodies are also called agglutinins**
- **Two types : a & b**

Points to be remembered

- **If an antigen is mixed with its corresponding antibody then clumping of blood takes place. The reaction is called AGGLUTINATION REACTION**

BLOOD GROUP

Blood Group	Antigens on RBCs	Antibodies in Plasma
A	A	anti-B
B	B	anti-A
AB	A, B	nil
O	nil	anti-A, B

Explanation

Genetic construction

- **Three genes are responsible for this different blood groups. These are collectively called i genes**
- **These genes are present on chromosome number 9**
- **They are IA,IB & IO gene. They are allele to each other. Among them the first two are dominant gene and the last one is recessive gene**

Blood group	Genotype
A	
B	
AB	
O	

BOMBAY PHENOTYPE

- **Discoverd by Y.M.Bhende in Mumbai**
- **Also called h/h blood group**
- **Rarest blood group**

Blood group	Antigens	Antibodies
A	A.H	b
B	B,H	a
AB	A.B.H	-
O	-,H	a,b
Bombay phenotype	-	a,b,h

Q1. Antigens are present on

a. Leukocytes
b. Erythrocytes
c. Thrombocytes
d. Lymphocytes

Q2. Antibodies are present in

a. Blood cells
b. Haemoglobin
c. Plasma
d. Plasma and platelets

Q3. When an antigen reacts with a corresponding antibody then the reaction is called

a. **Agglutinin**
b. **Agglutination**
c. **Agglutinogen**
d. **None of these**

Q4. A person having blood group AB can give his blood to the person having blood group

a. **A,AB**
b. **B,AB**
c. **O,AB**
d. **AB only**

Q5. A person having blood group O can take the blood from the person having blood group

a. **A,O**
b. **O only**
c. **B,O**
d. **AB,O**

Q6. Which type of exception of Mendelism is shown by ABO blood group system?

a. **Incomplete dominance**
b. **Polygenic inheritance**
c. **Multiple allelism**
d. **Multiple gene action**

Q7. Which type of deviation of Mendelism is shown by AB blood group?

a. **Incomplete dominance**
b. **Codominance**
c. **Polygenic inheritance**
d. **Multiple allelism**

Q8. If mother is having O blood group and father is having B blood group then which of the following blood group is possible in offspring?

a. **B**
b. **O**
c. **A**
d. **Both (a) and (b)**

Rhesus factor

- **Discoverd by Landsteiner and Weiner in 1940**
- **This antigen is also present on the surface of RBC**
- **D gene is responsible for producing this antigen.**
- **D gene is considered as Dominant gene**

- **The person having Rh antigen is considered as Rh+ and the person do not have this antigen,is considered as Rh-**
- **Rh+ having genotype DD or Dd and Rh- having genotype dd.**
- **85% of the total human population is Rh+ and 15% is Rh-.**

Erythroblastosis Foetalis

- **Also called Congenital haemolysis**
- **This condition occurs from the second pregnancy onwards**
- **In this condition mother is Rh- and foetus is Rh+.**
- **At the time of delivery, mother’s blood is exposed to baby’s blood and Rh antibody is developed in mother's blood.**

- **During second pregnancy onwards,this antibody crosses the placental barrier and destroys the Rh antigen as well as RBC of foetus.**
- **The foetus may suffer from severe anaemia.**

Which of the following statement is true for the condition of Erythroblastosis Foetalis?

a. **Mother Rh+ & foetus Rh+**
b. **Mother Rh- and foetus Rh-**
c. **Mother is Rh+ and foetus Rh-**
d. **Mother is Rh- and foetus is Rh+**

Body fluids

- **60% of the total body weight is body fluid**
- **40% of it is intracellular fluid(fluid inside the cell)**
- **15% of it is interstitial fluid (fluid between the cells)**
- **5% of it is blood and lymph**

- **Composition of blood : Plasma(55%) and Blood cells(45%)**
- **Plasma contains :**
  - **i. 90-92% proteins**
  - **ii. 8-10% proteins and minerals**
- **Blood cells are of three types :**

  i. RBC / Erythrocytes (44%)

  ii. WBC / Leukocytes. }

  iii. Platelets/ Thrombocytes }(1%)

Q. What is the percentage of plasma in human blood?

a.70%

b.90%

c.55%

d.75%

Q. Which of the following protein maintains osmotic balance of blood?

a.Albumin
b.Globulin
c.Prothombin
d.Fibrinogen

Q. Which of the following protein(s) help in blood coagulation?

a.Albumin

b.Prothombin

c.Fibrinogen

d.Both b and c

Q. Which of the following mineral helps in blood clotting?

a. Sodium

b.Potassium

c.Chlorine

d.Calcium

Q. Which of the following vitamin helps in blood clotting?

a.Vitamin A

b.Vitamin D

c.Vitamin E

d.Vitamin K

Q. What is the pH of human blood?

a.6.0

b.6.8

c.7.4

d.9.0

Q. Blood is an example of _____ tissue?

a.epithelial tissue

b.connective tissue

c.nervous tissue

d.muscular tissue

Q. Lymph is composed of

a.Plasma and blood cells

b.RBC and WBC

c.Plasma and platelets

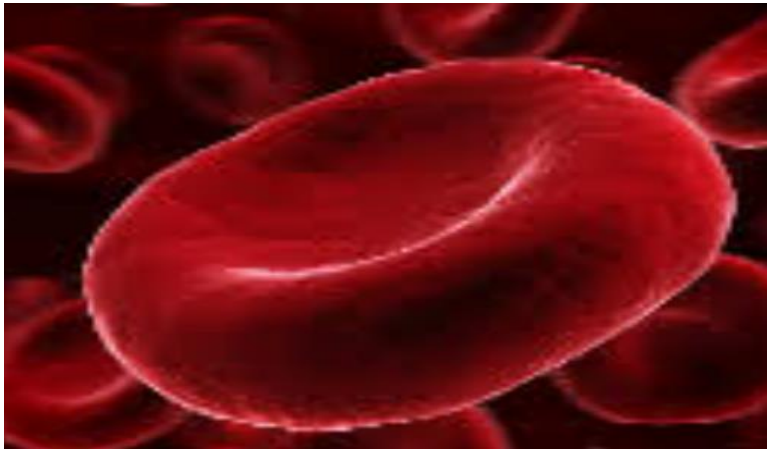
d.Plasma and WBC

RBC

- 5.5 million/cubic mm
- Shape : Biconcave
- Nucleus is absent (Exception : Camel)
- Life span : 120 Days
- Site of origination : Red Bone Marrow
- Site of Degradation : Spleen (Graveyard of RBC)
- Compound present in RBC : Haemoglobin

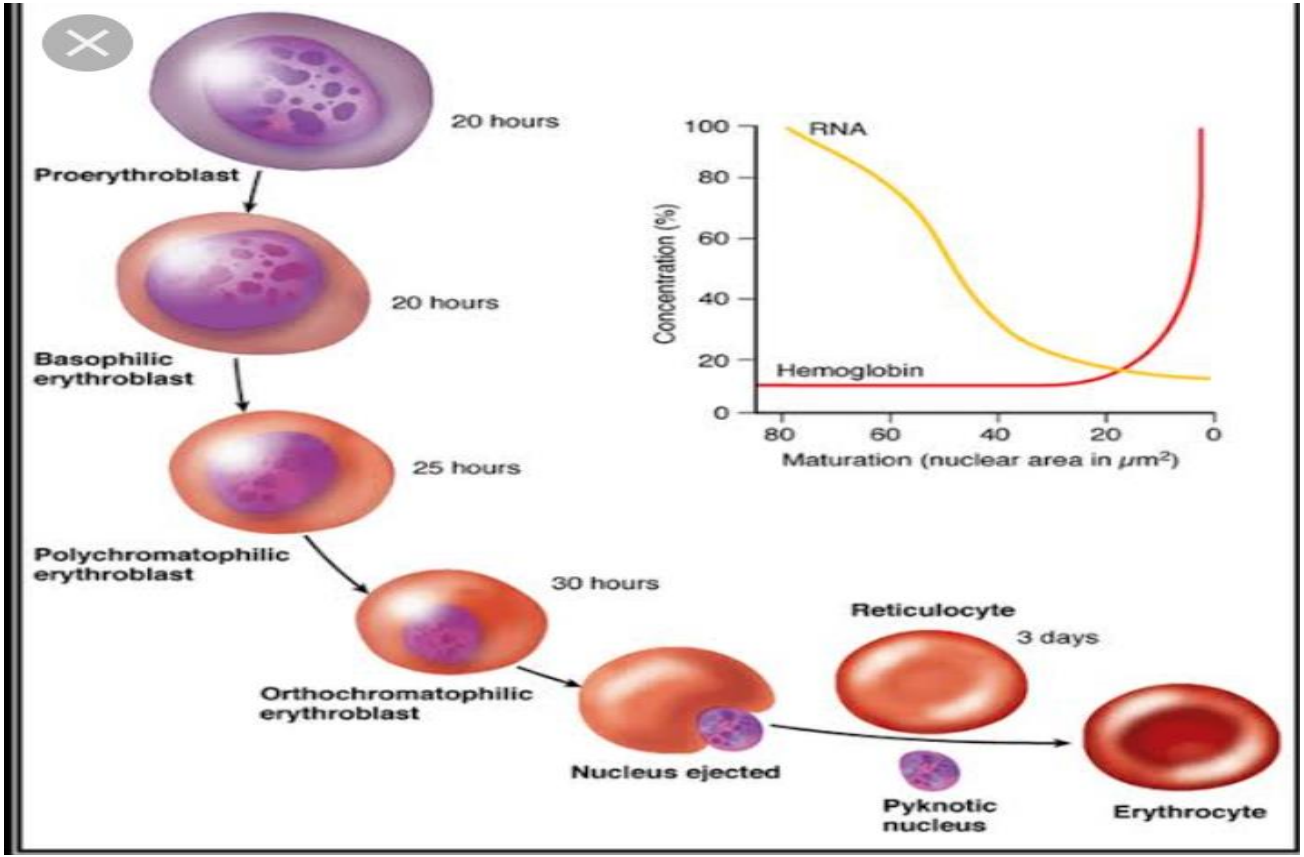
- **Normal amount of Hb : 13.5 mg/dl**
- **Decreased amount of Hb causes : Anaemia**
- **Haemoglobin = Haem + Globulin**
- **Hn has 4 PORPHYRIN RING structure With Nitrogen**
- **Central element of Hb : Ferrous (Fe2+)**
- **Diameter of RBC : 7.5 micrometre**

- **Function : RBC helps in the transport of respiratory gases oxygen and carbon dioxide by forming OXYHAEMOGLOBIN & CARBAMINOHAEMOGLOBIN compound respectively.**



- **The process of RBC formation is called Erythropoiesis.**
- **The Immediate precursor of RBC is Reticulocyte**
- **The precursor of RBC is Erythroblast.**

ERYTHROPOIESIS



WBC

- **7000-11,000 / cubic mm**
- **Types : 2types**
    - **a. Granulocytes (Granules are present in cytoplasm)**
    - **i. Neutrophils**
    - **ii. Eosinophils**
    - **iii. Basophils**

- **b. Agranulocytes**

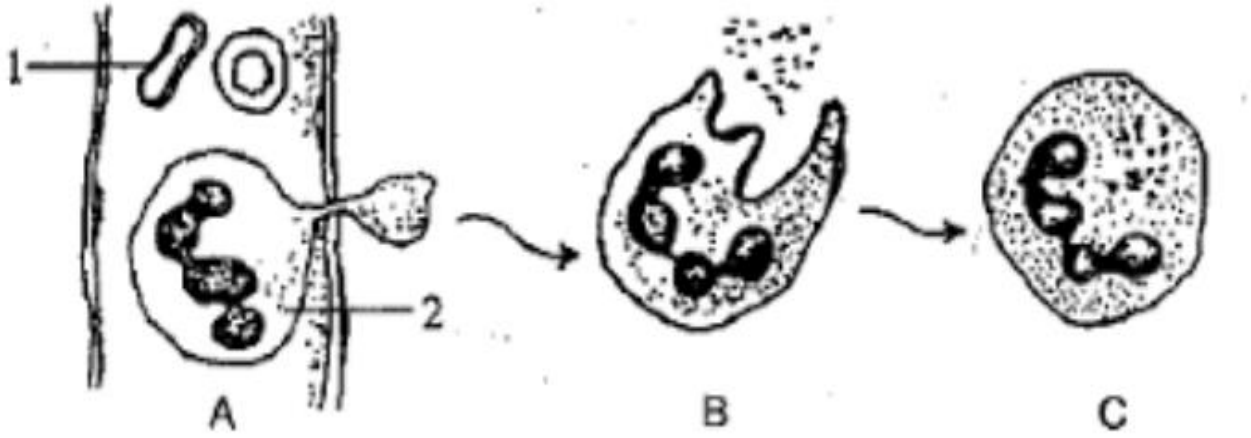
i. Lymphocytes

ii. Monocytes

- **Nucleus is present.**
- **Site of origination : Bone marrow**
- **Eosinophil gives the allergic response to our body.**
- **Neutrophils and Basophils do the Phagocytic function in our body.**

- **Diapedesis : WBCs squeeze out through the minute pores of the blood vessels to destroy the pathogens. This phenomenon is called Diapedesis**
- **WBCs show amoeboid movement.**
- **WBCs engulf the pathogens. The phenomenon is called Phagocytosis.**

Diapedesis and Phagocytosis



LYMPHOCYTES

- **Types : 2 types**
  - **i. T-lymphocytes**
  - **ii. B-lymphocytes**
- **T lymphocytes are formed in bone marrow and get matured in Thymus gland.**
- **T- cells are called memory cell and play a major role in vaccination process.**

- **B-lymphocytes are formed in bone marrow and get matured in homologous organ of Bursa of fabricius (present in bird)**
- **B-cells are called Antibody producing cells**
- **Fever is a immune response of our body.**
- **WBCs are called Policeman of our body.**