

The logo features a red arrow pointing right, enclosed within a black square frame that is open on the left side.

# SAFALTA CLASS<sup>TM</sup>

An Initiative by **अमरउजाला**

# BLOOD

→ Polymerase

• DNA → DNA  
↓

Replication

• Transcription:

DNA — RNA  
Transcriptase

• RNA → DNA

↓  
Reverse Trans.

• RNA → Pro  
↓  
Translation



# BLOOD: रक्त

pH: 7.35-7.45

- Blood is a connective tissue. संयोजी ऊतक
- Ph of blood is 7.4 (slightly basic/alkaline in nature)
- Average Volume of blood in an adult: (5-6) ltr (50-70) Kg
- Weight of blood: 7% of our body weight \*

## COMPOSITION OF BLOOD:

Blood is mainly composed of 2 parts:

1. Plasma (55%): liquid part of blood, yellow in colour
2. Cells/Corpuscles (45%): solid part of blood, red in colour.



50 kg → 3.5 kg  
60 kg → 4.2 kg  
70 kg → 4.9 kg



65-1.

Size: WBC > RBC > Plat

RBC : WBC : Plat

600 : 1 : 40

WBC: 8000

Plat: 8000 x 40

RBC: 8000 x 600

3.2 lakh

48 lakh → 4.8 mn

नसो : Anti Clotting Agent

Heparin हियरिन → (Carbohydrate)  
↳ Liver यकृत

Pigment लक

Que: Yellow → Bilirubin → Liver

Jaundice →

## Composition of Plasma:

1. Water: 92% ✓
2. Plasma Protein: 7%

Plasma protein mainly consists of 4 protein: Albumin, Globulin, Prothrombin, Fibrinogen

3. Salts and Minerals: 1% (Sodium, Calcium, HCO<sub>3</sub><sup>-</sup>)  
नमक — खनिज

Note: Yellow colour of plasma is due to a pigments namely Bilirubin, produced by Liver.

## FUNCTION OF PLASMA: कार्य

1. Provides fluidity to blood. तरलता
2. Helps in blood clotting. ✓
3. Regulates the Ph of blood. ✓
4. Regulates body temperature.

7.4

Blood Clotting



\*

\*

Na<sup>+</sup>

Ca<sup>+</sup>

	<b>RBC</b> <b>RED BLOOD CORPUSCLES</b> लाल रुधिर कणिका	<b>WBC</b> <b>WHITE BLOOD CELL</b> श्वेत रुधिर कोशिका	<b>PLATELETS</b> <u>                    </u>
SCIENTIFIC NAME:	<b>ERYTHROCYTES</b> <u>                    </u> ↓      ↓ Red    Cell  (45-55) lakh	<b>LEUKOCYTES</b> <u>                    </u> ↓ white (transparent)	<b>THROMBOCYTES</b> <u>                    </u>
<b>NUMBER(/0.001ML):</b> <u>                    </u>	(4.5- 5.5)MILLION FEMALE: (4.5- 5)MILLION MALE: (5-5.5)MILLION AVERAGE NUMBER :5 MN * Total (5-6) L - (25-30) trillion ( $10^{12}$ )	(4000-11,000) <u>                    </u>	(1.5- 4.5)LAKHS <u>                    </u>
DISEASE:	DEFICIENCY: ANAEMIA <u>                    </u> अशक्तता / रुधिर क्षीणता EXCESS: POLYCYTHEMIA <u>                    </u>	DEFICIENCY: MANY <u>                    </u> DISEASE EXCESS: BLOOD CANCER * <u>                    </u> (LEUKEMIA)	DEFICIENCY: BLEEDING / <u>                    </u> HAEMMORHAGE EXCESS: THROMBOSIS <u>                    </u>

## RBC (ERYTHROCYTES):

- Red colour of RBC is due to a protein namely Hemoglobin. (12-16) unit (gm/10ml)
- Hemoglobin: It is a protein found in our blood and composed of a metal IRON.
- Function of HB:

1. Transportation of Oxygen throughout the body that helps in energy formation.

2. Exhalation of CO<sub>2</sub>. श्वासोच्छ्वास

Facts:

Shape: Biconcave 

\* Nucleus: No nucleus, No Mitochondria

Brain of the cell

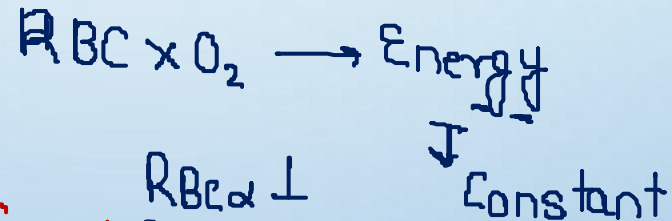
Life span: 120 days

Origin: Red Bone Marrow

Graveyard: Spleen and Liver

कोष्ठस्थान होती है। both

Que: 4 - If ↑ res



Exception: Camel  
Lama

RBC  $\perp$  O<sub>2</sub>

Femur

Back bone

long bone

Kidney

Erythropoietin

Que: Embryo 8 week

↓ 8 week → Liver

Bone marrow  
अस्थि मज्जा

Blood → Haemoglobin (Jaggery, Dates)  
          ↓          ↓  
          Iron      Protein

Que: 2 Max reactivity

$O_2, CO, CO_2, SO_2$

Haematology 300X

Que: Central Metal: Iron

$Fe^{2+}$  - ferrous  
 $Fe^{3+}$  - ferric

Haemocytometer

Blood Cell

Both

RBC

Fn:

air- $O_2$   
lungs

Haemoglobin

Oxyhaemoglobin

Que:

$O_2$  Porphyrin ring

Fe

Eg: 15 HB → 120.0 → 120 Energy  
8 HB → 64.0 → 64 En

$O_2 + food \rightarrow Energy$

+  $CO_2$

acidity

Atoms: 8.0

Molecules:  $4O_2$



# WBC (LEUKOCYTES):

- Also known as “Soldier of body”/ “bodyguard of body”
- Function: To fight against disease i.e. to provide immunity
- Facts:
- Shape: Irregular/amoeba shape
- Nucleus: Nucleated ~~no~~ mitochondria
- Life span: (2-5)days/ up to 21 days
- Origin: Bone Marrow
- Graveyard: Liver/ in the blood



सबसे छोटा रक्त कण

Smallest blood cell

Plat

RBC

Lym  
Mo.


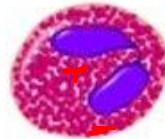
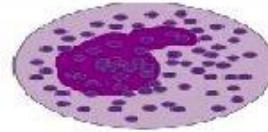

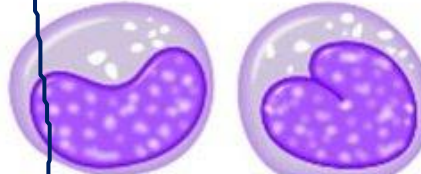
Largest blood cell

Plat

RBC

Lympho  
Mono

WBC

Subtype	Nucleus	Function	Example
Neutrophil — *	Multi-Lobed → MNCs Multi Nucleated Cell	Bacterial or fungal infection. These are the most common first responders to microbial infection.	 Granulocyte अभिर उज्ज्वल
Eosinophil →	Bi-Lobed —	Parasitic infections and allergic reactions (inflammatory).	
Basophil →	Bi/Tri-Lobed — — 2/3	Allergic and antigen response (releases histamine causing vasodilation).	
Lymphocyte →	Deep Staining, Eccentric ↖ Single	Include B cells, CD4+ helper T cells, and CD8+ cytotoxic T cells. Operate primarily in the lymphatic system.	 Agranulocyte अभिर उज्ज्वल
Monocyte →	Kidney Shaped	Phagocytosis of pathogens. Presentation of antigens to T cells. Eventually, they become tissue macrophages, which remove dead cell debris and attack microorganisms.	

(60-70)% max

min (0.5-2)%

Smallest WBC

Largest WBC

largest blood cell

Eosinophil ← - allergy

Basophil - identify → 'Histamine'

Non living  
dust, air  
↓  
Foreign,  
harmful

Living

• Neutrophil :

Eg: Corona → 'key-lock  
relation'

\* Que: AIDS - Acquired Immuno  
Deficiency Syn.

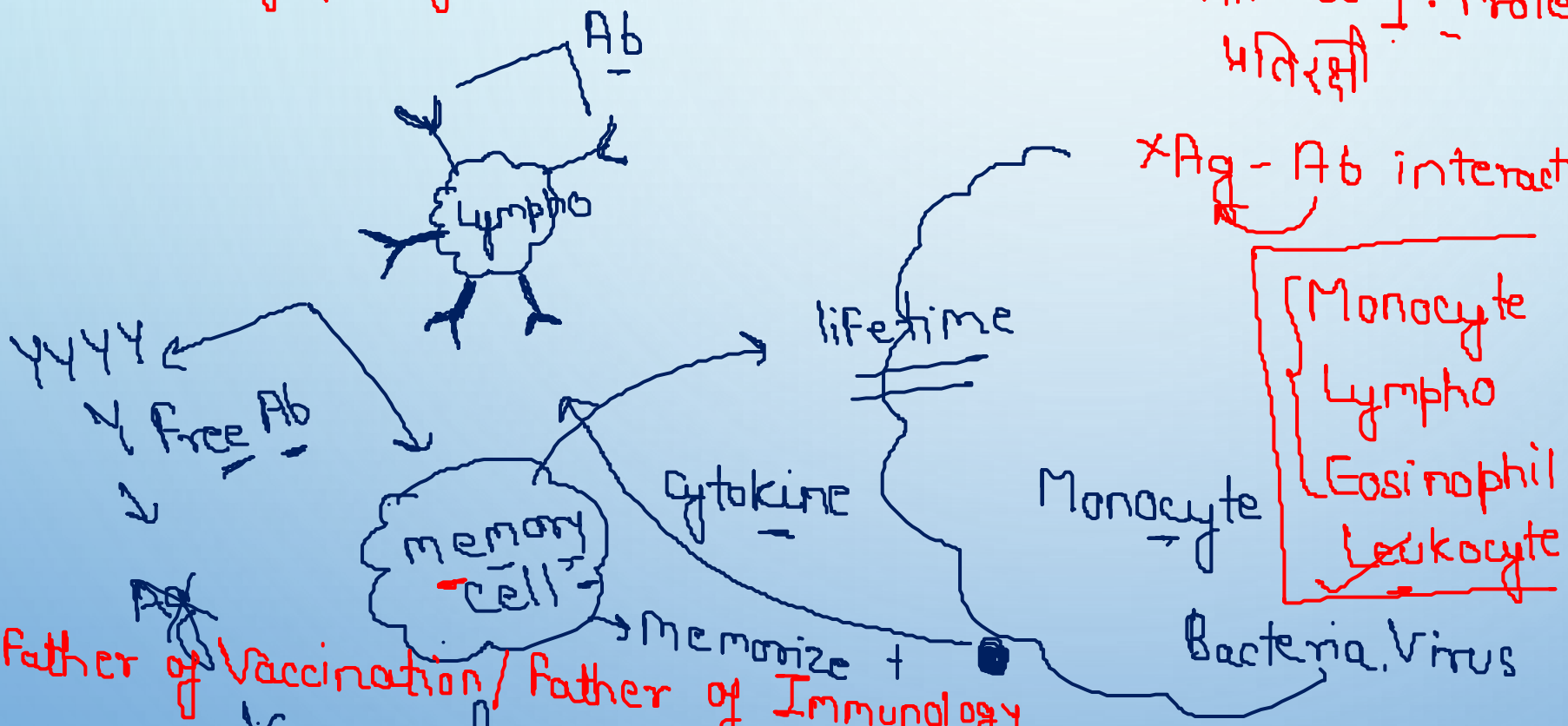
T-Lymphocyte Nipah →  
Zika →

Monocyte } Advanced immunity  
Lymphocyte }

Antigen : harm ful. Foreign  
खतरा

Antibody : Protein  
प्रोटीन

X Ag - Ab interaction



Father of Vaccination / Father of Immunology

Formation of memory cell ← Vaccine [V] → Edward Jenner  
↓ Small Pox

Virus → Deactivate → inject



## PLATELETS (THROMBOCYTES):

थ्रॉम्बोसाइट्स

(1.5 - 4.5) lakh

- Smallest blood corpuscles.
- Function: Helps in blood clotting

### Facts:

रक्त थक्का

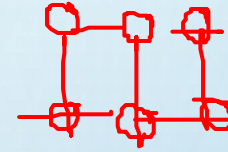
- Shape: Irregular (amoeba shape)
- Nucleus: No Nucleus ✓ 

कोरिया
- Life span: 7 days (1 week)
- Origin: Bone marrow
- Graveyard: Spleen 

लीवर

WBC > RBC > Plat

Plat  
Plasma



# • PROCESS OF BLOOD CLOTTING:

1. Calcium + Prothrombin + Thromboplastin → Thrombin

*mineral* (under Calcium)  
*protein* (under Thromboplastin)  
 Damaged cell (under Calcium)  
 plasma (under Prothrombin)  
 damaged cell (under Thromboplastin)

Thrombokinase / Factor IX → Christmas Factor → Thrombin

*(2-5) min*  
*deactivate Heparin*  
*Thrombin Factor*  
*Plat (Enz)*  
*Plat = (रेणु) Fibrin*

2. Thrombin + Fibrinogen → Fibrin

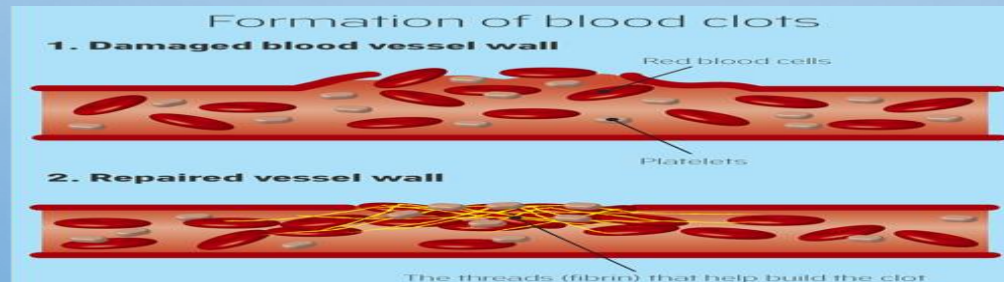
plasma (under Fibrinogen)

Thrombin / Pepsin  
*(Enz)*  
*Stomach (Enz)*

3. Fibrin + Blood (platelets) → Clot

*Vitamin K*

*Clot*

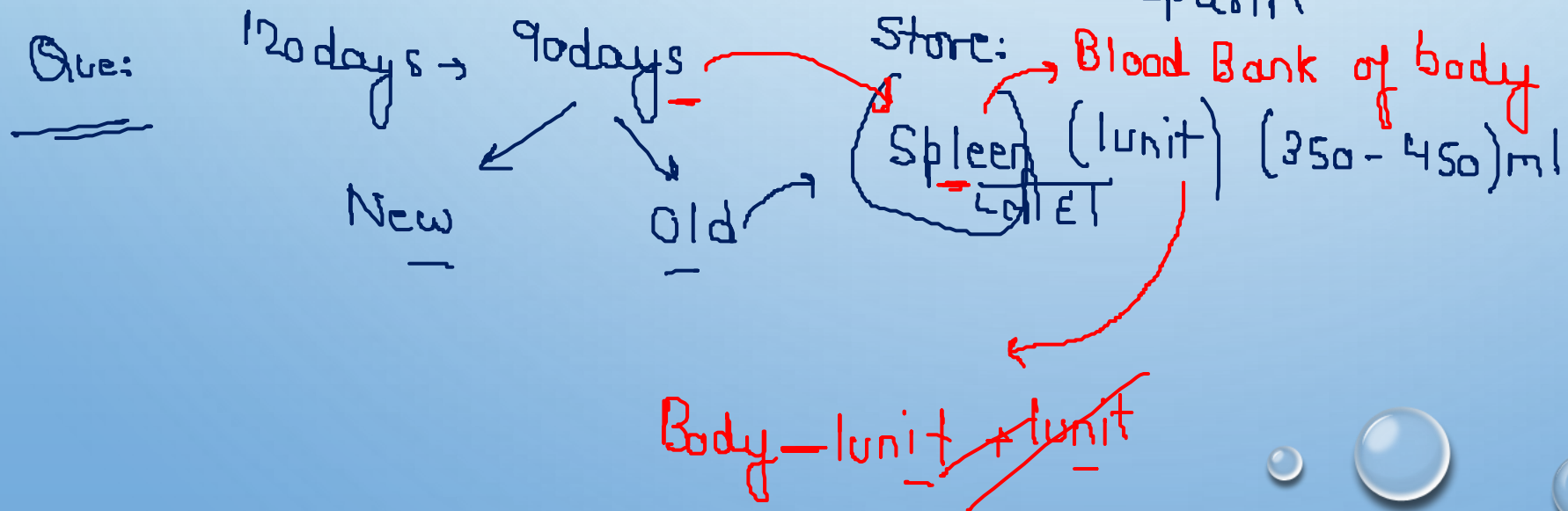


Enzyme ~~Ant~~: Bio catalyst

Que: Anti clotting agent used in blood ~~clot~~ bank  
↓  
Sodium oxalate / Sodium citrate

Haemophilia  
↓  
Christmas disease

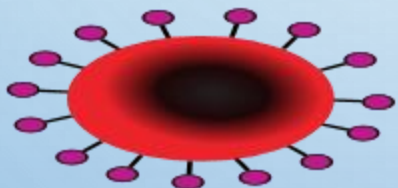
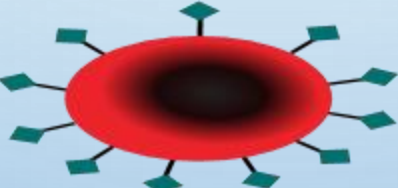
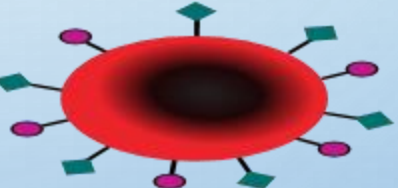
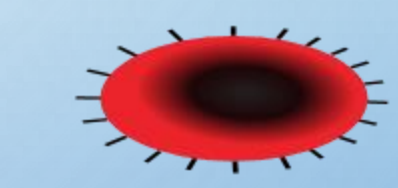







Que: Anti clotting agent found in mammals ~~तृ-धारीयों~~  
↓  
Heparin



**BLOOD GROUP:** A blood type (also known as a blood group) is a classification of blood, based on the presence and absence of antibodies and inherited antigenic substances on the surface of red blood cells (RBC). Persons may thus have type A, type B, type O, or type AB blood.

The ABO blood types were discovered by **Karl Landsteiner** in 1901.

Red blood cell

	A	B	AB	O
A				
B				
AB				
O				





**RH FACTOR (D SYSTEM OF BLOOD GROUPING):** Rh factor, also called rhesus factor, is a type of protein (D antigen) found on the outside of red blood cells. The designation Rh is derived from the use of the blood of **rhesus monkeys** in the basic test for determining the presence of the Rh antigen in human blood. The Rh blood group system was discovered in **1940 by Karl Landsteiner and A.S. Weiner.**

**D antigen:**



**ERYTHROBLASTOSIS FETALIS:** Erythroblastosis fetalis, also called **hemolytic disease** of the newborn, type of anemia in which the red blood cells (erythrocytes) of a fetus are destroyed in a maternal immune reaction resulting from a blood group incompatibility between the fetus and its mother.

### How Rh hemolytic disease develops

