

## Blood

is a body fluid in humans and other animals that delivers necessary substances such as nutrients and oxygen to the cells and transports metabolic waste products away from those same cells.

## Blood Functions

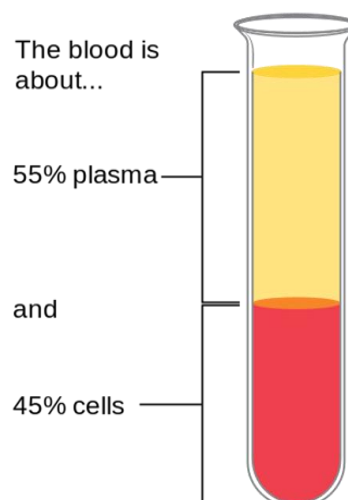
- Transport of dissolved substances.
- Regulation of pH and ions.
- Restriction of fluid losses at injury sites.
- Defense against toxins and pathogens.
- Stabilization of body temperature.

## Physical Characteristics of Blood

Colour	Bright red in arteries & dark red in veins
Mass	8 % of the body mass
pH	Slightly alkaline (pH = 7.35 – 7.45)
Taste	Salty
Temperature	38° C (100.4° F)
Viscosity	3-4 times more viscous than water
Volume	5-6 liter

## COMPOSITION OF BLOOD

- Plasma
- Cellular elements
  - ❖ RBCs (erythrocytes)
  - ❖ WBCs (leucocytes)
  - ❖ Platelets (thrombocytes)



## Introduction of Blood Physiology

**1. Plasma:** is the liquid portion of blood.

- ❖ It constitutes about 55 % of blood volume
- ❖ 90% of plasma is water
- ❖ It contains:
  - ✚ Albumin (the chief protein constituent)
  - ✚ Fibrinogen (responsible, in part, for the clotting of blood)
  - ✚ Globulins (including antibodies).

**2. Cellular elements**

**1. Red blood cells**

Shape	Circular biconcave non-nucleated
Size	Diameter = 7 – 8 $\mu\text{m}$ Thickness = 2.5 $\mu\text{m}$
colour	Red (hemoglobin pigment)
count	Adult male = 5.4 million RBCs/ $\mu\text{L}$ Adult female = 4.8 million RBCs/ $\mu\text{L}$
Life Span	120 days

### Functions of RBCs

- ❖ Transport O<sub>2</sub> from lungs to tissues.
- ❖ Transport CO<sub>2</sub> from tissues to lungs.

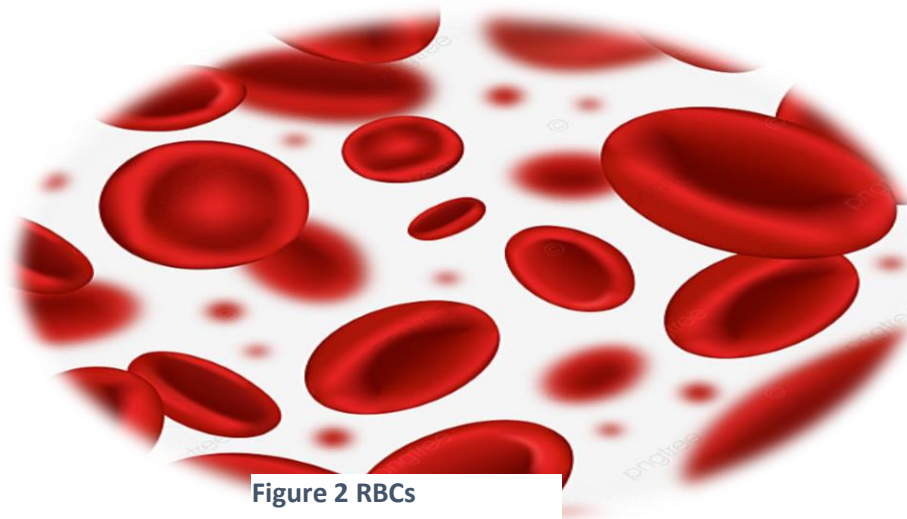


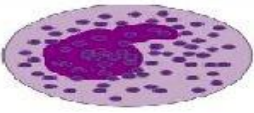

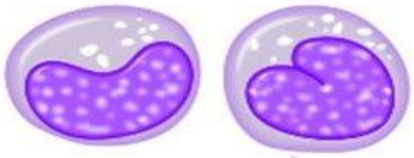


Figure 2 RBCs

## 2. White blood cells

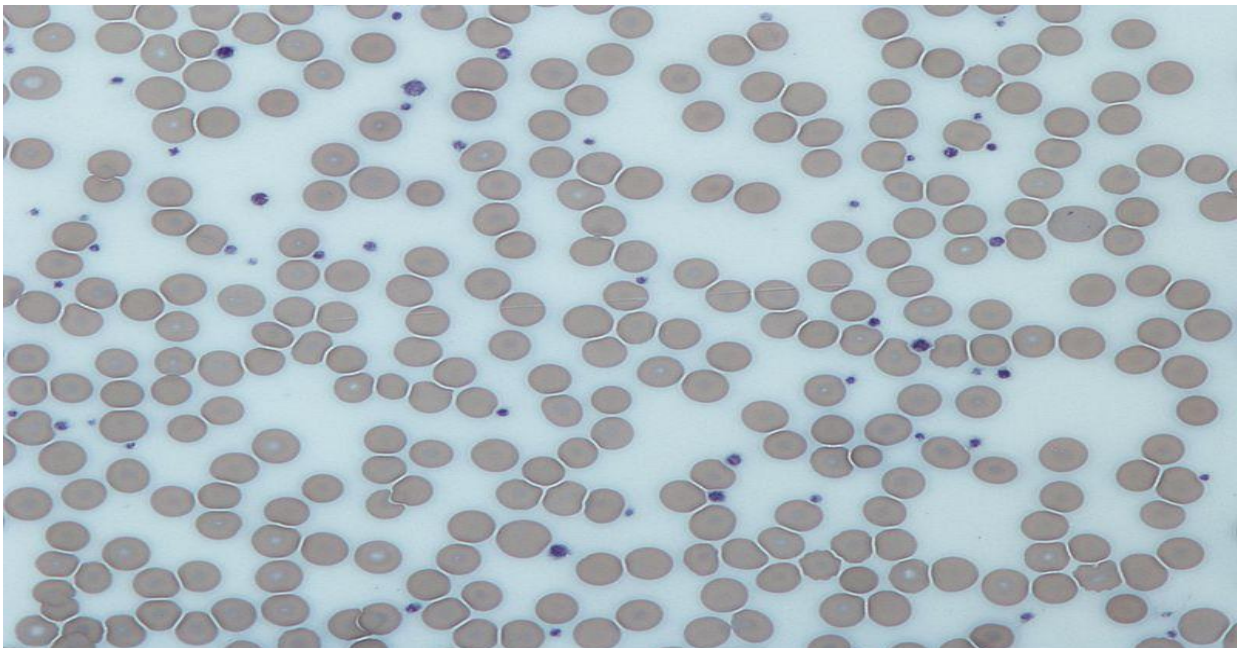
Shape	Amoeboid nucleated
Size	12 – 15 $\mu\text{m}$
colour	Colourless & translucent
count	5000 – 10000 WBCs/ $\mu\text{L}$
Life Span	10 – 13 days

### Granular WBCs

Subtype	Nucleus	Function	Example
Neutrophil	Multi-Lobed	Bacterial or fungal infection. These are the most common first responders to microbial infection.	
Eosinophil	Bi-Lobed	Parasitic infections and allergic reactions (inflammatory).	
Basophil	Bi/Tri-Lobed	Allergic and antigen response (releases histamine causing vasodilation).	
Lymphocyte	Deep Staining, Eccentric	Include B cells, CD4+ helper T cells, and CD8+ cytotoxic T cells. Operate primarily in the lymphatic system.	
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.	

### 3. Platelets

Shape	Circular biconvex non-nucleated
Size	2 – 4 $\mu\text{m}$
count	1,50,000 – 4,00,000 platelets/ $\mu\text{L}$
Life Span	5 – 9 days
Function	Blood clotting



Platelets