


Body Fluids

Bloods

Composition & Functions

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 www.youtube.com/pharmacologyconceptsbyrajeshchoudhary

 www.pharmacyconcepts.com

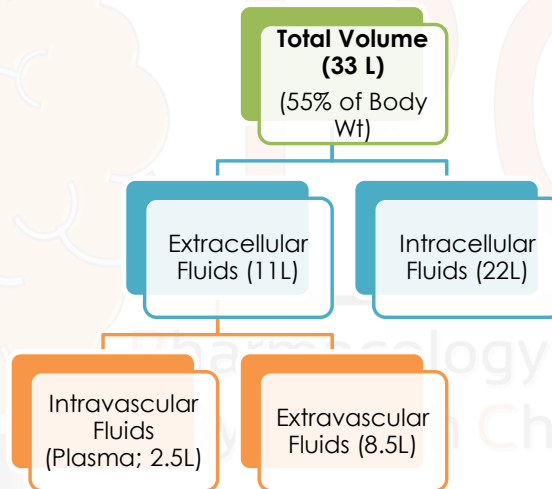
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Body Fluids

- Human Body contains many types of fluids with different compositions and functions
- The important Body Fluids are:
 - Blood
 - Urine
 - Saliva
 - Milk
 - Cerebrospinal fluids
 - Vaginal Fluids and Seminal fluids
 - Aqueous humour

Body Fluids

Adult Body (60 Kg) Fluids Components



Blood

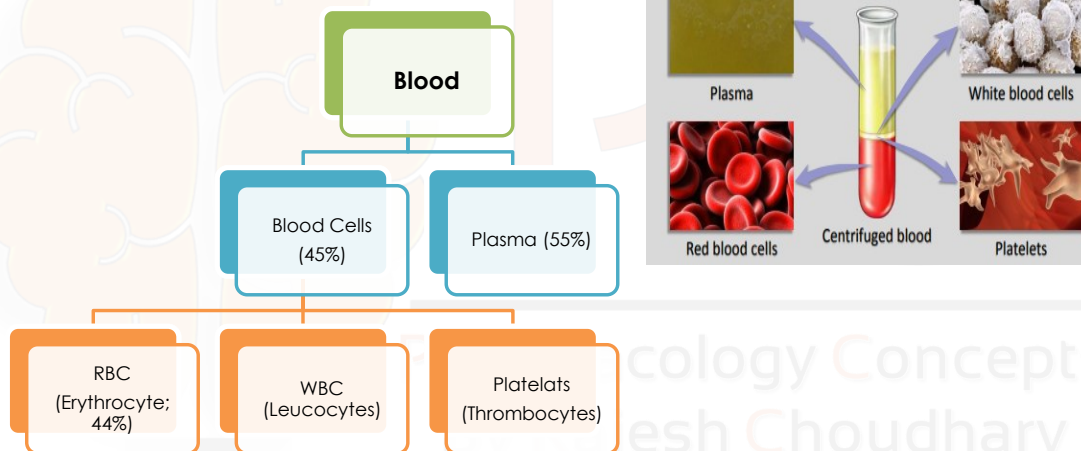
- 💡 **Haematology** (Gk: haeme – blood and logos – study)
- 💡 The branch of science concerned with the study of blood, blood-forming tissues, and the disorders associated with them is called haematology.
- 💡 **Human Blood** is a type of fluid connective tissue, which helps to communications between Body Systems/organs/Tissues/Cells

BASIC PROPERTIES

- 💡 **Amount:** 8% of body weight (5-6L)
- 💡 **Colour:** Bright **red** in Artery and dark **red** in veins
- 💡 **pH:** Slightly alkaline (7.35-7.45)
- 💡 **Temp:** 38° C (100.4 F)
- 💡 **Viscosity:** 3-4 times higher than Water

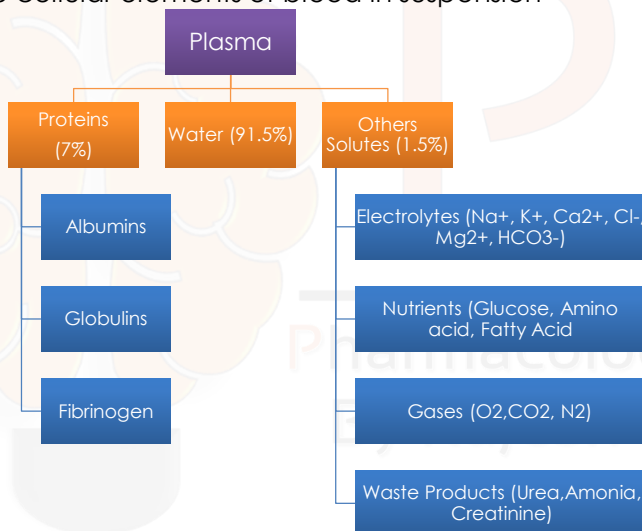
Blood

COMPOSITIONS



Blood

1. Plasma: Plasma is a pale yellow coloured liquid component of a blood that holds the cellular elements of blood in suspension



Blood

Plasma Constituents and their Function:

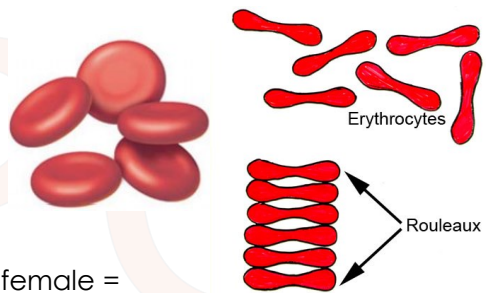
- 🔦 **Water:** Absorb, transport and release heat and works as a media.
- 🔦 **Albumins:** maintain plasma osmotic pressure and act as a carrier protein for various acidic drugs
- 🔦 **Globuline:** Défense mechanism (Antibodies), transportation of some hormone (thyroglobulin, carries the thyroxine and transferrin)
- 🔦 **Clotting Factors (Fibrinogen):** For blood coagulation
- 🔦 **Electrolyte:** pH buffering, and regulate some basic physiology like
 - 🔦 Na^+ - impulse generation
 - 🔦 Ca^{2+} - muscle contraction
 - 🔦 K^+ Impulse conduction
 - 🔦 Cl^- hyperpolarization
 - 🔦 Mg^{2+} - Stabilization
 - 🔦 PO_4^{3-} , HCO_3^- - Acid base balance (maintain blood pH 7.4)
- 🔦 **Nutrients:** for energy, heat, repair and replacement

Blood

2. Blood Cells

A. Red Blood Cells (RBC; Erythrocytes)

- 🔦 99% of blood cells
- 🔦 **Shape:** Circular biconcave non-nucleated
- 🔦 **Size:** Diameter = 7 – 8 μm , Thickness = 2.5 μm
- 🔦 **Colour:** Red (haemoglobin pigment)
- 🔦 **Count:** Adult male = 5.4 million RBCs/ μL , Adult female = 4.8 million RBCs/ μL
- 🔦 **Life Span-** 120 days
- 🔦 **Production (Erythropoiesis, 7days):**
 - 🔦 **Adults:** Red bone marrow of long bones (hip bone, breast bone & ribs)
 - 🔦 **Child:** Bone marrow of all the bones
 - 🔦 **Foetus:** Liver & spleen
- 🔦 Increase RBCs- Polycythemia
- 🔦 Decrease RBCs- Erythropenia



Blood

2. Blood Cells

A. Red Blood Cells (RBC; Erythrocytes)

- 🔦 **Major Function:** Transportation of the Gases (O₂ and CO₂) between Lungs and Tissues
- 🔦 Normal blood contains 13 – 15 g of Hb per 100 ml of blood (Hb: 13-15 g%)
- 🔦 1 Hb contains **4 haem** unit + 4 globin chain
- 🔦 1 Haem unit contains 4 Fe²⁺
- 🔦 1 Fe²⁺ combines with 1 molecule of O₂
- 🔦 Each molecule of Hb carries **four molecules** of oxygen
- 🔦 One RBC contains about **250-280 M** molecules of Hb
- 🔦 **1 RBC carries: >1000 M molecules of O₂**

Blood

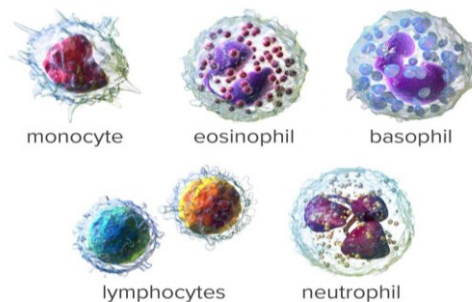
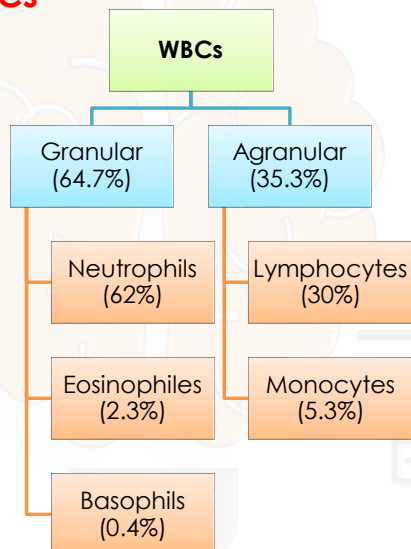
2. Blood Cells

B. White Blood Cells (WBC; Leucocytes)

- 🔦 Largest blood cells, 1% of Blood Cells
- 🔦 They contains nuclei and Granules
- 🔦 **Shape:** Amoeboid nucleated
- 🔦 **Size:** 12 – 15 μm
- 🔦 **Colour:** Colourless & translucent
- 🔦 **Count:** 5000 – 10000 WBCs/μL
- 🔦 **Life Span-** 10-13 days
- 🔦 **Production (Leukopoiesis):**
 - 🔦 **Adults:** Liver, spleen, tonsils, bone marrow
 - 🔦 **Foetus:** Liver & spleen
- 🔦 Increase WBCs- Leucocytosis, **Leukemia** (Blood cancer)
- 🔦 Decrease WBCs- Leucopenia

Blood

WBCs

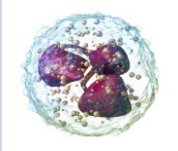



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By Rajesh Choudhary

Blood

2. Blood Cells

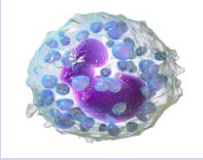
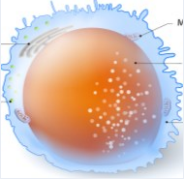
B. White Blood Cells (WBC; Leucocytes)

Type	Feature	Function	Location of production
Neutrophils 	<ul style="list-style-type: none"> Nucleus with 3-4 lobes Stain with neutral dye (hematoxylin) 	<ul style="list-style-type: none"> Destroy bacteria, and others by phagocytosis Granules having lysozymes Chemotaxis 	Bone Marrow
Eosinophile 	<ul style="list-style-type: none"> Nucleus with 2 lobes Stain with acidic dye (eosin) 	<ul style="list-style-type: none"> Combat the effect of histamine in allergic reactions Eliminate worms Granules having toxic chemicals 	Bone Marrow

Blood

2. Blood Cells


B. White Blood Cells (WBC; Leucocytes)

Type	Feature	Function	Location of production
Basophil 	<ul style="list-style-type: none"> Nucleus with indistinct lobes Stain with basic dye (methylene blue) 	<ul style="list-style-type: none"> Granules Liberate heparin and histamine in allergic reactions to intensify inflammatory response 	Bone Marrow
Lymphocyte 	<ul style="list-style-type: none"> Smallest of WBCs Large round nuclei 	<ul style="list-style-type: none"> Produce antibodies 	Bone marrow, spleen, tonsils
	<ul style="list-style-type: none"> T-Lymphocytes: processed in thymus glands by thymosin hormone, which is responsible for fully specialized, mature and functional lymphocyte B-Lymphocyte: they are produced and processed in bone marrow 		

Blood

2. Blood Cells

B. White Blood Cells (WBC; Leucocytes)

Type	Feature	Function	Location of production
Monocyte 	<ul style="list-style-type: none"> Largest of WBCs Large kidney shaped nucleus 	<ul style="list-style-type: none"> Ingest microorganisms 	Bone Marrow

Monocyte-Macrophages system

- Histiocyte (connective tissue), Synovial cells (Joints),
- Microglia (Brain), Kuffer cells (Liver), Langerhans cells (Skin)

Blood

2. Blood Cells

C. Platelets (Thrombocyte)

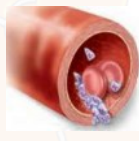
- 🔦 **Shape:** small circular biconvex non-nucleated disk
- 🔦 **Size:** 2-4 μm (diameter)
- 🔦 **Count:** 1,50,000-4,00,000 platelets/ μL
- 🔦 **Life Span-** 5-9 days (destroyed by macrophages in spleen)
- 🔦 **Production (Thrombopoiesis):** red bone marrow
- 🔦 Increase Platelets- thrombocytosis
- 🔦 Decrease Platelets- thrombocytopenia
- 🔦 **Functions:** Blood clotting (Haemostasis)

Blood

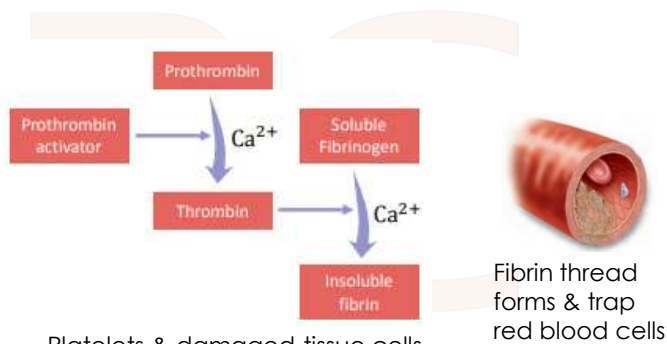
Coagulation



Blood vessel is punctured



Platelets form a plug



Platelets & damaged tissue cells release prothrombin activator, which initiates a cascade of enzymatic reactions

Blood

FUNCTION OF THE BLOOD

- 💡 Transportation
 - 💡 Gas (b/w Lungs & tissues)
 - 💡 Nutrients (GIT to Tissues)
 - 💡 Hormones (Glands to Tissue)
 - 💡 Antibodies (to infective site)
 - 💡 Heat (Active to Less active)
 - 💡 Clotting Factors (to bleeding area)
 - 💡 Medicines/Drugs
- 💡 As a vehicle for hormones, vitamins, minerals, pigments, etc.
- 💡 Water balance
- 💡 Acid base balance
- 💡 Temp regulation
- 💡 Excretion
- 💡 Body defense
- 💡 Prevention of hemorrhage



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