

BODY FLUIDS AND BLOOD

Blood contributes to homeostasis by Transporting oxygen, Carbondioxide, Nutrients and Hormones to and from body's cells.

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It regulate Body pH & Temperature, and provide protection
Against Disease through

- phagocytosis and
- production of Antibodies

Body Fluids: - Most cells of a Multicellular organism cannot move around to obtain oxygen and nutrients (1) eliminate CO_2 & other waste, these needs are met by body fluids.

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Blood Interstitial Fluid

Body fluids contribute b/w 55% to 60% of total body mass.
Intra cellular fluid (ICF) about $\frac{2}{3}$ rd of Body Fluid (1)
cytosol the fluid in cell. Extra cellular Fluid (ECF) about
 $\frac{1}{3}$ rd of body fluid outside of cell & it is divided into
Interstitial fluid and plasma.

Blood

It is a connective tissue composed of a liquid ECF called
Blood plasma that dissolve (1) suspends various cells
and cell fragments.

Interstitial Fluid

It is a fluid that bathes body cells and is constantly
renewed by the blood.

FUNCTIONS OF BLOOD:-

Blood which is a liquid CT, has three General Functions:-

- (1) Transportation
- (2) Regulation
- (3) Protection

Transportation:-

It is involved in the transport of

- (a) oxygen from lungs to various body parts
- Carbon dioxide from various body parts to lungs.
- (b) Nutrients from GIT to different cells in the body
- (c) Hormones from endocrine glands to other glands
- (d) tissues (target site) of body.
- (e) clotting factors to site of Injury to minimize bleeding
- (f) Antibodies to site of Injection.
- (g) Waste products to Excretory organs like lungs, kidney and skin.

Regulation:- Blood circulation helps in.

- (a) Maintain Homeostasis of all body fluids
- (b) Blood help to adjust pH through use of physiological buffers.
- (c) It also helps to adjust body temperature through heat absorbing & cooling properties of water.
- (d) It regulate Blood pressure by regulating the volume and viscosity of Blood.

Protection :-

- (a) Blood can clot $\rightarrow$ so protect Against Excessive loss of Blood after an Injury.
- (b) WBC provide protection Against diseases by various microorganisms by carrying on phagocytosis.
- (c) several types of blood proteins (e.g. Antibodies, Interferons) and complement system.
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Helps to protect Against diseases in variety of ways.

Composition of Blood (a) Components of Blood

Blood has Two components

(1) Blood plasma (55%)



A watery liquid Extracellular matrix that contains dissolved substances

- If a sample of blood is centrifuged in a small glass tube



The cells (WBC, RBC) sink to bottom of tube and light weight plasma forms a layer on top.

(2) Formed Elements (45%)

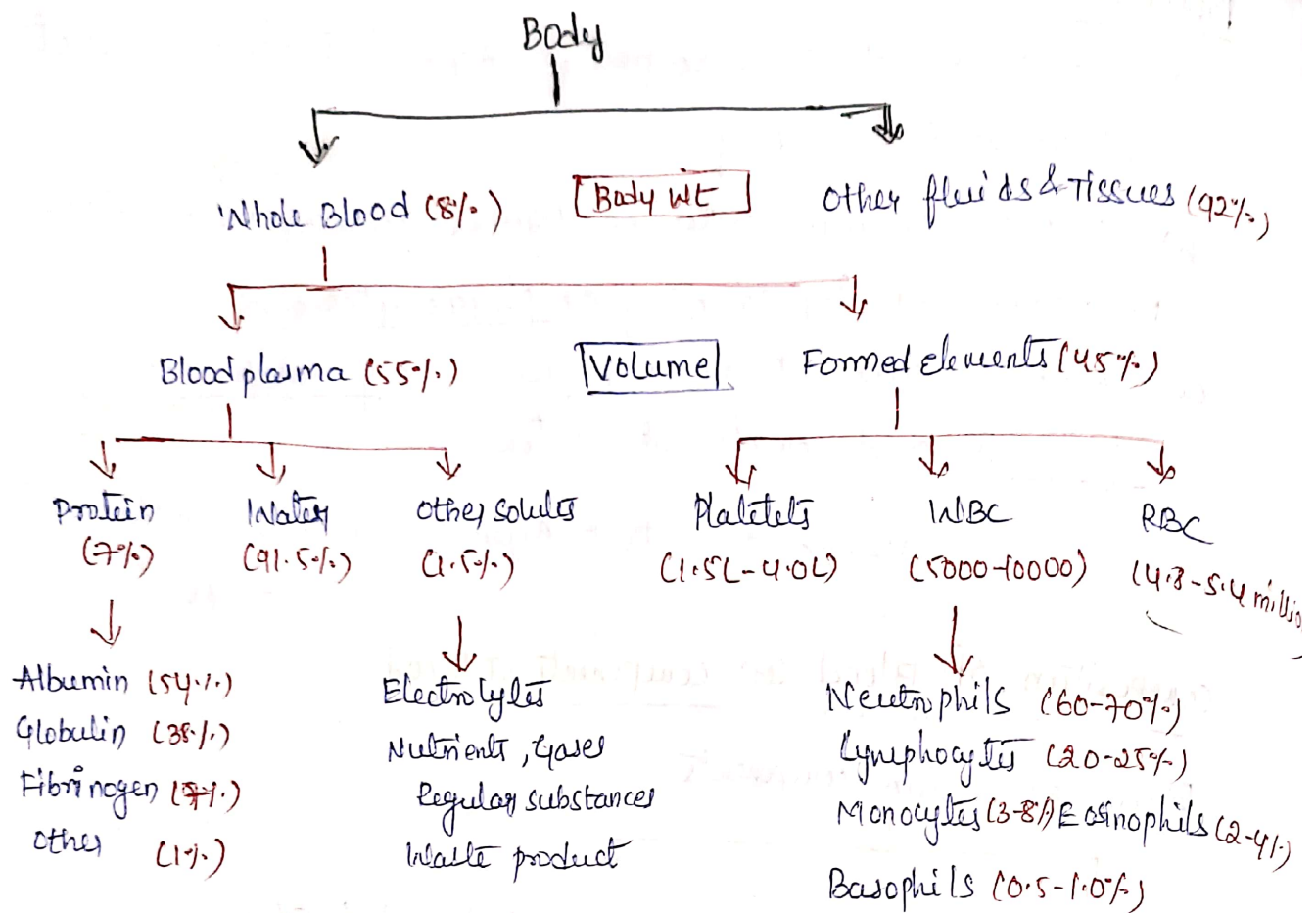
$\downarrow$
cells and cell fragments



plasma (55%)

WBC, platelets

RBC (45%)



(1) Blood plasma :-

- When formed Elements are removed from blood.

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A straw colored liquid is left called Blood plasma (or) plasma.

- Blood plasma is about 91.5% water and 8.5% solutes

Most of which (7%) are proteins called
plasma proteins

- Hepatocytes (~~liver cells~~) synthesize most of the plasma proteins

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it includes albumins (54%) globulins (38%) & fibrinogen (7%)

- These plasma proteins are also called **Antibodies** (or) immunoglobulins

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- The other solutes in plasma include **Electrolytes**, nutrients, regular substances such as enzymes and hormones, gases and waste products such as urea, uric acid, creatinine, ammonia, bilirubin.

1) Formed Elements :-

The Formed Elements of blood include three principal components - (RBC's, WBC's & platelets) → Whole cells

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cell fragments

- RBCs and platelets have just a few roles, but WBCs have a number of specialized functions.

(I) Red Blood cells

(II) White Blood cells

(A) Granular Leukocytes

(i) Neutrophils

(ii) Eosinophils

(iii) Basophils

(B) Agranular Leukocytes

(i) T and B lymphocytes and Natural Killer (NK) cells,

(ii) Monocytes

(III) Platelets

* The percentage of total blood volume occupied by RBCs is called Hematocrit

Hematocrit of 40 indicates that 40% of the volume of blood is composed of RBCs.

* The normal range of hematocrit for adult females is 35-46% (average - 42)

For adult males is 40-54% (average - 47)

significant drop in hematocrit indicates Anaemia.

* In polycythemia - percentage of RBCs abnormally high (65% or more)

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This increases viscosity of blood & contributes to high blood pressure and risk of stroke.