

PLASMA PROTEINS

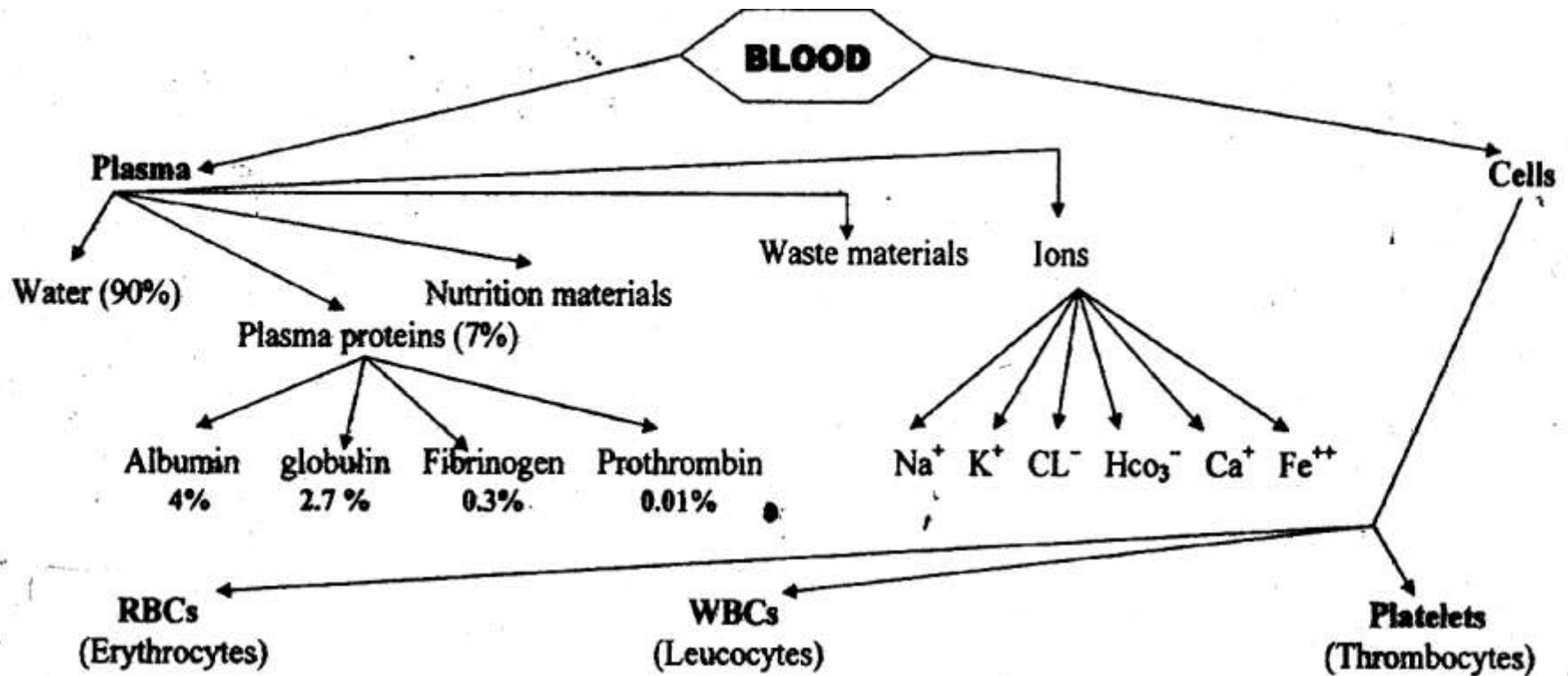


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STUDY OBJECTIVES

By the end of the lecture the student will able

- To describe the composition of plasma.
- To describe the different types & functions of plasma proteins.



- Number:

* Average 5 million / mm³.

* Adult male 5-5.5 million / mm³.

* Adult Female 4.5-5 million / mm³.

* IF less than 4 million / mm³ = anaemia.

* IF more than 6 million / mm³ = polycythemia.

Life Span = 120 days

- Function:

O₂ and Co₂ Carriage.

Erythropoiesis = Formation of RBCS.

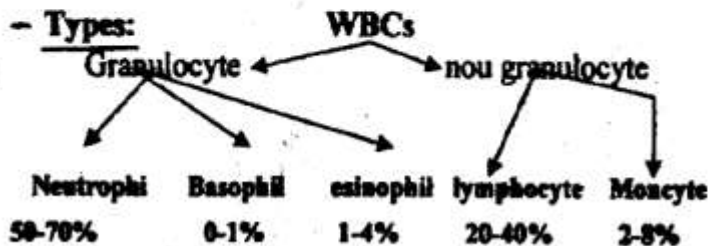
- Number:

* Average 4000-11000 /mm³.

* IF less than 4000/mm³ = leucopenia.

* IF more than 11000/mm³ = leucocytosis.

- Types:



- Number:

* Average

$$\frac{1}{4} - \frac{1}{2} \text{ million / mm}^3$$

* If less than $\frac{1}{4}$ Million/mm³

= purpura

= thrombocytopenia

* IF more than $\frac{1}{2}$ Million/mm³

= thrombocytosis

= function:

Haemostasis (stoppage of bleeding)

PLASMA PROTEINS (PP)

● Concentration: 6-8 gm /100 % (with average 7 gm %).

● Types:

1- **Albumin**: 3-5 gm % (average 4 gm %).

2- **Globulin**: 2-3 gm % (2.7)(there are 3 types: alpha (α_1 & α_2), beta (β_1 & β_2) and gamma (γ)).

3- **Fibrinogen**: 0.3 gm %.

4- **Prothrombin**: 40 mg %.

Functions of Plasma Proteins

I-SPECIFIC FUNCTIONS:

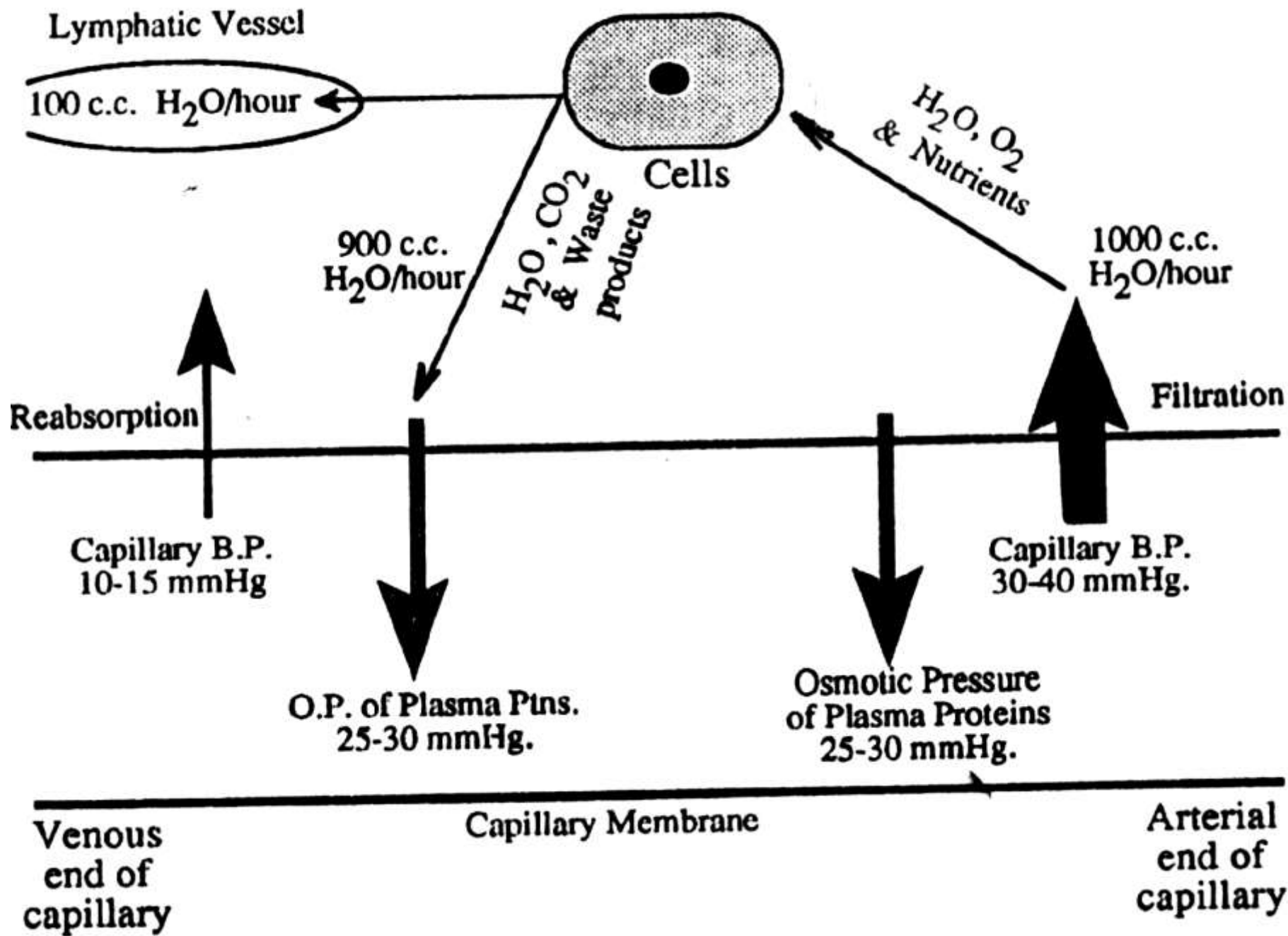
Albumin	Globulin	Fibrinogen	Prothrombin
<p><u>1- Colloid Osmotic pressure of plasma proteins (OPPP)</u></p> <p>-It is important in the regulation of tissue fluid formation and blood volume.</p>	<p><u>2-Defense (immunity) Mechanism</u></p> <p><u>By</u> gamma globulin.</p>	<p><u>3-Blood Viscosity:</u></p> <p>prevention of the rapid outflow of blood through the vessels, thus maintaining normal arterial blood pressure.</p>	<p><u>4-Blood Coagulation.</u></p>

Colloid Osmotic pressure of plasma proteins (OPPP)

-Causes: Albumin.

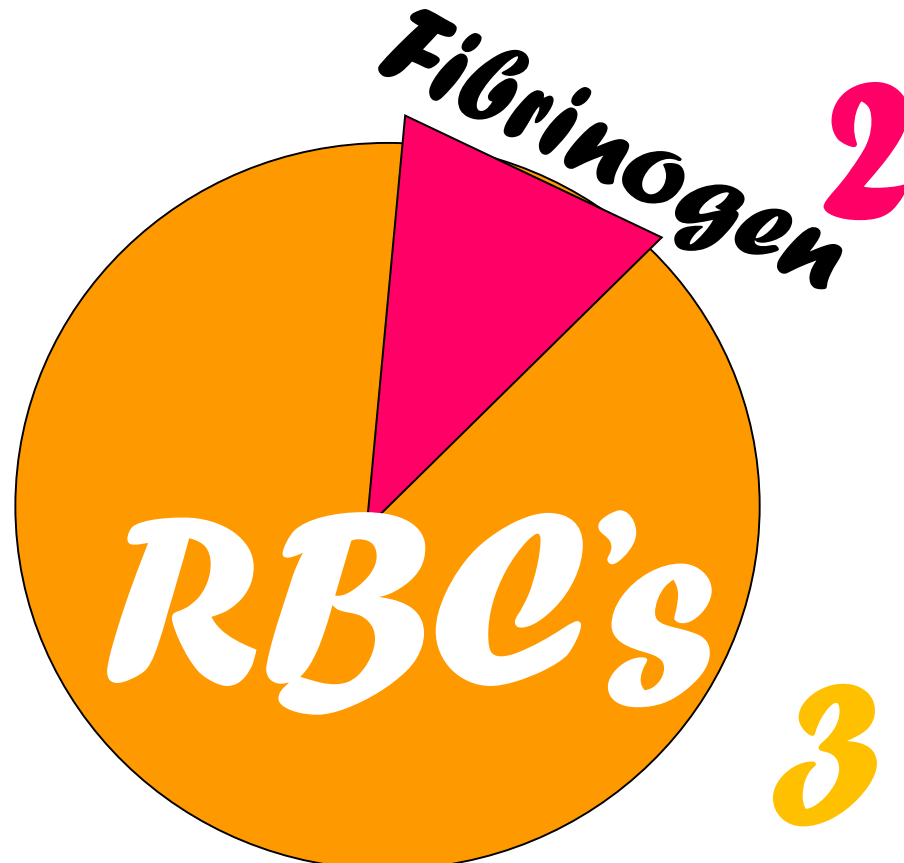
Value: is 25 – 30 mm Hg.

-Importance: It is a re-absorption force (by it, fluid passes from tissue space to blood) and antagonizes the filtration forces (capillary hydrostatic pressure at arterial end of capillary = 30- 40 mm Hg and capillary hydrostatic pressure at venous end of capillary = 10-15 mm Hg). Fluids are filtered at the arterial ends (where the hydrostatic pressure exceeds the OPPP) and reabsorbed at the venous ends. ***So, the OPPP is important in regulation of tissue fluid formation and blood volume.***



Blood viscosity.

5 than water



Viscosity is important in the production of the peripheral resistance and maintenance of blood pressure.

Mechanism: Prevent rapid flow of blood from arteries to veins during diastole.

II-NON SPECIFIC FUNCTIONS: A, B, C, D,

5-Absorption and Transport:

For several substances e.g. vitamins & hormones.

- **-Importance:**

a- Prevent loss of these substances in urine (plasma proteins are large MW so not filtered by the kidney) .

b- Serve as a reservoir.

II-NON SPECIFIC FUNCTIONS: A, B, C, D,

6-Buffering Action:

- = **15%** of the buffering capacity of the blood.
- It is composed of proteinic acid/ Na proteinate (weak acid/ weak base). When added of a strong acid (e.g. lactic acid) the plasma protein buffer reacts with it by its salt (Na proteinate) to produced neutral salt (Na lactate) and very weak acid (proteinic acid), also when added a strong alkali, the acid of the buffer reacts with it to produce a very weak alkali (sodium proteinate) and very weak acid (carbonic acid). Net result is no change in pH.

Lactic acid + Na proteinate \Rightarrow Na lactate + proteninic acid

Sodium bicarbonate + proteinic acid \Rightarrow carbonic acid + sodium proteinate

II-NON SPECIFIC FUNCTIONS: A, B, C, D,

7-Capillary Permeability:

It ↓ the capillary permeability (closes the capillary pores)

8-Diet Reserve:

Plasma proteins are used in starvation as a diet.