



ALAYEN UNIVERSITY

ANESTHESIA DEPARTMENT

FIRST STAGE

BIOLOGY

A close-up, microscopic view of numerous red blood cells, which are biconcave discs, filling the frame. The cells are a vibrant red color and are slightly out of focus, creating a sense of depth. The lighting highlights the texture and shape of the cells.

BLOOD

Composition and Functions

HAP Unit 5th

INTRODUCTION

- The normal pH range of blood is 7.35 to 7.45, which is slightly alkaline. The venous blood normally has a lower pH than the arterial blood because of presence of more Carbon dioxide.

Temperature

- The temperature of the blood is 38°C(100.4°F), about 1°C higher than oral body temperature.

Viscosity

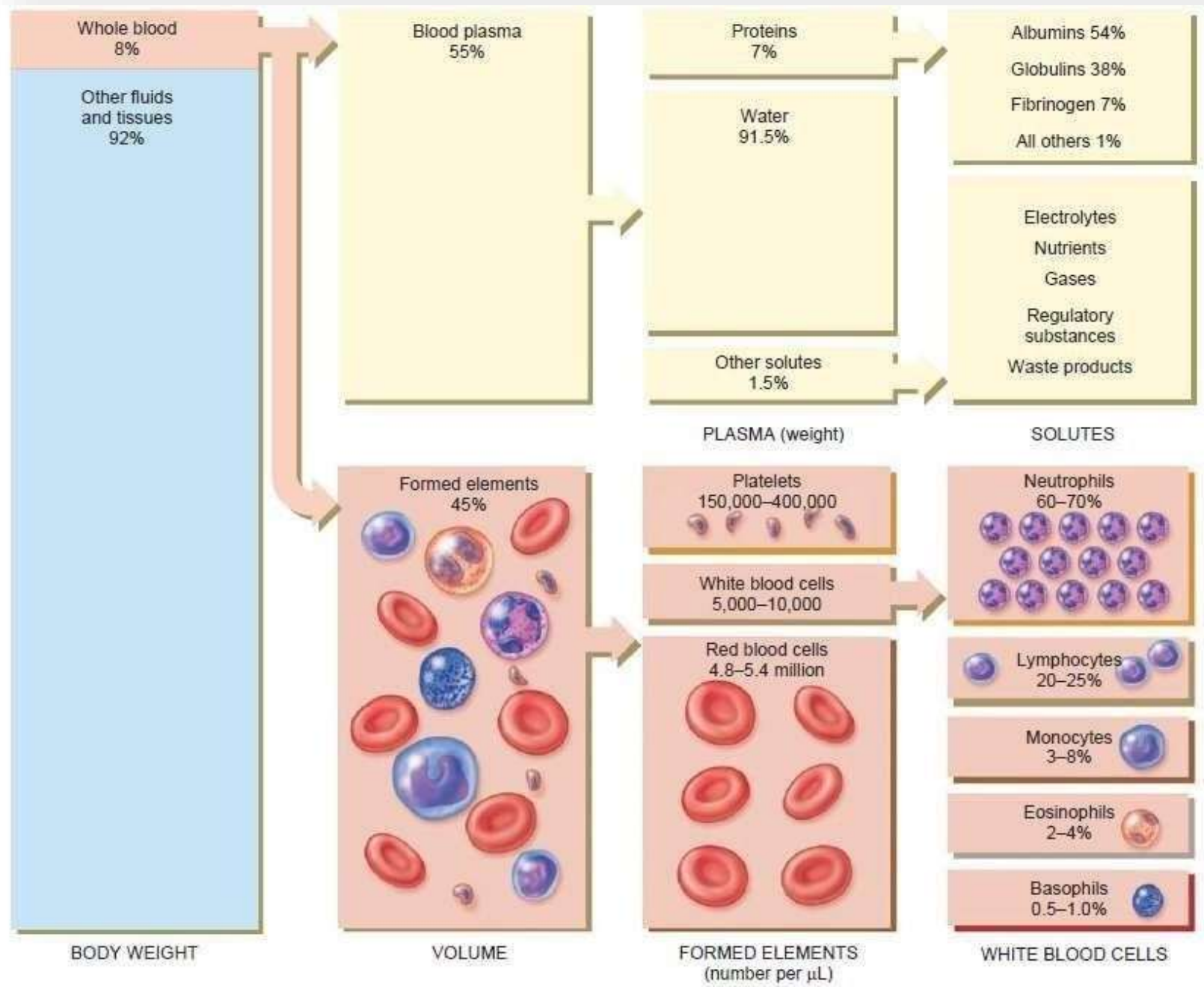
- 'Viscosity' means thickness or resistance to flow. Blood is about 3-5 times denser & more viscous(thicker) than water. Viscosity is increased by the presences of blood cells & plasma proteins. This thickness contributes to normal blood pressure.

- The colour of blood varies with its oxygen content. Arterial blood is bright red due to it's high level of oxygen. Venous blood has given up much of it's oxygen in tissues & thus has a darker.

Amount

- Blood constitutes about 20% of extracellular fluid, amounting to 8% of total body mass. The blood volume is 5L to 6L in adult male & 4L to 5L in adult female

COMPOSITION OF BLOOD





PLASMA

Pale yellow fluid consist of water and its dissolved constituents including especially proteins (such as albumin, fibrinogen, and globulins)

WATER(91.5%)	Liquid portion of blood. Acts as suspending medium for components of blood; absorbs, transports and releases heat.
PLASMA PROTEIN(7.0%)	which helps maintain water balance between blood and tissues and regulates blood volume.
ALBUMIN	Smallest and most numerous blood plasma proteins; produces by liver.
GLOBULINS	Produces by liver. Antibodies help attack viruses and bacteria. Alpha and beta globulins transport iron, lipids and fat soluble vitamin.
FIBRINOGEN	Produces by liver. Plays essential role in blood clotting.

OTHER SOLUTES(1.5%) ELECTROLYTES	Inorganic salts include Na^+ , K^+ , Ca^+ , Mg^{2+} . Help maintain osmotic pressure and plays essential roles in function of cells.
NUTRIENTS	Products of digestion pass into blood for distribution to all body cells. Includes amino acids(from proteins), glucose(from carbohydrates), fatty acids and glycerol(from triglycerides), vitamins and minerals.
GASES	Oxygen, Carbon dioxide and Nitrogen.
REGULATORY SUBSTANCES	Enzymes,. Hormones, Vitamins.
WASTE PRODUCTS	Include urea, uric acid, creatinine, ammonia.

FORMED ELEMENTS

NAME AND APPEARANCE	NUMBER	CHARACTERISTICS*	FUNCTIONS
<p>Red Blood Cells(RBCs) or Erythrocytes</p> 	<p>4.8 million/μL in females 4.5 million/μL in males</p>	<p>7-8 μm diameter, biconcave discs, without nuclei; live for about 120 days.</p>	<p>Hemoglobin within RBCs transports most of the oxygen and part of carbon dioxide in the blood.</p>
<p>White Blood Cells(WBCs) or Leukocytes</p>	<p>5000-10,000/μL</p>	<p>Most live for a few hours to a few days. Some called T and B memory cells can live for many years.</p>	<p>Combat pathogen and other foreign substances that enter the body.</p>
<p>Granular Leukocytes</p> <p>Neutrophiles</p> 	<p>60%-70% of all WBCs</p>	<p>10-12μm diameter; nucleus has 2-5 lobes connected by thin strands of chromatin; cytoplasm has granules.</p>	<p>Phagocytosis.</p>

Eosinophils



2-4% of all WBCs

10-12 μ m diameter; nucleus usually has 2 lobes connected by a thick strand of chromatin.

Eliminates parasites, such as worms which are too big to be phagocytosed

Basophils



0.5-1% of all WBCs

8-10 μ m diameter; nucleus has 2 lobes.

Liberate heparin, histamine and serotonin.

Agranular Leukocytes

Lymphocytes (T cells, B cells & natural killer cells)



20-25% of all WBCs

Small lymphocytes are 6-9 μ m in diameter; large lymphocytes are 10-14 μ m in diameter; nucleus is round.

Medium immune response, including antigen-antibody reactions.

Monocytes



3-8% of all
WBCs

12-20 μ m
diameter; nucleus
is kidney shaped
or horseshoe
shaped.

-

stimulates the production
of some globulins by the

liver;

Platelets(Thrombocytes)



150,000-
400,000/ μ L

2-3 μ m diameter
cell fragments
that live for 5-
9days;

Form platelet plug in
homeostasis; release
chemicals that promote
vascular spasm and blood
clotting.

FUNCTIONS OF BLOOD

TRANSPORTATION

- Respiration
- Nutrient carrier from GIT
- Transportation of hormones from endocrine glands
- Transports metabolic wastes

REGULATION

- Regulates pH
- Adjusts and maintains body temperature
- Maintains water content of cells

PROTECTION

- WBC protects against disease by phagocytosis
- Reservoir for substances like water, electrolyte etc.
- Performs haemostasis

THANK
YOU!

