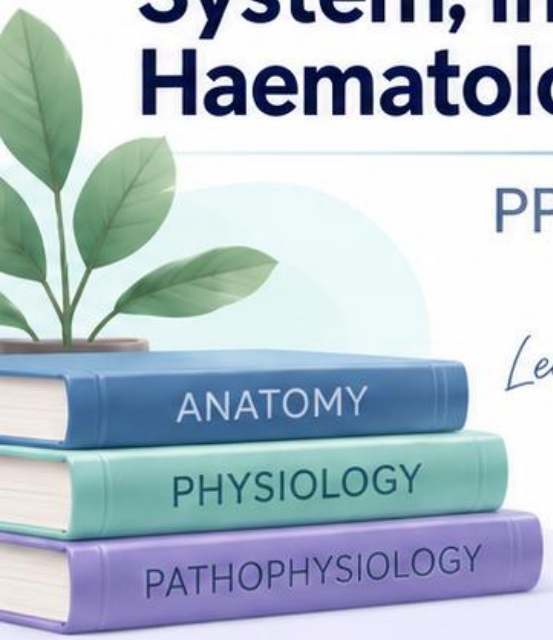
B.Pharm Semester 1

Human Anatomy, Physiology and Pathophysiology I

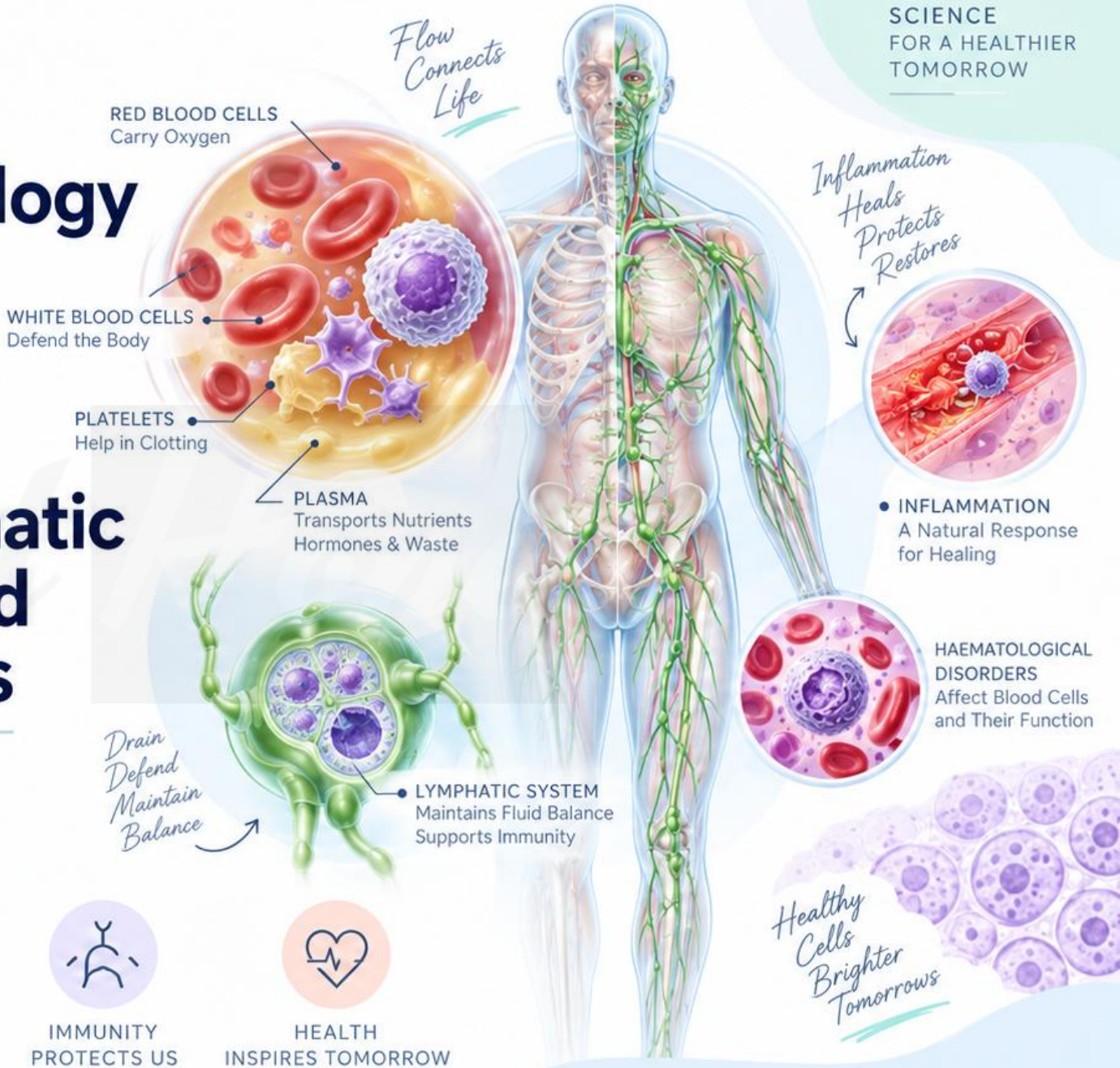
Unit 03

Body Fluids, Blood, Lymphatic System, Inflammation and Haematological Disorders

PPT Notes



Learn the Science Behind Life



SCIENCE
FOR A HEALTHIER
TOMORROW

BLOOD
SUSTAINS LIFE

IMMUNITY
PROTECTS US

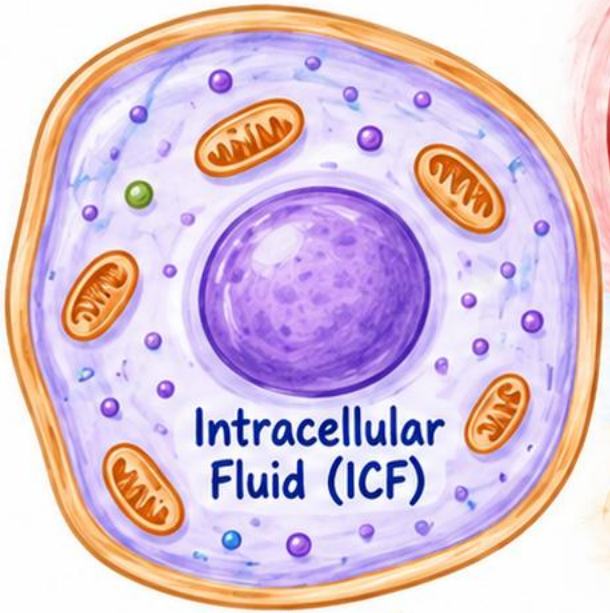
HEALTH
INSPIRES TOMORROW

STUDY | UNDERSTAND | APPLY | GROW

BODY FLUID COMPARTMENTS

1 INTRACELLULAR FLUID (ICF)

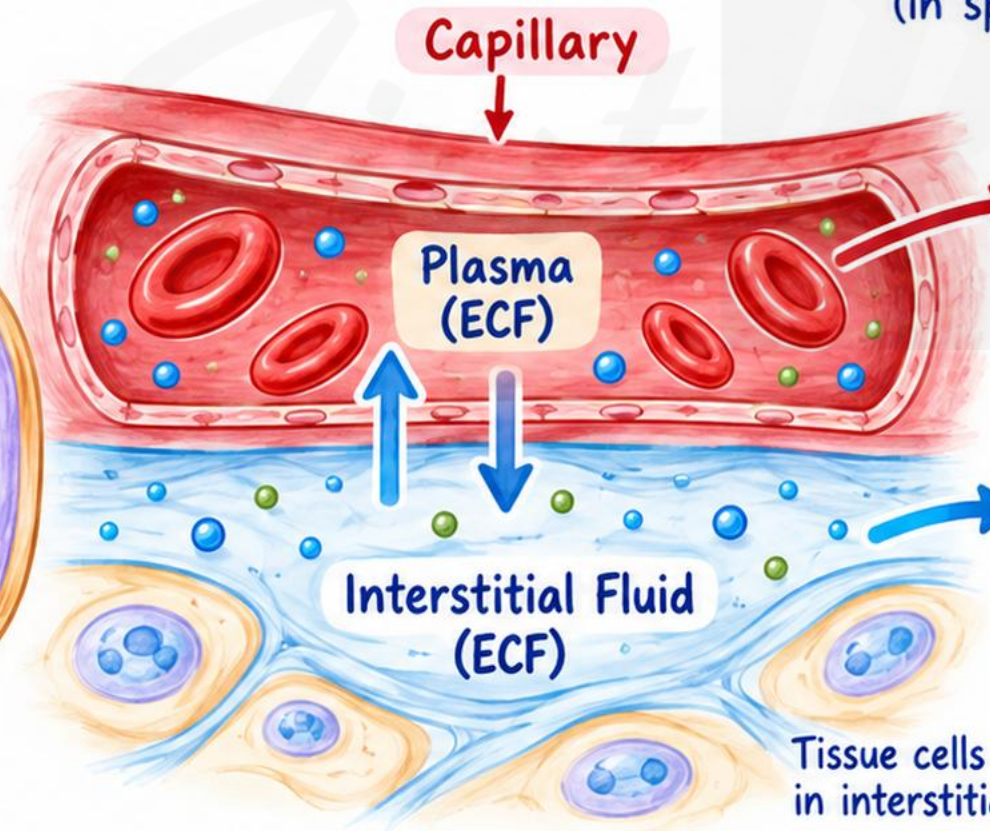
- Found within cells.
- Largest component of total body water.
- Contains water and dissolved substances inside cells.



Body cell

2 CAPILLARY EXCHANGE

- Water and small solutes move between plasma and interstitial fluid across capilllary walls.



3 EXTRACELLULAR FLUID (ECF)

- Found outside cells.
- Divided into plasma, interstitial fluid and transcellular fluid (in specialised spaces).

Plasma

- Fluid part of blood.
- Remains within blood vessels.

Interstitial Fluid

- Surrounds tissue cells.
- Exchanges with plasma across capillary walls.

4 NET EFFECT

- Continuous exchange maintains fluid balance and supports normal cell function.
- Each compartment has specific roles but they are interconnected.

Fluids move between plasma ⇆ interstitial fluid (across capillaries) and between interstitial fluid ⇆ intracellular fluid (across cell membranes).

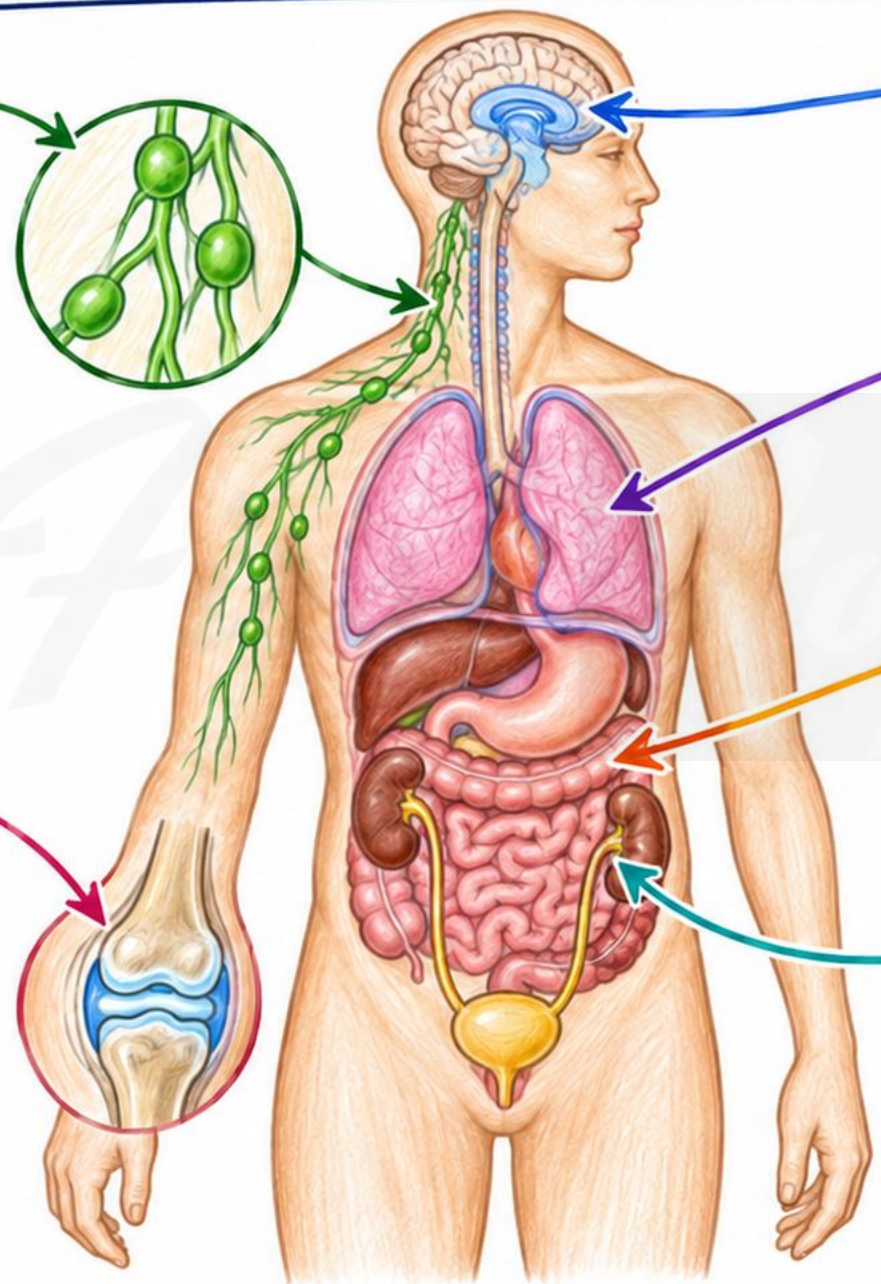
SPECIALIZED BODY FLUIDS

LYMPH

- **Location:** Lymphatic vessels and lymph nodes
- **Function:** Transports immune cells (e.g. white blood cells) and helps in defence against pathogens.

SYNOVIAL FLUID

- **Location:** Synovial cavities of joints (e.g. knee)
- **Function:** Lubricates joints, reduces friction and allows smooth movement.



CEREBROSPINAL FLUID (CSF)

- **Location:** Brain and spinal cord (ventricles and subarachnoid space)
- **Function:** Cushions and protects the central nervous system.

SEROUS FLUIDS

- **Location:** Serous cavities (e.g. pleural cavity around lungs)
- **Function:** Lubricates organs and reduces friction between surfaces.

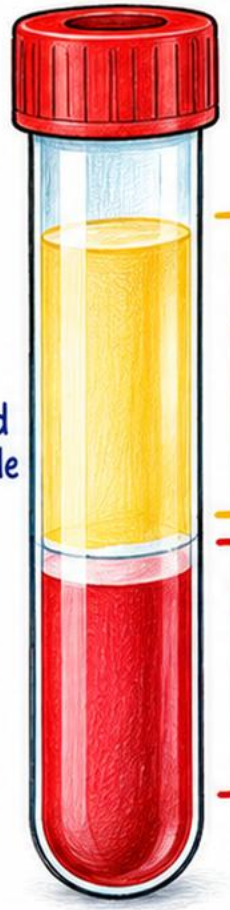
GASTROINTESTINAL FLUIDS

- **Location:** Saliva (mouth), gastric juices (stomach), pancreatic juices, bile and intestinal fluids.
- **Function:** Involved in the digestion and absorption of nutrients.

URINE

- **Location:** Produced by kidneys; excreted via the urinary system.
- **Function:** Eliminates waste products and excess substances; helps maintain electrolyte balance and regulate blood pressure.

BLOOD: COMPOSITION AND FUNCTIONS



Centrifuged blood sample

Plasma (about 55% of blood volume)

Formed elements (about 45%)

PLASMA (≈ 55%)



- Liquid part of blood
- ~90% water
- Contains plasma proteins, glucose, mineral ions, hormones and other substances
- Helps transport substances around the body

FORMED ELEMENTS (≈ 45%)

Red Blood Cells (RBCs) / Erythrocytes



Transport oxygen

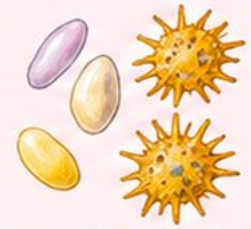
White Blood Cells (WBCs) / Leukocytes



Monocyte | Lymphocyte | Eosinophil | Basophil | Neutrophil

Immune defence (body's protection)

Platelets (Thrombocytes)



Help in blood clotting (hemostasis)

FUNCTIONS OF BLOOD

1. **Transport** — Carries oxygen, nutrients, hormones and wastes.
2. **Regulation** — Helps maintain fluid, electrolyte and hormone balance.
3. **Protection** — White blood cells defend against infection.
4. **Hemostasis** — Platelets help in blood clotting to prevent blood loss.
5. **Heat distribution** — Helps distribute heat around the body.

PLASMA

Liquid component of blood that carries water, electrolytes, nutrients, hormones, waste products and plasma proteins throughout the body.

1 Water

Main constituent (~90%). Dissolves and carries substances throughout the body.

2 Electrolytes

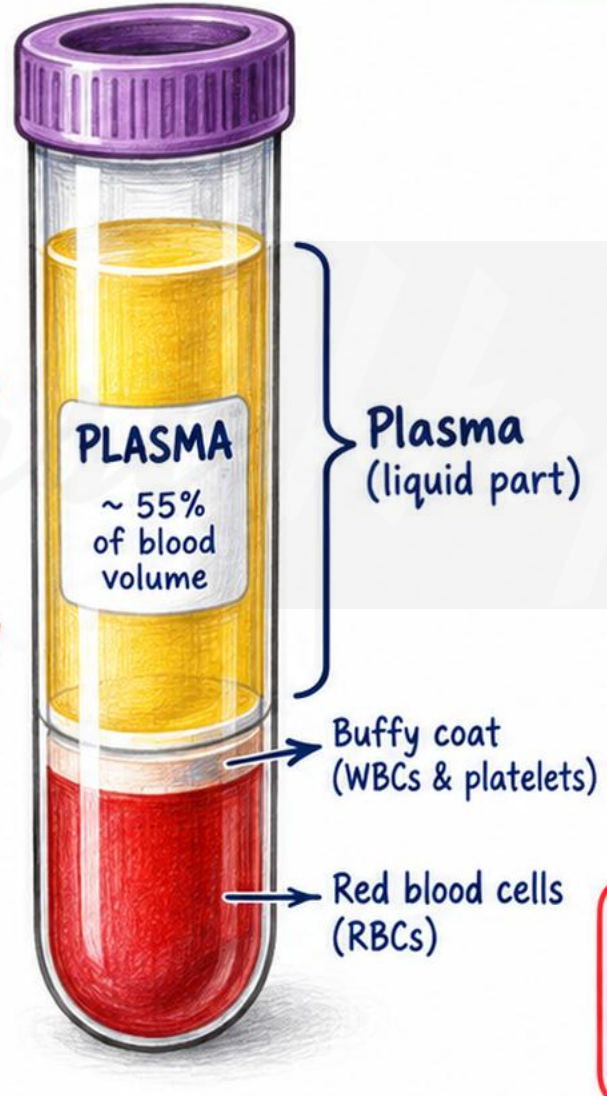
Na^+ K^+ Cl^- HCO_3^-

Help maintain fluid balance, acid–base balance and support regulation of body temperature.

3 Nutrients, Hormones and Wastes

Glucose (nutrient) · Hormones (e.g. insulin) · Urea (waste product)

Transport nutrients to tissues, hormones to target organs, and carry metabolic wastes for excretion.



4 Plasma Proteins

Main types: albumin, globulins and fibrinogen.

Albumin



- Most abundant plasma protein.
- Maintains colloid (oncotic) pressure, helping to keep fluid within blood vessels.
- Also transports various substances.

Globulins



- Include immunoglobulins (antibodies).
- Help in immune defence.
- Also transport other substances (e.g. hormones, lipids).

Fibrinogen



- A clotting protein.
- Converted to fibrin during blood clotting, helping to form a clot and prevent blood loss.

CAUTION: Abnormal levels of plasma proteins (e.g. low albumin or fibrinogen) can affect fluid balance and clotting. Interpretation is clinician-directed and context-specific.

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