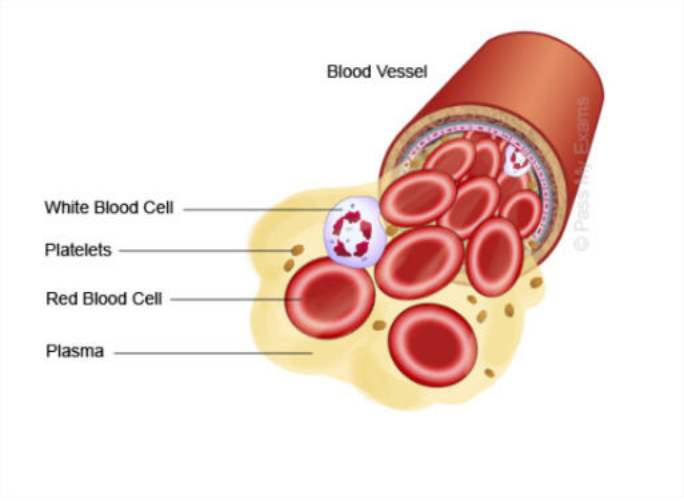
Hematology



Hematology-Introductory lecture

Learning Objectives:
At the end of this lecture student should be able to describe

1. What is Hematology
2. Definition, composition and functions of blood
3. Difference between blood and serum and importance of the term serum

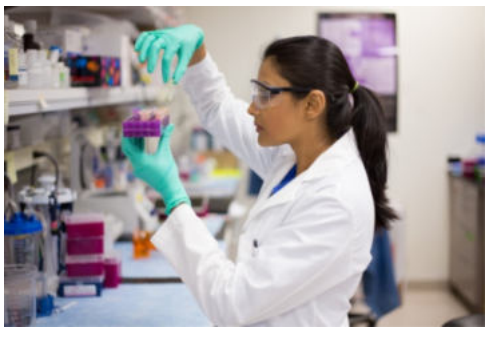
??Hematology

Introduction to the branch of Hematology

Hematology –
It is a branch of medical sciences that is concerned with the study of blood i.e. functions of its components, and related disorders (diseases) and treatment.

Introduction to the branch of Hematology

It encompasses
physiology,
pathology &
clinical laboratory work,
internal medicine, and
pediatrics

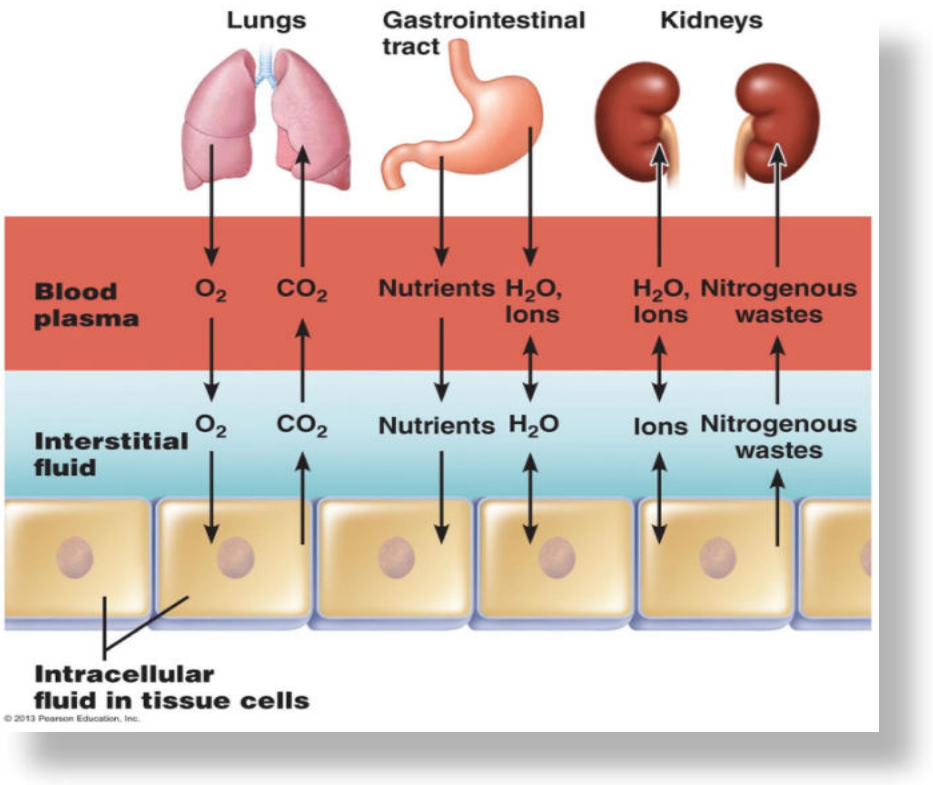


Definition of Blood

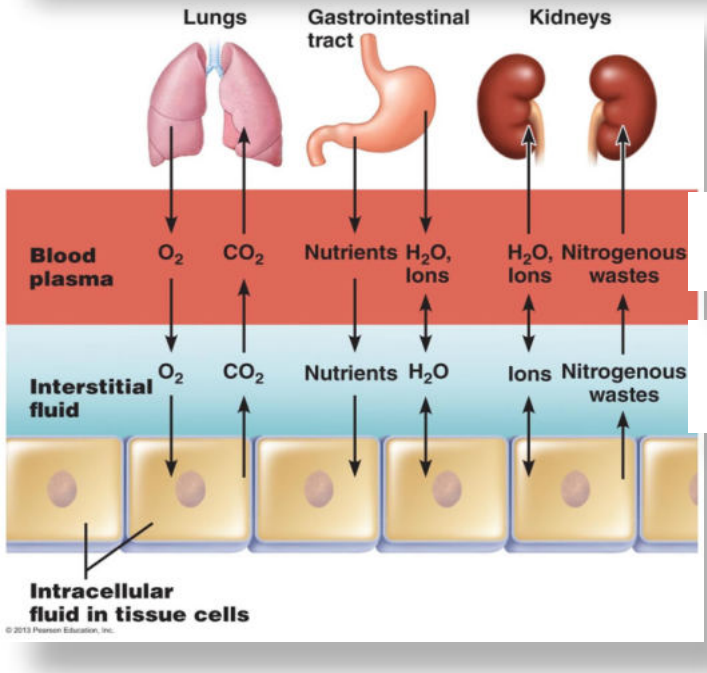
Definition of Blood

Blood is a specialized, constantly flowing connective tissue which acts as
a link between external & internal environment
Thus carries out transport functions in body
and works to maintain 'constancy of milieu interior'

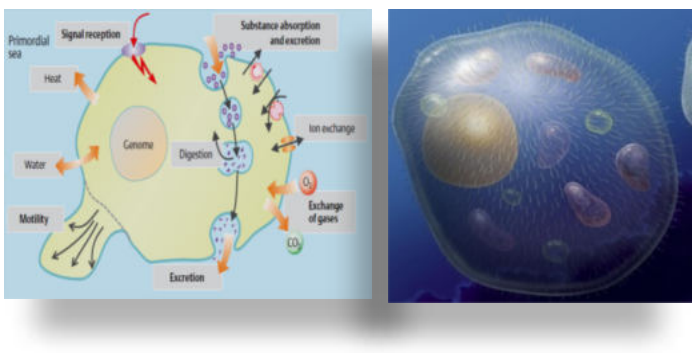
What is external and internal environment



What is external and internal environment



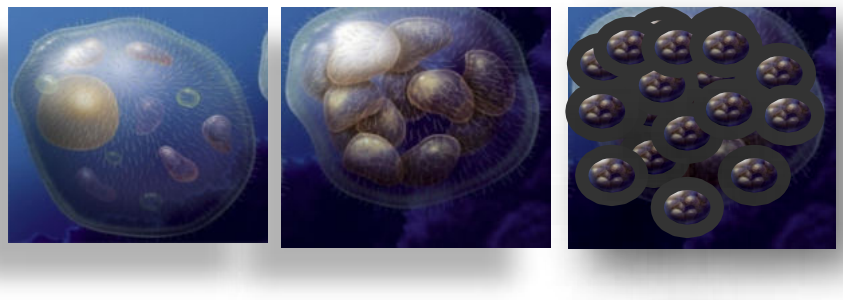
Need - a link between ext & int environment

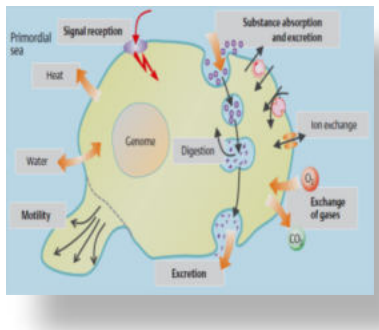


Life arose in sea as unicellular organisms.

Unicellular organism was present in the 'unlimited – constant' external environment of the primordial sea.

Need of a link between ext & int environment





With time the evolution from unicellular organisms to multicellular organisms, the transition from specialized cell groups to organs, occurred.
Thus interstitial fluid came into existence but it was very limited.
Thus a system of circulating fluid blood came in to existence as a link between this int and ext environment

Common Characteristics of Blood

- Blood volume (liters) = 7%-8% of body weight (80 ml/kg bw)
  - adult male: 5 to 6 liters
  - adult female: 4 to 5 liters

- Blood pH:
  Slightly alkaline pH - **7.35-7.45**

- Viscosity:
  Blood is a viscous fluidWhole blood: 4–5 times to water (RBC).

Common Characteristics of Blood

The specific gravity (relative density) of

Whole blood : 1.050-1.060

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Functions of blood

Maintain homeostasis

Transport Actions : Blood transports various substances-
1. Nutrients, 2. Gases, 3. Waste products, 4.Transport of various cellular products

Defense against invading foreign substances including microorganisms

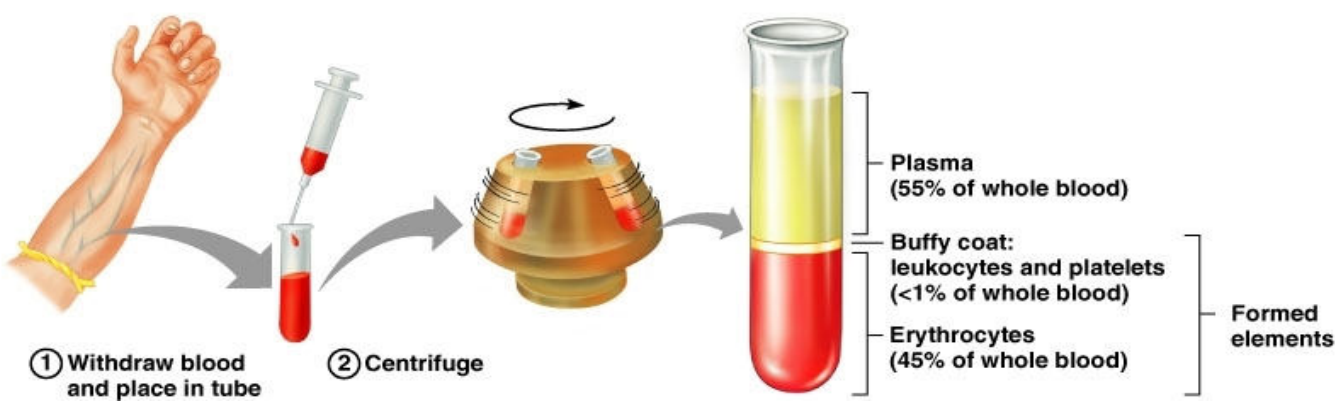
Hemostasis is one of the very important function

Water balance : Increased intake → Increased output

Temperature Regulation: It helps in circulating body heat evenly throughout the body.

Composition of Blood

- Whole blood
  - Plasma: 50-60%
    - Water: 90% - 93%
    - Solutes: 7% -10%
      - Proteins
      - Nutrients
      - Products
      - Electrolytes
      - Others: urea, gases.
  - WBC+ Platelet: 1%
  - RBC: 40-50% (male)
    37-45% (female)



And anticoagulant is mixed

Composition of Blood

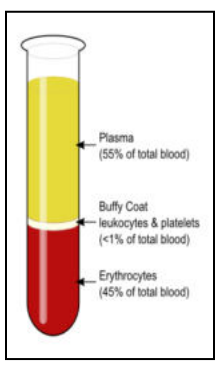
Formed cellular Components:

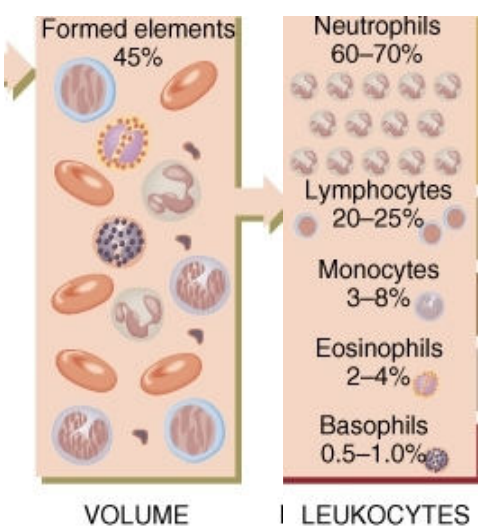
The Erythrocytes (RBCs - 4-6 million/mm^3 , 45% - PCV)

The Leukocytes and Platelets =~1%),

Leukocytes (WBCs - 4000-11000/mm^3)

Platelets (Thrombocytes - 1.5-4.0 lac/mm^3)





Composition of Blood

Plasma:

A protein-rich straw colored supernatant clear fluid portion of the anticoagulant mixed blood,

that is devoid of suspended cellular elements,

has immense number of organic & inorganic molecules.

Composition of Blood

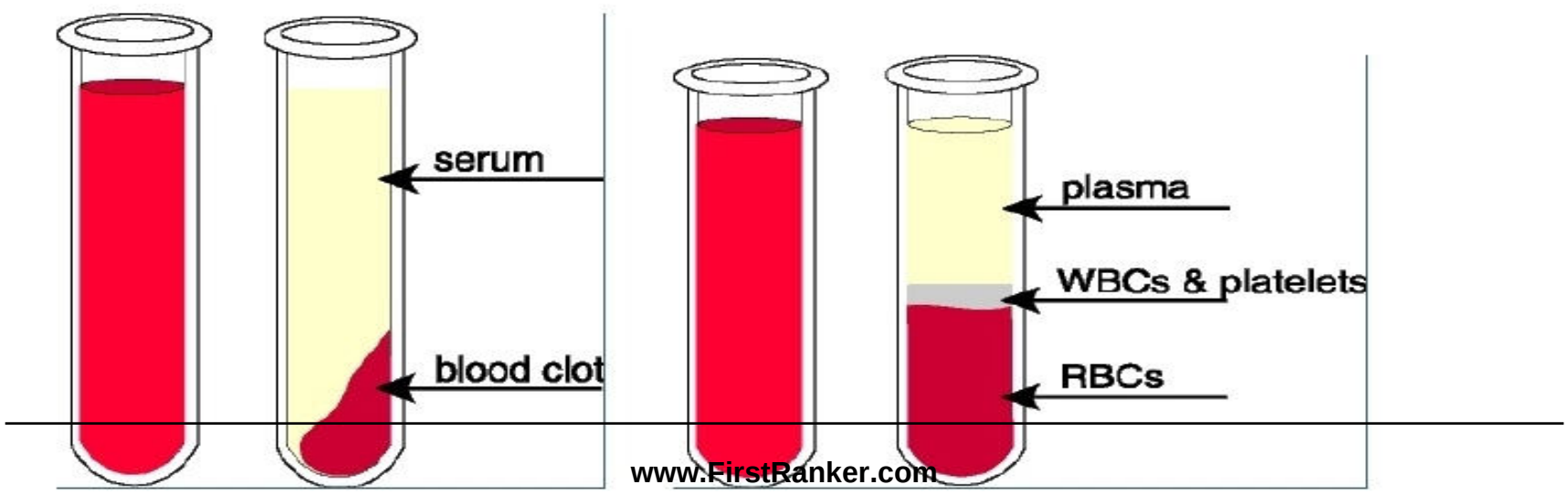
Serum:

If whole blood is allowed to clot and

the clot is removed, the remaining **clear** fluid is called **serum.**

Serum has essentially the **same composition as plasma**, except that its fibrinogen and clotting factors II, V, and VIII have been removed and it has a higher serotonin content

For all blood chemistry serum of blood is preferred over plasma.



Exercise-MCQs

Major constitute of blood is

(a) Water
(b) Protein
(c) Cells
(d) Inorganic molecules

Amount of total blood volume in an individual is approximately:

(a) 50 -60 ml/kg body weight
(b) 70-80 ml/kg body weight
(c) 90-100 ml/kg body weight
(d) >100 ml/kg body weight

Total blood volume (% of body weight) is:

(a) 8
(b) 20
(c) 40
(d) 80