Introduction to Hematology

Overview

Hematology is the study of the formed elements of blood and blood forming tissues.

- Blood forming tissues:
  - Adults: Bone Marrow
  - Neonates: Liver and Spleen

- Total blood volume = 6 to 7 liters which is 8% of total body weight (TBW)

Blood

Blood is composed of formed elements suspended in a fluid called plasma.

- Formed elements: refers to cellular components (45% of total volume): red blood cells (RBC), white blood cells (WBC), platelets.

- Plasma: refers to liquid portion of blood (55% of total volume). Contains mostly water, carries proteins, carbohydrates, etc. throughout body.

Plasma vs. Serum

- Plasma
  - Liquid part of the blood that contains clotting factors (usually inactive)

- Serum
  - Liquid part of the blood that does not contain clotting factors (used up in clot formation)
Examination of Formed Elements

Formed Elements

- Erythrocytes (red blood cell, RBC)
- Leukocytes (white blood cell, WBC)
- Thrombocytes (platelets which are cell fragments)

Function

- Transports hemoglobin which carries oxygen
- Defense/immunity
- Assist in blood clotting (coagulation)

How Formed Elements are Studied

Cells can be studied by:
- Counting cells: individual types and numbers
- Examination of blood smear: a single layer of cells is viewed under a microscope to identify:
  ▪ % of cell types
  ▪ Morphology of cells (structure, size and form/shape)

Usefulness of Examination of Formed Elements

Examining the numbers and types of formed elements in the blood aids in the diagnosis of:

- infections
- anemias
- cancers
- leukemias
Staining of Formed Elements

- In order to increase the ease of viewing formed elements, cells are stained with polychromatic stains.
- Polychromatic stains contain dyes that will stain various components of the cell different colors.

Appearance of Properly Stained Blood Smears

- RBC’s: pink/salmon color
- WBC’s:
  - Nuclei: dark blue to purple
  - Cytoplasm: pink-blue/gray-lilac
  - Granules:
    - purple (neutrophils)
    - red-orange (eosinophils)
    - dark blue-black (basophils)

Properly Stained Blood Smear

In a properly stained blood smear:
- Red cells barely touching, not overlapping
- White cells are not distorted or misshapen