Introduction to Hematology
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 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.
Formed Elements

Blood Cells

Monocyte, Lymphocyte, Neutrophil, Eosinophil, Basophil, Macrophage, Erythrocyte, Platelets
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

<table>
<thead>
<tr>
<th>Formed Elements</th>
<th>Function</th>
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<tbody>
<tr>
<td>- Erythrocytes (red blood cell, RBC)</td>
<td>- Transports hemoglobin which carries oxygen</td>
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<tr>
<td>- Leukocytes (white blood cell, WBC)</td>
<td>- Defense/immunity</td>
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<tr>
<td>- Thrombocytes (platelets which are cell fragments)</td>
<td>- Assist in blood clotting (coagulation)</td>
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</tbody>
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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
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.
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)
- Platelets: bluish purple
- Red cells barely touching, not overlapping
- White cells are not distorted or misshapen
- Platelets are evenly distributed