Differential leukocyte (WBC) count

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Differential leukocyte (WBC) count

- The (white blood cell differential count) determines the **number** (or the **percentage**) of each type of white blood cell, present in the blood.

- They are **neutrophils**, **lymphocytes**, **monocytes**, **eosinophils** and **basophils**.

- The biological functions of WBCs include: **defense** and **protection** against **microbial** infections or any **foreign** substances, and the production of **immunoglobulins**.
Materials

1. 2 ordinary glass slides (one used as spreader)
2. Leishman or geimsa stain
3. Distilled water
4. Cedar oil
5. Lancet, spirit
Reporting a Differential Count

Ways to report the values

By relative % of each WBC type

By absolute number of each WBC type (more CORRECT)

(% of each cell type x total WBC number)
The procedure

1. **Prepare** 2 clean slides, put a small drop of blood from the finger on one end of the clean and dry slide.

2. **Put** the slide on the surface of your bench.

3. **Apply** the edge of the 2nd slide to drop of the blood (angle 45°), allow blood to **spread** along the edge of the spreader.

4. **Move** the spreader slide slowly to make a blood film.
Dry the blood film and Cover the blood film with leishman or Geimsa stain (leave for 2 min.)

- **Note → Dilute** (not wash) the stain with distilled water (leave it for 10 min).
- **Wash** the stain of the slide with D.W and dry it.

Apply a drop of *(cider oil)* on one end of the blood film & using power 100× objective lens examines your slide and start counting WBC.
Counting direction:

Observe one field and record the number of WBC according to the different type then turn to another field in a zigzag direction. *Avoid repeat or miss some cells.*
- Prepare a table & label it with the 5 different types of WBC
- Count a total of 100 WBC
- Find the percentage of each type

<table>
<thead>
<tr>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
</tr>
</tbody>
</table>

| | | | | | |
| | | | | | |
Neutrophils

- Cytoplasm: pink and Granular

• Nucleus: dark purple blue dense chromatin, 2-5 lobes

mature neutrophil usually having (3-5) lobes.
neutrophil
Eosinophil
Basophil
Monocyte
Lymphocyte
**Differential count: DLC**

- Neutrophils: 62-68%
- Eosinophils: 1-4%
- Basophils: 0-1%
- Monocytes: 4-7%
- Lymphocytes: 25-30%

<table>
<thead>
<tr>
<th>Cell Type</th>
<th>Birth</th>
<th>1 mo</th>
<th>6 yr</th>
<th>14 yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total WBC x 10³/µL</td>
<td>10-26</td>
<td>5-19.5</td>
<td>4.3-13.5</td>
<td>4.5-11.0</td>
</tr>
<tr>
<td>Neutrophils %</td>
<td>37-57</td>
<td>25-35</td>
<td>45-55</td>
<td>50-65</td>
</tr>
<tr>
<td>Lymphocyte %</td>
<td>25-35</td>
<td>50-65</td>
<td>35-45</td>
<td>30-40</td>
</tr>
<tr>
<td>Monocyte %</td>
<td>3-9</td>
<td>2.5-7.5</td>
<td>0-8</td>
<td>0-10</td>
</tr>
<tr>
<td>Eosinophil %</td>
<td>1-3</td>
<td>1-4</td>
<td>1-4</td>
<td>0-4</td>
</tr>
<tr>
<td>Basophil %</td>
<td>0-1</td>
<td>0-1</td>
<td>0-1</td>
<td>0-1</td>
</tr>
</tbody>
</table>
• **Leukocytosis**
• Leukocytosis is an **increase** in the number of white blood cells. It is caused by:
  • Chronic infections
  • Inflammation
  • Leukemia
  • Allergy.

• **Leukopenia**
• Leucopenia is a **decreased** white blood cell count. It is caused by:
  • Chemotherapy
  • Radiation therapy
  • Some types of cancer
  • Malaria
  • Tuberculosis
• Neutrophilia
  • Neutrophilia is an abnormal increase in the number of neutrophils. Some of its causes are:
    • Acute bacterial infection,
    • Chronic granulocytic leukemia
    • Inflammation
    • Corticosteroid therapy

• Eosinophilia
  • Eosinophilia is an abnormal increase in the number of eosinophils. It is caused by:
    • Allergies
    • Parasitic infections
    • Drug sensitivity
    • Skin diseases.
• **Basophilia**
  • An abnormal **increase** in the number of basophils is called basophilia. It occurs during:
    • Chronic granulocytic **leukemia**
    • Delayed **hypersensitivity** reaction
    • Hypothyroidism
    • Nephrosis
    • Ulcerative **colitis**.

• **Lymphocytosis**
  • An abnormal increase in the number of lymphocytes. It is caused by:
    • **Viral** infections (infectious mononucleosis, hepatitis, cytomegalovirus)
    • **Lymphoproliferative** disorders (chronic lymphocytic leukemia, lymphoma)
• **Monocytosis**

• Abnormal increase in the number of monocytes. It is caused by:

  • Chronic myelocytic leukemia
  • Parasitic infections
  • T.B.
  • Subacute bacterial endocarditis
  • Syphilis