

Aim: Demonstration of Total Blood Count by Cell Analyzer

References:

- Clinical Laboratory Hematology, 3rd Edition by Shirlyn B. McKenzie, Lynne Williams
- Hematology Analyzer User Manual (specific to the analyzer used in the lab)

Introduction:

The total blood count (TBC) is a crucial diagnostic tool used in medicine to assess overall health and diagnose various medical conditions. It provides quantitative information about the cellular components of blood, including red blood cells (RBCs), white blood cells (WBCs), and platelets. Cell analyzers automate the process of counting these cells, providing accurate and reliable results.

Objective:

The objective of this practical session is to demonstrate the procedure for performing a total blood count using a cell analyzer, understand the principle behind cell counting, and interpret the results obtained.

Materials Required:

1. Blood samples
2. Cell analyzer machine
3. Reagents (if required by the specific analyzer)
4. Pipettes and pipette tips
5. Hematology analyzer software (for data interpretation)
6. Safety equipment (lab coat, gloves, goggles)

Procedure:

1. Preparation of Samples:

- Collect blood samples from patients using standard venipuncture techniques.
- Ensure proper labeling of the samples with patient identifiers.
- Mix the blood samples gently to prevent clotting.

2. Calibration of the Cell Analyzer:

- Follow the manufacturer's instructions to calibrate the cell analyzer before use.
- Use calibration standards provided by the manufacturer to ensure accuracy.

3. Running Samples:

- Turn on the cell analyzer and allow it to warm up according to the manufacturer's instructions.
- Prepare the analyzer by loading the appropriate reagents (if required) and setting the parameters for the analysis.
- Load the blood samples into the analyzer according to the manufacturer's instructions.
- Start the analysis and allow the analyzer to run until all samples have been processed.

4. Interpretation of Results:

- Once the analysis is complete, retrieve the results from the cell analyzer's software.
- Review the results for each sample, including counts of RBCs, WBCs, and platelets.
- Pay attention to any abnormal values or flags generated by the analyzer.
- Compare the results with reference ranges provided by the manufacturer or established clinical guidelines.

5. Quality Control:

- Perform regular quality control checks on the cell analyzer according to the manufacturer's recommendations.
- Document all quality control procedures and results for traceability.

Sample Data Table:

Patient ID	RBC Count ($\times 10^6/\mu\text{L}$)	WBC Count ($\times 10^3/\mu\text{L}$)	Platelet Count ($\times 10^3/\mu\text{L}$)
001	5.2	7.8	250
002	4.9	6.5	210
003	5.5	8.2	280

Calculations:

1. Mean Corpuscular Volume (MCV):

$$\text{MCV} = (\text{Hematocrit} / \text{RBC count}) \times 10$$

Example: If the hematocrit is 45% and the RBC count is $5.2 \times 10^6/\mu\text{L}$,

$$\text{MCV} = (45 / 5.2) \times 10 = 86.54 \text{ fL}$$

2. Mean Corpuscular Hemoglobin Concentration (MCHC):

$$\text{MCHC} = (\text{Hemoglobin} / \text{Hematocrit}) \times 100$$

Example: If the hemoglobin is 15 g/dL and the hematocrit is 45%,

$$\text{MCHC} = (15 / 45) \times 100 = 33.33 \text{ g/dL}$$

Conclusion:

Performing a total blood count using a cell analyzer is an essential procedure in clinical laboratories. It provides valuable information about a patient's health status and aids in the diagnosis and monitoring of various medical conditions. By following the standardized procedure outlined in this manual, laboratory technicians can ensure accurate and reliable results.