

Lab 16

Hematology Automation : principle and practice

outlines

- ❖ Introduction
- ❖ Working principle
- ❖ Result
- ❖ Types
- ❖ Uses
- ❖ Advantages
- ❖ Disadvantages

Hematology analyzer

- Fully automatic double chamber
- 3-part differential cell counting
- 20-parameters + 3 color histogram
- Manual & auto calibration
- throughput: 60 samples/ hour
- Sample volume: 9 μ l
- Storage output 1000 test results with histogram
- Inbuilt thermal printer
- Fully touch screen operation
- Cyanide free eco friendly reagents



- Hematology analyzers are used to count and identify blood cells at highspeed and accuracy.
- These are computerized, highly specialized and automated machines.
- Features vary from one hematology analyzer to another, such as closed vial testing and open sampling testing.
- Other features to consider in a hematology analyzer are;
 - sample size required
 - type and quantity of testing modes
 - speed in which the results are available
 - automatic flagging of results that are out of normal range
 - the capacity of test results it can store.

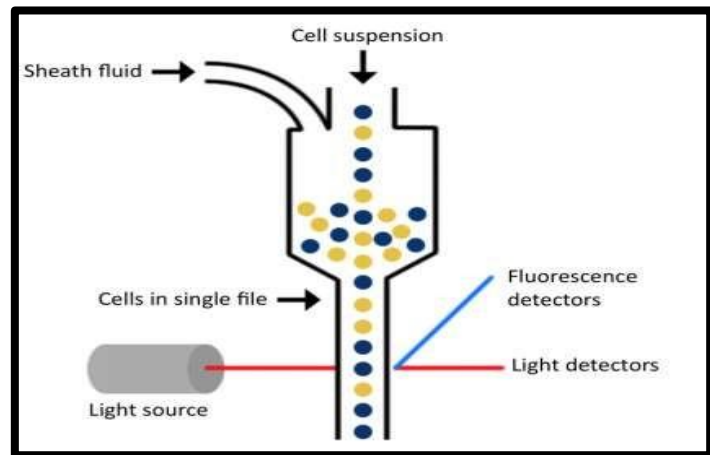
Hematology analyzer



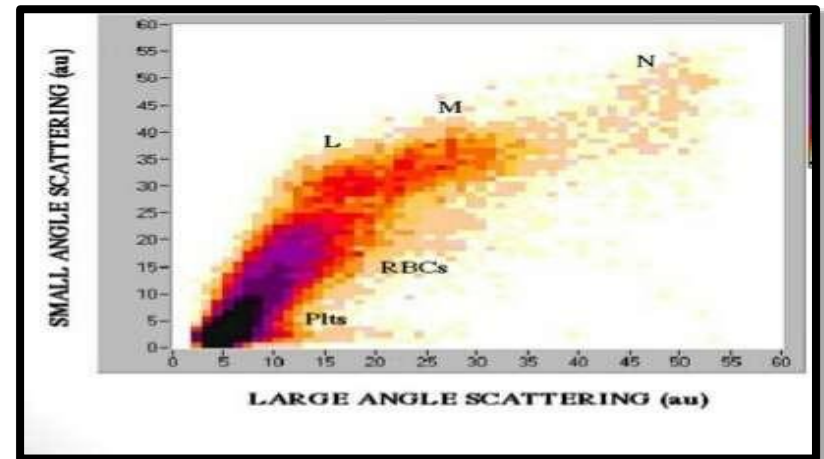
Working principles

- Flow cytometry
- Fluorescent dyes
- Electrical impedance
- Optical scatter
- radiofrequency

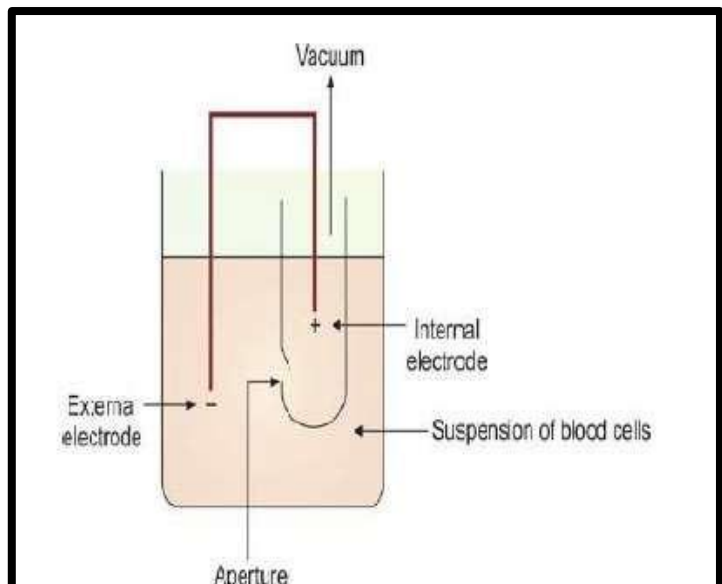
1. Flow cytometry



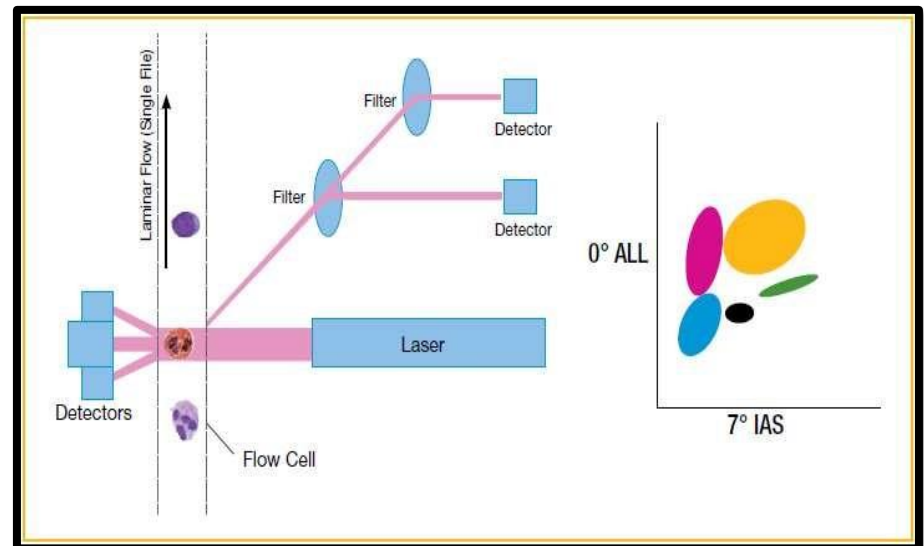
2. Fluorescent dyes



3. Electrical impedance

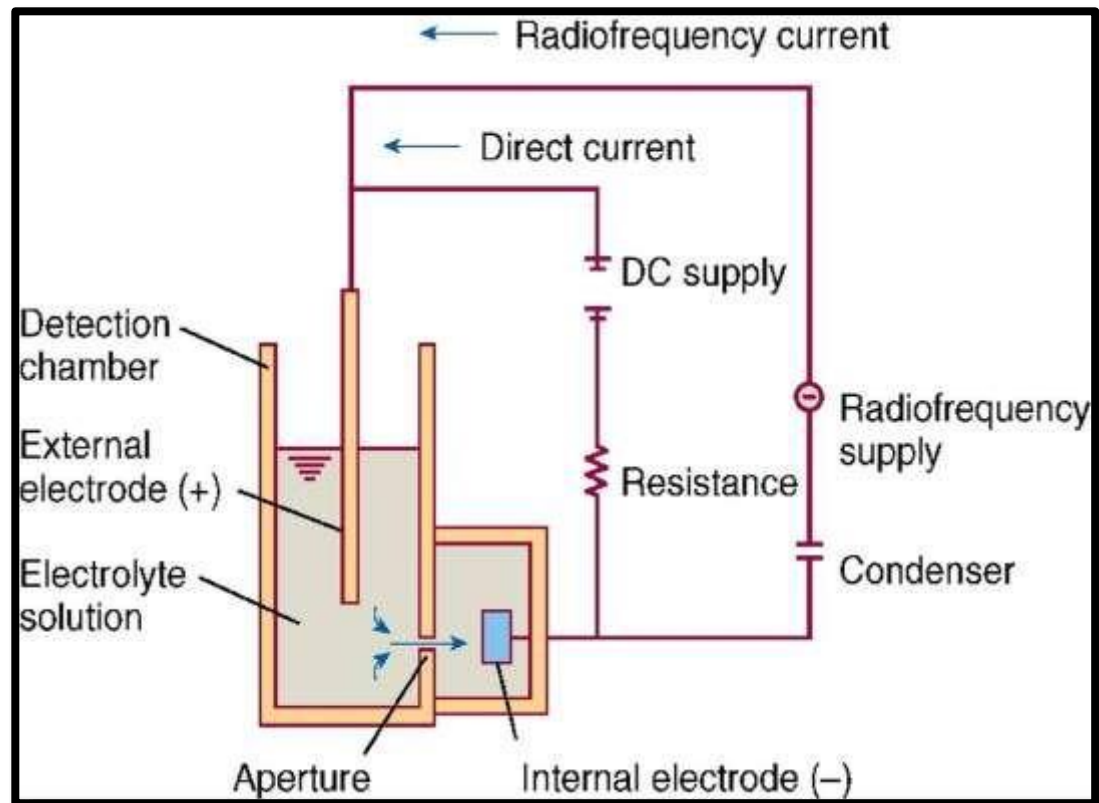


4. Optical scatter



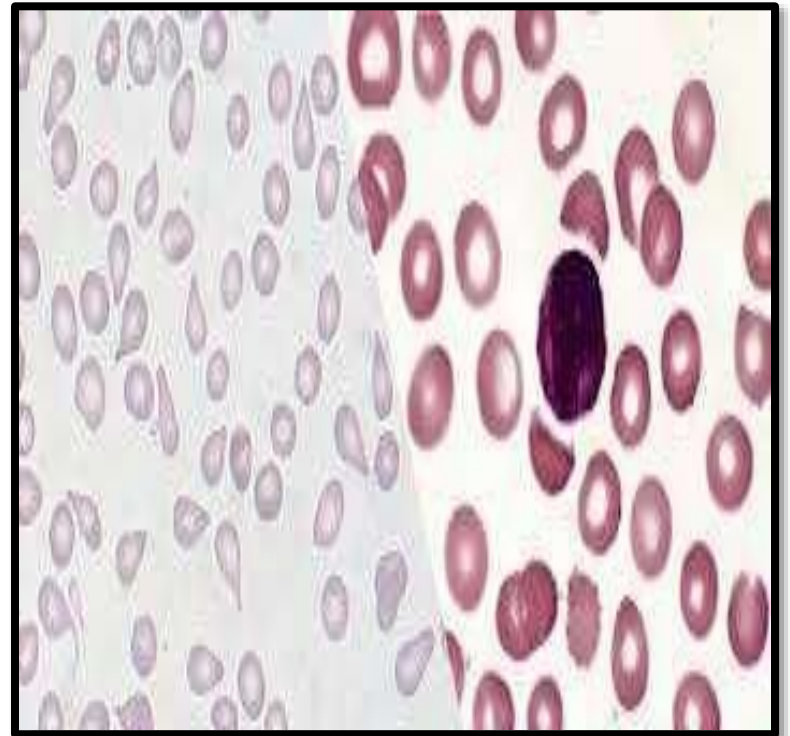
5. Radiofrequency

- Conductivity(RF)- proportional to cell interior density (granules and nucleus).



Results

- They provide the results are known as **completed blood counts(CBC's)**.
- Complete -Complete blood with differentiation of cells known as **CBC's with diff.**
- **CBC's** contains red blood cells, white blood cells, platelets and their various parameters.
- It can help to serve as a screening test for many disorders and as a prognostic or follow up tool.
- Some cell counters can process 120-150 samples per hour.



Types of hematology analyzer

Semi- automated analyzer

- Measures only few parameters
- It requires diluted blood samples



Fully automated analyzer

- Measures multiple parameters
- It requires anticoagulant blood samples



Uses

- ✓ RBC distribution width
- ✓ Mean corpuscular volume
- ✓ Mean corpuscular hemoglobin
- ✓ WBC differential count in percentage and absolute value
- ✓ Platelet distribution width
- ✓ Platelet mean volume
- ✓ Large platelet cell ratio
- ✓ Platelet criteria

Advantages of Hematology Analyzer

- Speed with efficient handling of a large number of samples.
- Accuracy and precision in quantitative blood tests.
- Ability to perform multiple tests on a single platform.
- Significant reduction of labor requirements.
- Invaluable for accurate determination of red cell indices.
- Low quantity of blood need (small amount)

Disadvantages of Hematology Analyzer

- **Flags:** Flagging of a laboratory test result demands labour-intensive manual examination of a blood smear.
- Comments on red cell morphology cannot be generated. Abnormal red cell shapes (such as fragmented cells) cannot be recognized.
- Erroneously increased or decreased results due to interfering factors.
- Expensive with high running costs.

References

- ❑ <https://www.bioscience.com.pk/topics/hematology/item/810&811->
 - [principles-of-working-of-automated-hematology-analyzer](#)
- ❑ <https://slideshare.net/mobile/nayabarshad/hematology-analysor-and-its-working>
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