

Practical physiology 1

Dr. Boraq.j.ab

- Practical Hematology Laboratory

1. Laboratory Safety

The primary objective in a hematology lab is to prevent exposure to blood-borne pathogens (such as HBV, HCV, and HIV) and maintain a sterile, hazard-free working environment.

- Personal Protective Equipment (PPE):

1..Lab coat, disposable gloves, and safety goggles (mandatory when handling liquid reagents or working near optical/laser equipment).

2..Biohazard Waste Management:

.a.Sharps Disposal: Used needles, lancets, and broken glass must be discarded immediately into rigid, puncture-resistant Yellow Sharps Containers. Never recap needles manually.

.b.Biohazard Bags: Contaminated gauze, wipes, and disposable tubes belong in marked biohazard waste bags (autoclaved prior to disposal).

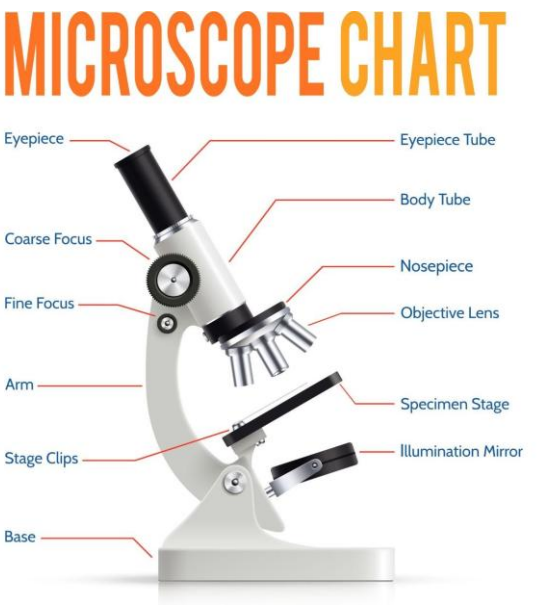
.c.Decontamination & Emergencies:

Clean work surfaces before and after each session using a 10% sodium hypochlorite (bleach) solution, leaving it in contact with the surface for 10–15 minutes.

- Always wash hands thoroughly after removing gloves.

2. Introduction to Hematology Equipment

•



Equipment / Tool	Primary Function	Technical / Working Principle
Compound Light Microscope	Examination of peripheral blood smears, cell counting, and morphological evaluation.	Utilizes glass optics and brightfield illumination; the 100\times oil immersion objective is essential for leukocyte differential counts.
Microhematocrit Centrifuge	Measurement of Packed Cell Volume (PCV / Hematocrit).	Uses high-speed centrifugal force to separate whole blood into plasma, buffy coat, and packed red cells based on density.
Hemocytometer	Manual quantification of RBCs, WBCs, and platelets	Precision-machined glass slide featuring an etched counting grid of calibrated volume and depth (0.1 mm).
Automated Hematology Analyzer	High-throughput Complete Blood Count (CBC) analysis.	Operates on Electrical Impedance (Coulter principle) and Laser Light Scattering to measure cell volume and internal complexity
EDTA Blood Collection Tubes	Whole blood sample collection and preservation.	Contains Dipotassium/Tripotassium EDTA, which chelates divalent calcium

• 3. Hormonal Effects on Blood (Discussion)

Hormones modulate hematopoiesis, circulating cell counts, and blood indices through direct and indirect physiological pathways:

- 1/ Erythropoietin (EPO):

Origin: Synthesized primarily by renal peritubular cells in response to tissue hypoxia.

Effect: Directly stimulates erythroid progenitor cells in bone marrow, driving RBC proliferation and elevating total Hemoglobin (Hb) and PCV.

- 2/ Cortisol and Glucocorticoids:

Effect: Induces classic "stress leukogram" alterations: marked neutrophilia (due to marginal pool demargination) accompanied by lymphopenia and eosinopenia.

- 3/ Testosterone (Androgens):

Effect: Enhances renal EPO secretion and directly stimulates marrow erythroblasts. This explains why post-pubertal biological males display higher baseline RBC, Hb, and PCV reference ranges than females.

- 4/ Thyroid Hormones (T₃ / T₄):

Effect: Stimulates cellular oxygen consumption and basal metabolic rate, potentiating erythropoiesis; hypothyroid states frequently present with normocytic or macrocytic anemia.