

Introduction to Hematology

Introduction to Hematology – Study Notes

1. What Is Hematology?

- **Definition:** The branch of medicine that deals with the study of blood, the organs that produce blood, and blood-related diseases.
- **Key Components of Blood:**
 - **Plasma** – liquid matrix (~55% of blood volume) containing water, electrolytes, proteins, hormones, and waste products.
 - **Cellular elements** – red blood cells (RBCs), white blood cells (WBCs), and platelets (thrombocytes).

2. Major Blood-Forming Organs (Hematopoietic System)

Organ / Tissue	Primary Function	Notes
Bone Marrow	Site of hematopoiesis (production of all blood cells)	Red marrow active in children; becomes yellow (fatty) in adults except in axial skeleton
Spleen	Filters blood, removes aged cells, immune surveillance	Reservoir for platelets; produces some lymphocytes
Thymus	Maturation of T ⁺ lymphocytes	Involutes after puberty
Lymph Nodes	Immune response coordination	Filter lymph, house B ⁺ and T ⁺ cells
Liver	Fetal hematopoiesis; stores iron; produces clotting factors	Can resume hematopoiesis in severe disease (extramedullary hematopoiesis)

3. Blood Cell Types & Functions

Cell Type	Normal Count (per μ L)	Main Functions	Life Span
-----------	-------------------------------	----------------	-----------

Introduction to Hematology

Red Blood Cells (Erythrocytes)	4.5–5.9?M (men), 4.0–5.2?M (women)	Transport O ₂ (via hemoglobin) & CO ₂	~120?days
Neutrophils	1.5–8.0?K	Phagocytosis of bacteria; first line of defense	6–8?hrs (circulating)
Lymphocytes	1.0–4.8?K	Adaptive immunity (B?cells produce antibodies; T?cells mediate cellular immunity)	Weeks–years
Monocytes	0.2–0.8?K	Phagocytosis, antigen presentation; become macrophages in tissues	1–3?days (circulating)
Eosinophils	0.04–0.5?K	Combat parasites, modulate allergic responses	8–12?hrs
Basophils	0.02–0.1?K	Release histamine & heparin; role in allergy & inflammation	1–2?hrs
Platelets (Thrombocytes)	150–400?K	Initiate clot formation, release growth factors for wound healing	7–10?days

4. Basic Hematologic Tests

Test	What It Measures	Clinical Use
Complete Blood Count (CBC)	RBC, WBC, platelet counts; hemoglobin, hematocrit, indices (MCV, MCH, MCHC)	Screening for anemia, infection, leukemia, thrombocytopenia
Peripheral Blood Smear	Morphology of cells	Identify abnormal shapes, parasites, blasts
Reticulocyte Count	Immature RBCs	Assess marrow response to anemia
Coagulation Panel	(	