Clinical Laboratory Tests

HEMATOLOGICAL TEST				
	Test	**Notes**	**⬇**	**⬆**
RBCs	**1- RBCs Count**	- No. of RBCs in mm^3 blood - Indirect estimate of blood's Hb		
	2- Hct or PCV Packed Cell Volume	- % of packed RBC in whole blood after centrifugation - 3x Hb - % or fraction of 1	- Anemia - Over hydration - Blood loss	- Dehydration
	3- Hb	- Grams of Hb in 100 ml (1 dl) or 1 L - Estimates O_2 carrying capacity - Depend on No. of RBCs & amount of Hb in each RBC	- Anemia	
	4- RBC Indices (Wintrobe)	- RBCs size, Hb conc. & Hb weight - Used to categorize anemias - Peripheral blood smear	Variation in RBC shape (poikilocytosis) → **sickle-cell anemia** Variation in RBC size (anisocytosis) → **mixed anemia**	
	5- MCV (Mean Cell Volume)	- Ratio between Hct & RBC count - MCV = $\frac{\text{Hct (\%) X 10}}{\text{RBC count (In millions)}}$	- **Microcytic** → Iron deficiency	- **Macrocytic** → Vit B_{12} def. → Folic acid def.
	6- MCH (Mean Cell Hb)	- Amount of Hb in average RBC - MCH = $\frac{\text{Hb X 10}}{\text{RBC count (In millions)}}$		
	7- MCHC (Mean Cell Hb Conc.)	- Average conc. of Hb in average RBC - MCHC = $\frac{\text{Hb (g/100ml) X 100}}{\text{Hct}}$	- **Hypochromia** → Iron deficiency	
	8- Reticulocyte count	- Measure of immature RBCs containing remnants of nuclear material (Reticulum) - They circulate in blood for 1-2 days - Index of bone marrow production of mature RBCs	- Drug-induced aplastic anemia	- Hemolytic anemia - Acute blood loss - Response to the treatment of a factor def. (Fe,B_{12},folate) - Polychromasia

RBCs	**9- ESR (Erythrocyte Sedimentation Rate)**	- Rate of RBCs settling of whole uncoagulated blood over time - **Used to** 1- Follow the <u>clinical course</u> of a disease 2- Presence of <u>occult organic</u> disease 3- Differentiate conditions with <u>similar symptomatology</u> Angina: No change, Myocardial infarction: ⬆		- Infection (Acute or Chronic) - Tissue necrosis or infarction - Malignancy - Rheumatoid collagen diseases - Myocardial infarction
WBCs	**1- WBCs Count**	- No. of WBCs in mm^3 blood	**<u>Leucopenia</u>** - Bone marrow depression - Metastatic carcinoma - Lymphoma - Antineoplastic agents	**<u>Leucocytosis</u>** - Infection (Bacterial) - Leukemia - Tissue necrosis
	2- Neutrophils	- **Mature** : Polymorphnuclear leukocytes PMNs "polys" or Segmented "segs" - **Immature** : "bands" or "stabs" - **<u>Chemotaxis</u>** : Body's 1st line of defence Congregate at sites in response to stimulus	**<u>Neutropenia</u>** - **Overwhelming infection** (Bone marrow is unable to keep up with the demand) - **Viral Infect<u>n</u>**: mumps, measles - **Idiocyncratic drug reactions** - **Chemotherapy** **<u>ANC</u>** **= %$_{Neutrophils}$** X Total $_{WBCs}$ Absolute Neutrophil Count Neutropenia is ANC < 1000 cells/mm^3	**<u>Neutrophilic Leucocytosis</u>** With ⬆ in immature cells - **Systemic infect<u>n</u>** : pneumonia - **Viruses**: Chicken pox, herpes zoster - **Rickettsial diseases**: Rocky Mountain spotted fever - **Fungi** - **Stress**: Physical, hemorrhage, emotional - **Inflammatory dis**. : rheumatic fever, rheumatoid arth. , gout - **Hypersensitivity to drugs** - **Tissue necrosis**: burns, myocardial infarction , cancers - **Metabolic dis:** Uremia, diabetic ketoacidosis - **Myelogenous leukemia** - **Certain drugs**: epinephrine, lithium

<table>
<tr><td rowspan="4">WBCs</td><td>3- Basophils</td><td>- Blue with basic dye
- Function in circulation not understood
- In tissues they’re referred to as <u>mast cells</u></td><td>- Not apparent bec. of their small no.</td><td><u>Basophilia</u>
- CML (Chronic Myelogenus Leukemia)</td></tr>
<tr><td>4- Eosinophils</td><td>- Red with acidic dye
- Associated with immune reactions</td><td></td><td><u>Eosinophilia</u>
- Allergic reactions: asthma, hay fever, drug allergy)
- Parasitic infestation: trichinosis, amebiasis)</td></tr>
<tr><td>5- Lymphocytes</td><td>- Immunologic activity: produce antibodies
<table><tr><th>B lymphocytes</th><th colspan="2">T lymphocytes</th></tr><tr><td></td><td>T_4
Helper-inducer</td><td>T_8
Suppressor cells</td></tr></table>- <u>Atypical lymphocytes</u> : associated with infectious mononucleosis</td><td><u>Lymphocytopenia</u>
- Debilitating illness
- Immunodeficiency
- AIDS</td><td><u>Lymphocytosis</u>
- Viral infection</td></tr>
<tr><td>6- Monocytes</td><td>- Phagocytic cells</td><td></td><td><u>Monocytosis</u>
- TB
- Subacute bacterial endocarditis
- Recovery phase of infectn</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td>Platelets</td><td>Platelets (Thrombocytes)</td><td>- Smallest blood element
- Involved in blood clotting
- Vital to formation of hemostatic plug after vascular injury</td><td><u>Thrombocytopenia</u>
Moderate < 100,000/mm^3
Severe < 50,000/mm^3
- Idiopathic thrombocytopenic purpura
- Drugs: quinidine, sulphonamides</td><td></td></tr>
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