Hematology Notes

Hematology is the branch of medicine that deals with the study of blood, blood-forming organs, and blood diseases. Below are the detailed notes that include the topics requested and associated aspects.

Topics Covered

1. **Composition of Blood**
2. **Common Hematological Tests**
3. **Hematological Disorders**
    - **Red Blood Cell (RBC) Disorders**
    - **White Blood Cell (WBC) Disorders**
    - **Platelet Disorders**
    - **Hemoglobinopathies**
4. **Hematopoiesis**
5. **Clotting Mechanism**
6. **Blood Transfusion**
7. **ICD-10 Codes for Hematological Disorders**
8. **Therapeutics in Hematology**
9. **Diagnosis of Hematological Cases**
10. **ETL Concepts in Data Profiling and Cleaning**
11. **Data Warehousing Overview**

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1. Composition of Blood

Blood consists of plasma (55%) and formed elements (45%):

- **Plasma:**
    - **90% water, proteins (albumin, globulin, fibrinogen), electrolytes, nutrients, and waste products.**
- **Formed Elements:**
    - **RBCs: Transport oxygen via hemoglobin.**
    - **WBCs: Defend the body against infection.**
    - **Platelets: Facilitate clotting.**

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2. Common Hematological Tests

- **Complete Blood Count (CBC): Measures RBCs, WBCs, hemoglobin, hematocrit, and platelets.**
- **Peripheral Blood Smear: Identifies cell morphology abnormalities.**
- **Bone Marrow Aspiration and Biopsy: Diagnoses marrow-related issues like leukemia.**
- **Coagulation Studies: Measures clotting (PT, aPTT, INR).**

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3. Hematological Disorders

A. Red Blood Cell Disorders

- **Anemia:**
  - **Types: Iron deficiency, megaloblastic, hemolytic, aplastic.**
- **Polycythemia Vera: Overproduction of RBCs.**
- **Sickle Cell Disease (SCD): Inherited disorder with sickle-shaped RBCs.**

B. White Blood Cell Disorders

- **Leukemia: Blood cancer affecting WBCs.**
  - **Types: Acute/Chronic Myeloid, Acute/Chronic Lymphoid.**
- **Lymphoma: Cancers in lymphatic tissue.**
  - **Hodgkin's and Non-Hodgkin's Lymphomas.**

C. Platelet Disorders

- **Thrombocytopenia: Low platelet count.**
- **Thrombocytosis: High platelet count.**

D. Hemoglobinopathies

- **Thalassemia: Abnormal hemoglobin production.**
- **Sickle Cell Anemia: Defective hemoglobin leads to rigid RBCs.**

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4. Hematopoiesis

- **Definition: Production of blood cells in the bone marrow.**
- **Lineages:**
  - **Myeloid: RBCs, platelets, granulocytes, monocytes.**
  - **Lymphoid: T-cells, B-cells, NK cells.**
- **Regulators:**

- **Erythropoietin (EPO): Stimulates RBCs.**
- **Colony-Stimulating Factors: WBC production.**

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5. Clotting Mechanism

1. **Primary Hemostasis: Platelet plug formation.**
2. **Secondary Hemostasis: Coagulation cascade stabilizes clot with fibrin.**
3. **Pathways:**
    - **Intrinsic: Activated by internal vessel damage.**
    - **Extrinsic: Activated by external trauma.**
    - **Common: Produces fibrin for clot stabilization.**

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6. Blood Transfusion

- **Components: Packed RBCs, platelets, fresh frozen plasma (FFP), cryoprecipitate.**
- **Indications: Severe anemia, bleeding disorders.**

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7. ICD-10 Codes for Hematological Disorders

Disorder	ICD-10 Code
Iron Deficiency Anemia	D50.9
Sickle Cell Disease	D57
Leukemia (ALL)	C91.0
Hodgkin Lymphoma	C81

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8. Therapeutics in Hematology

- **Medications:**
    - **Iron, folate, vitamin B12 supplements.**
    - **Anticoagulants: Warfarin, Heparin.**
- **Advanced Therapies:**
    - **Bone Marrow Transplant.**
    - **Gene Therapy for hemoglobinopathies.**