Blood pathology 2

Acute leukemia

LEC 3

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- **Acute leukemia**

- Defined as the presence of over 20% of blast cells in the blood or bone marrow. It is subdivided into acute myeloid leukemia (AML) and acute lymphoblastic leukemia (ALL) on the basis of whether the blasts are **myeloblasts** or **lymphoblasts**.

- Acute leukemias are usually aggressive diseases in which **malignant transformation** occurs in the hemopoietic stem cell or early progenitors, by successive divisions.
- Genetic damage is believed to involve several key biochemical steps resulting in (1) an increased rate of proliferation (2) reduced apoptosis and (3) a block in cellular differentiation.
- If untreated, these diseases usually **rapidly fatal** but , they are also easier to cure than chronic leukemias.

- **Risk factors associated with Acute Leukemia**
- 1. Age - Older adults are more likely to develop AML
- 2. Smoking
- 3. Genetic disorders - Down syndrome.
- 4. High doses of radiation
- 5. Previous chemotherapy treatment
- 6. Exposure to industrial chemicals – Benzene

- **Acute lymphoblastic leukemia (ALL)**

- It is the most common form of leukemia in children; it's incidence is highest at 3-7 years , with a **secondary rise** after the age of 40 years. ALL causes damage and death by crowding out **normal cells** in the bone marrow , and by spreading (metastasizing) to other organs.

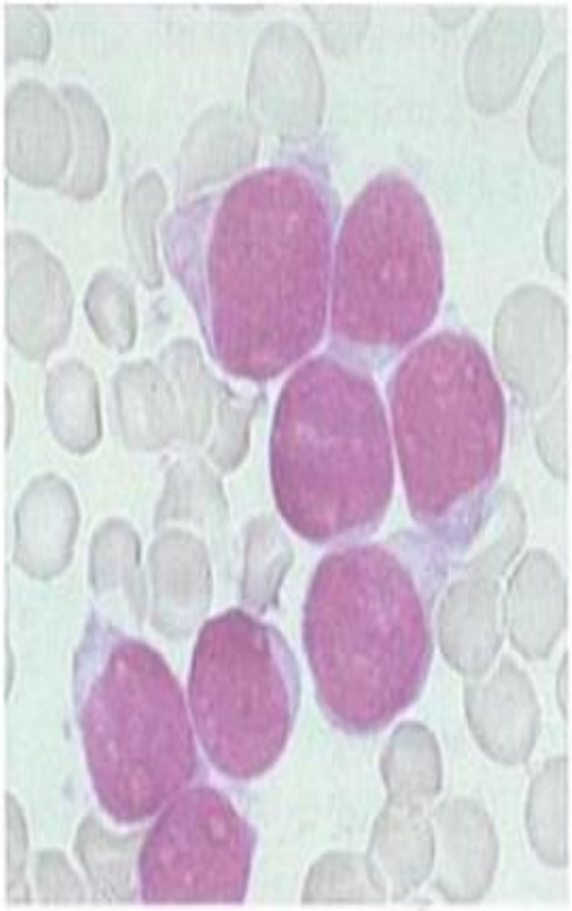
- **Classification of ALL**

- The French-American-British (FAB) group subclassifies ALL into three subtypes

- **1-** The L1 type show uniform, small blast cells with scanty cytoplasm.

- **2-** The L2 type comprises larger blast cells with prominent nucleoli and cytoplasm.

- **3-** The L3 blasts are large with prominent nucleoli, **strongly basophilic cytoplasm** and **cytoplasmic vacuoles**.



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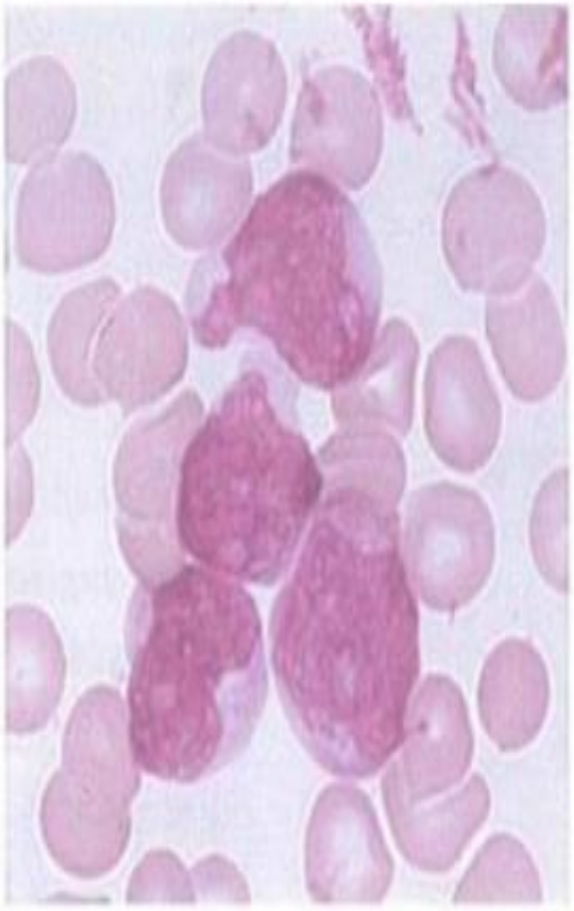

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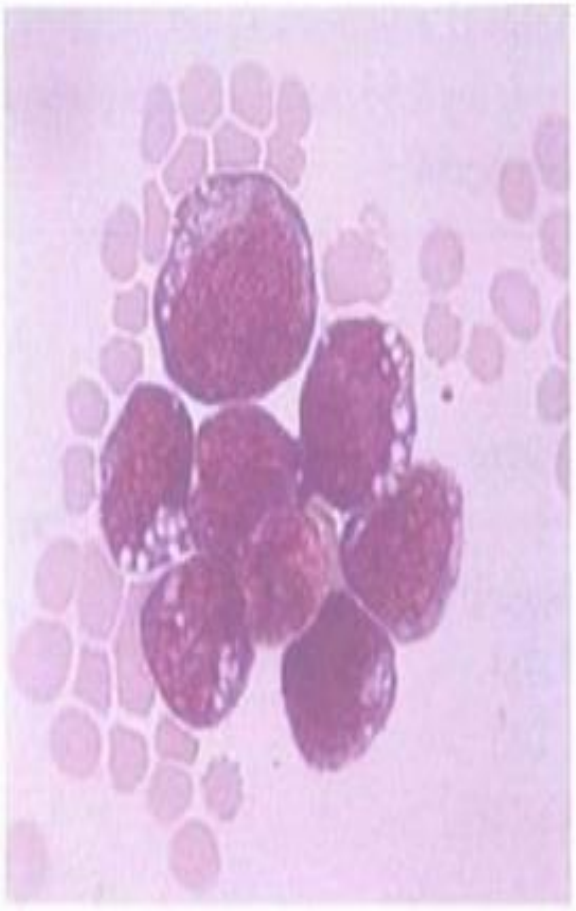

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- **Clinical features of ALL**

- 1- Bone marrow failure: Anemia (pallor); neutropenia (fever, infections); and thrombocytopenia (bleeding).

- 2- Organ infiltration.

- 3- weight loss , loss of apetite , bone pain and joint pain.

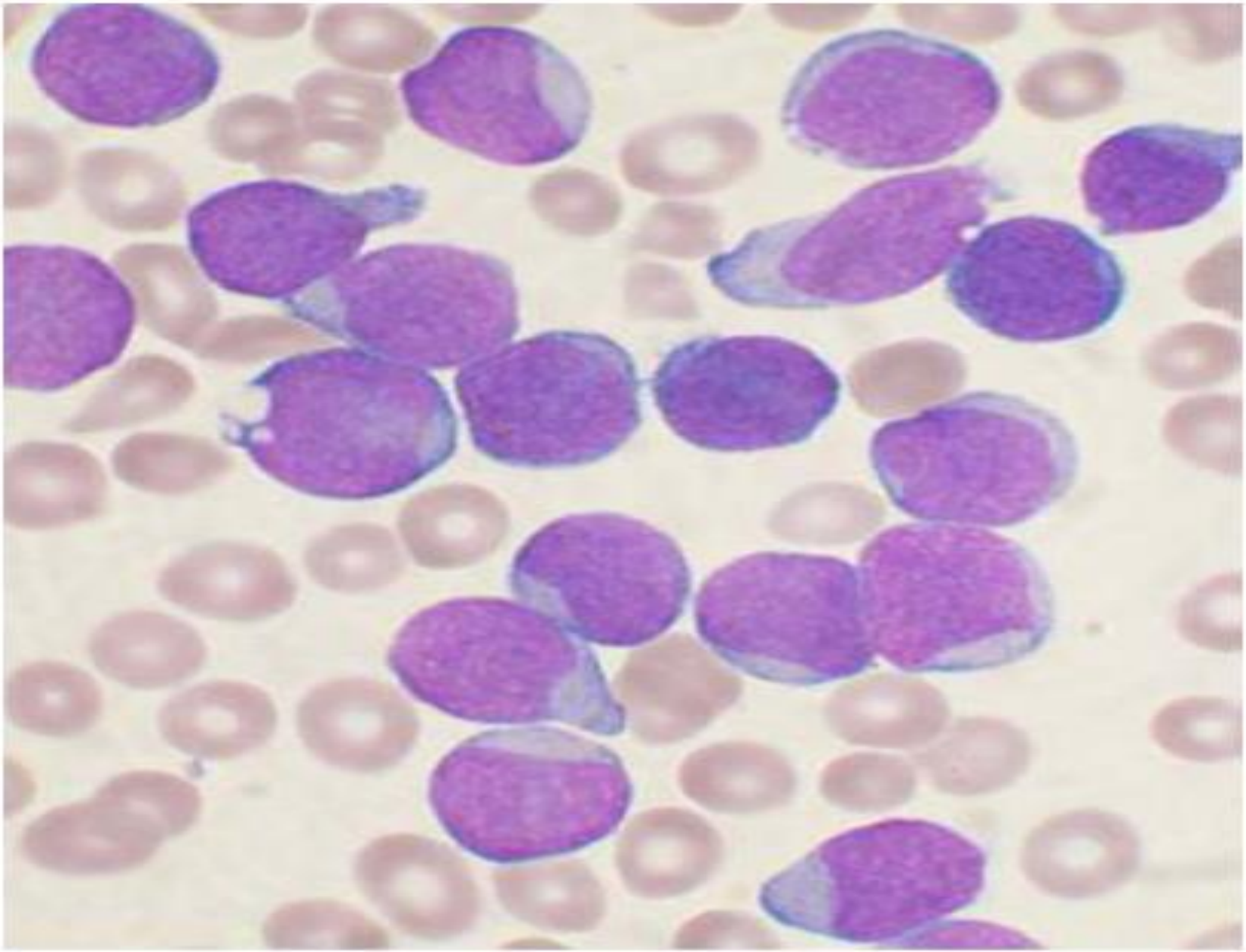
- **Haematological investigations:**

- 1- Complete blood count and blood film a normochromic, normocytic anemia with thrombocytopenia.

- 2- The total white cell count may be decreased, normal or increased to $200x10^9$ / L or more.

- 3- Blood film examination typically shows a **variable numbers** of blast cells. Blast cells are seen on blood smears in 90% of cases

- 4- A bone marrow biopsy is **critical proof** of ALL. The bone marrow is hypercellular with >20% leukemic blasts.



- **Acute Myeloblastic Leukemia (AML)**

- It is the cancer of myeloid blood cells , characterized by the rapid growth of abnormal white cells that accumulate in the bone marrow . It is the **common form** of acute leukemia in **adults**.

- **Classification**

- Classification of AML is usually based on the **morphological criteria** of French-American-British (FAB) scheme and modified by the WHO.

- Type M0, M1, M2, M3, M4, M4eso, M5, M6, and M7

Classification of AML

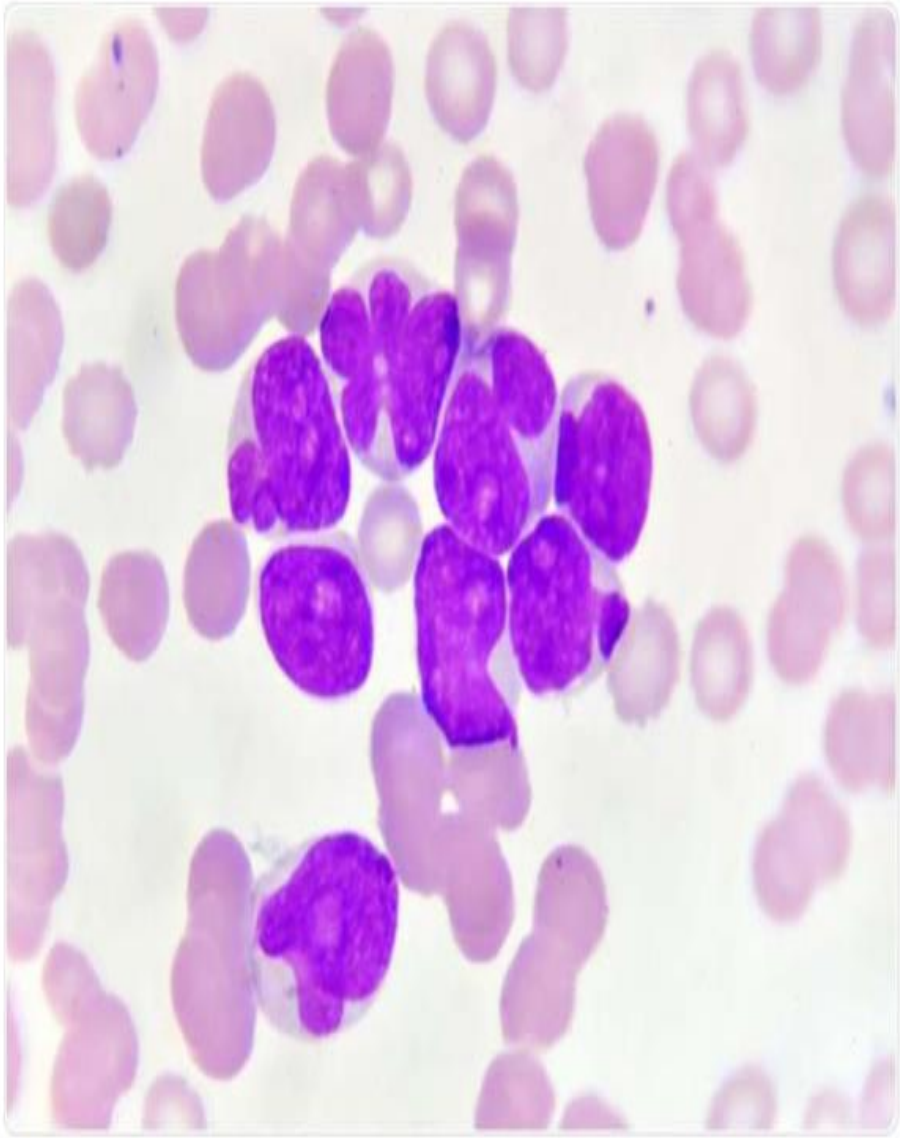
FAB subtype	Name
M0	Undifferentiated acute myeloblastic leukemia
M1	Acute myeloblastic leukemia with minimal maturation
M2	Acute myeloblastic leukemia with maturation
M3	Acute promyelocytic leukemia
M4	Acute myelomonocytic leukemia
M4eos	Acute myelomonocytic leukemia with eosinophilia
M5	Acute monocytic leukemia
M6	Acute erythroid leukemia
M7	Acute megakaryocytic leukemia

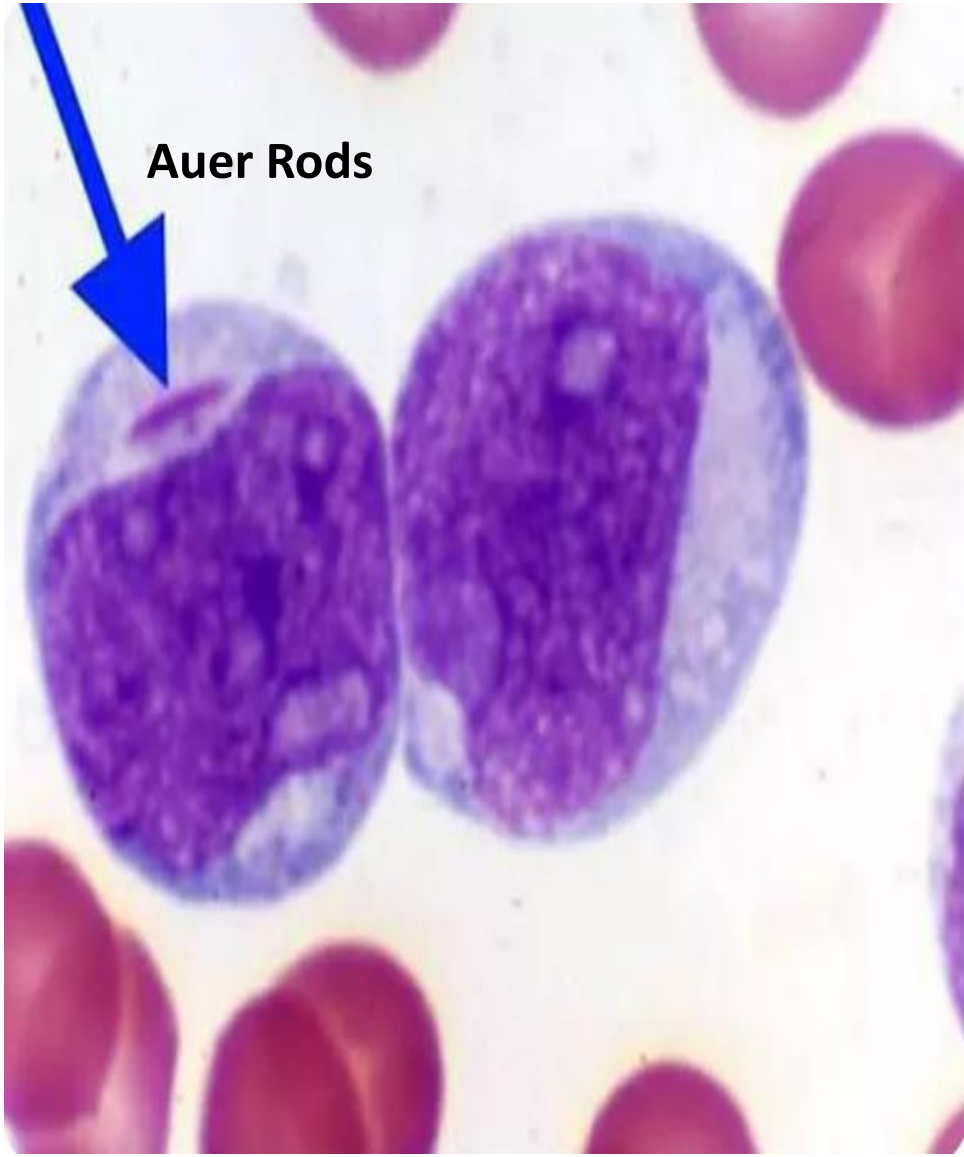
- **Clinical features of AML**

- Anemia and thrombocytopenia , fatigue , shortness of breath , easy bleeding and increased risk of infection , fever , enlarged lymph node, liver and spleen.

- **Diagnosis of AML**

- Blood film examination reveals leukocytosis (20-100 x 10^9/L), thrombocytopenia and decrease in red cell count.
- In **AML** , the predominating white cell is the myeloblast.
- Bone marrow biopsy and aspiration is important to confirm the diagnosis and to distinguish AML from other acute leukemias such as Presence of **red Auer rods** in the cytoplasm of myeloblasts , promyelocytes or neutrophils is **diagnostic morphologic feature** of AML.
- In AML , a positive peroxidase reaction is of diagnostic value.




Auer Rods

Thank You For Listening