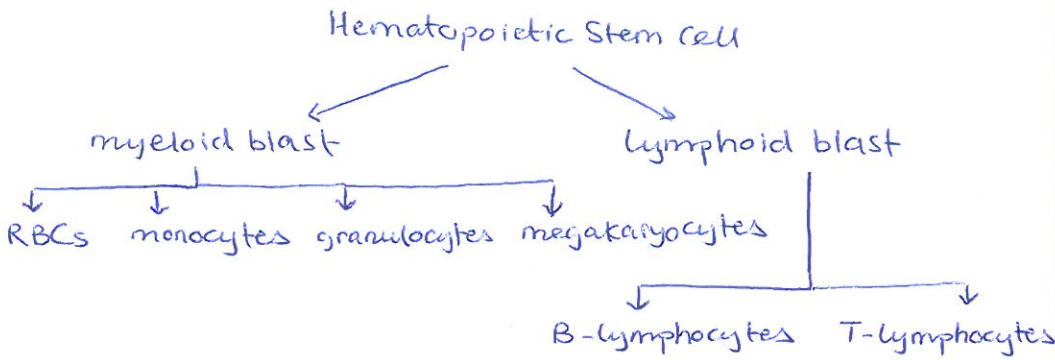


# Acute Leukemias



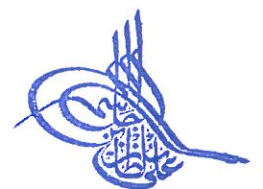
- Acute leukemia: is a neoplastic proliferation of blasts → > 20% blasts in the bone marrow
- With accumulation of blasts → there will be abnormal hematopoiesis resulting in acute:
  - ↳ Anemia → hypoxia
  - ↳ Thrombocytopenia → bleeding
  - ↳ Neutropenia → infection
- Blasts will enter blood resulting in ↑ WBC
  - ↳ They are large, immature cells with punched out nucleoli
- There are two types of acute leukemia:
  - ↳ AML: accumulation of myeloid blasts - MPO ⊕
  - ↳ ALL: accumulation of lymphoid blasts - tdt ⊕

- Myeloperoxidase (MPO): can be detected by:
  - ↳ Chemical stains
  - ↳ Viewing Auer rods under microscope
- TdT: DNA polymerase which is not present in myeloid blasts or mature lymphocytes

## ALL

- ↳ Neoplastic accumulation of lymphoblasts
- ↳ ⊕ TdT
- ↳ Common in: children
  - ↳ Associated with Down's syndrome (but after the age of 5))
- ↳ Two types (Based on surface markers):
  - ↳ **B-ALL**
    - ↳ Most common
    - ↳ Surface markers: CD10, CD19, CD20
    - ↳ Excellent response to chemotherapy
    - ↳ Prognosis (based on cytogenetic abnormalities)
      - ↳ t(12, 21): good prognosis, common in kids
      - ↳ t(9, 22): poor prognosis, common in adults
  - ↳ **T-ALL**
    - ↳ Surface markers: CD2-CD8 (no CD10)
    - ↳ Thymic mass in teenagers
    - ↳ Also known as: acute lymphoblastic lymphoma.

- Chemotherapy cannot cross blood-brain barrier or blood-testicular barrier thus must be injected directly in these two locations.



## Acute Leukemias

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### 2 | AML

- Neoplastic accumulation of myeloblasts
- ⊕ MPO → detected by:
  - Chemical stains
  - Presence of Auer rods in myeloblasts
- Common in: older adults (50-60 years)
- Subclassification:
  - According to cytogenetic abnormalities
  - According to lineage of myeloblasts
  - Surface markers
- \* → Acute promyelocytic Leukemia (15,17):
  - RAR receptor disrupted leading to accumulation of promyelocytes
  - Multiple Auer rods; risk of DIC
  - Treatment: ATRA (All Trans Retinoic Acid)
- \* → Acute monocytic Leukemia:
  - Proliferation of monoblasts; lacking MPO
  - Monoblasts infiltrate gums

## Chronic Leukemias

- Chronic leukemia is proliferation of mature circulating lymphocytes, characterized by:

- ↑ WBC count
- Gradual onset
- Seen in older adults

### 1 | CLL

- Neoplastic proliferation of naïve B-cells
- Markers: CD5, CD20
- Blood smear: ↑ lymphocytes & smudge cells
- Complications:
  - Hypogammaglobulinemia: because B-cells are neoplastic & cannot be converted to plasma cells which normally produce immunoglobulins
  - Autoimmune hemolytic anemia: production of abnormal antibodies against RBCs
  - Transformation to diffuse large B-cell lymphoma

\* Naïve cells are mature but still have never been exposed to antigens



## Chronic Leukemias

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### 2] Hairy cell leukemia:

- Neoplastic proliferation of mature B-cells
- Hairy cytoplasmic processes
- Positive to TRAP
- Clinical features:
  - ↳ Splenomegaly (expansion is in red pulp!)
  - ↳ Lymphadenopathy is usually absent
- Treatment:
  - ↳ 2 - CDA : adenosine deaminase inhibitor (why?)  
Because adenosine accumulates to toxic levels in neoplastic B-cells

## Myeloproliferative Disorders

- Neoplastic proliferation of mature cells of myeloid lineage
  - ↳ Cells of all myeloid lineages are increased → and the disorder is classified based on the dominant myeloid cell produced
- Complications:
  - ↳ ↑ risk of hyperuricemia and gout
  - ↳ Progression to marrow fibrosis
  - ↳ Transformation to acute leukemia

### 1] CML

- ↳ Neoplastic proliferation of mature myeloid cells → especially granulocytes
- ↳ ↑ basophils (basophilia)
- ↳ t(9, 22) → resulting in fusion between BCR and ABL → increasing tyrosine kinase activity & overproduction of neoplastic cells
- ↳ Treatment: imatinib (blocking action of tyrosine Kinase).
- ↳ Three stages of the disease:
  - ↳ Chronic: splenomegaly
  - ↳ Accelerated: spleen will enlarge even further
  - ↳ Transformation to acute leukemia:
    - ↳ 2/3 : AML
    - ↳ 1/3 : ALL

