What is a hematological malignancy?

- A hematologic malignancy is a malignancy (or cancer) of any of the formed elements in the blood.
- The malignancies may be classified into:
  - Lymphomas
    - Hodgkins versus non-Hodgkins
  - Leukemias
    - Chronic versus acute

Etiology of hematological malignancies

1. Host Factors
   - a. Hereditary
   - b. Chromosomal abnormalities
   - c. Immunodeficiency

2. Environmental Factors
   - a. Ionizing radiation
   - b. Chemicals
   - c. Drugs
   - d. Viruses

Leukemias

- Divided as
  - Acute or chronic
  - Myeloid or lymphoid

Lymphocytic and myelocytic

- The lymphocytic leukemias are caused by cancerous production of lymphoid cells
- Myelogenous leukemia, begins by cancerous production of young myelogenous cells-precaucers of WBC other than lymphocytes
Acute vs Chronic

- **Chronic** in which the onset is gradual, the disease is less aggressive, and the cells involved are usually more mature cells.

- **Acute** in which the onset is usually rapid, the disease is very aggressive, and the cells involved are usually poorly differentiated with many BLASTS. Clinically, acute leukemia is defined as a disease in which the patient die within 6 months without treatment.

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Leukemias

- ALL - acute lymphocytic leukemia
- CLL - chronic lymphocytic leukemia
- AML - acute myeloid leukemia
- CML - chronic myeloid leukemia

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### Acute vs Chronic Leukemia

<table>
<thead>
<tr>
<th></th>
<th>Acute</th>
<th>Chronic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>All ages</td>
<td>Usually adults</td>
</tr>
<tr>
<td><strong>Clinical Onset</strong></td>
<td>Sudden</td>
<td>Insidious</td>
</tr>
<tr>
<td><strong>Course (untreated)</strong></td>
<td>6 mo</td>
<td>2-6 yrs</td>
</tr>
<tr>
<td><strong>Leukemic cells</strong></td>
<td>Blasts</td>
<td>More mature cells</td>
</tr>
<tr>
<td><strong>WBC count</strong></td>
<td>Variable</td>
<td>High</td>
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</tbody>
</table>

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### Acute Leukemia

- Rapid progression of symptoms
- Uncontrolled proliferation of blast cells in bone marrow results in bone marrow failure
- Blast cells infiltrate organs causing problems

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Bone Marrow Failure

- **Leukopenia**: Infections, sepsis
- **Anemia**: Fatigue, Pallor
- **Thrombocytopenia**: Bleeding
Furthermore, Infiltration of tissues/organisms causes:

- Enlargement of liver, spleen, lymph nodes
- Gum hypertrophy
- Bone pain
- Other organs: CNS, skin, testis, any organ

Gum Hypertrophy

Pictures Of Blood

Symptoms

- Anemia
- Infections
- Hepatosplenomegaly
- Fever
- Night sweats
- Enlarged lymph nodes

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Treatment of chronic leukemias
- Chronic lymphocytic leukemia: rituximab, steroids, fludarabine, bendamustine, ibrutinib.
- Chronic myeloid leukemia: Tyrosine kinase inhibitors eg gleevec.
- Polycythemia vera: phlebotomy and hydroxyurea.

Treatment of acute leukemias
- Induction chemotherapy: clear bone marrow of all leukemia.
- Consolidation chemotherapy to keep the disease from coming back.
- If the risk of relapse is very high, then one would consider an allo transplant as consolidation.

Treatment of Acute Myeloid Leukemia
- Typical induction chemotherapy is Idarubicin (or Daunorubicin) daily x 3 days and cytarabine by civi x 7 days (7+3).
- Check cardiac function before anthracycline chemotherapy.
- Cytarabine can be associated with cerebellar and ocular toxicity but not typically at this dose.
Consolidation chemo for AML
- Consolidation often consists of high dose of cytarabine q 12 hrs x6.
- Pts needs cerebellar checks prior to each chemo dose and steroid eye drops because of risk of conjunctivitis.

Treatment of acute lymphoblastic lymphoma
- Induction chemotherapy is more complex than AML.
- Use multiple drug combinations.
- All patients with ALL need CNS prophylaxis eg IT methotrexate and/or IT cytarabine.

Presentation of lymphomas
- Painless lymphadenopathy
- Enlarged liver and spleen
- Recurrent fever and infections
- Night sweats
- weight loss

Leukemia vs Lymphoma
- Leukemia= increased WBC in blood and marrow
- Lymphoma usually starts in secondary lymphoid tissues, especially lymph nodes, so usually the patient is presented to the physician with lymphadenopathy

Lymphomas
- Could be classified as:
  - Hodgkin’s Lymphoma
  - Non-Hodgkin’s Lymphoma
Hodgkin’s Lymphoma

- It is characterized by:
  - B cell in origin, and the presence of:

  **REED-STERNEBERG CELLS**

Non-Hodgkin’s Lymphoma

The term is used to characterize all other lymphomas in which the description of Hodgkin’s lymphoma is not applied, i.e. whenever there is **NO** REED-Sternberg cells, it could be due to B or T or NK cells involvement.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Hodgkin Lymphoma</th>
<th>Non-Hodgkin Lymphoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nodal involvement</td>
<td>Localized to a specific group of nodes</td>
<td>Usually disseminated among &gt; 1 n group</td>
</tr>
<tr>
<td>Spread</td>
<td>Tends to spread in an orderly, contiguous fashion</td>
<td>Spreads noncontiguously</td>
</tr>
<tr>
<td>Extranodal involvement</td>
<td>Infrequent</td>
<td>Frequent</td>
</tr>
<tr>
<td>Stage at diagnosis</td>
<td>Usually early</td>
<td>Usually advanced</td>
</tr>
<tr>
<td>Histologic classification in children</td>
<td>Usually one with a favorable prognosis</td>
<td>Usually high grade</td>
</tr>
</tbody>
</table>

PET Scan

PET scan in a patient with HD

Before treatment
After treatment

Treatment of lymphoma
- Hodgkin's disease: ABVD or BEACOPP.
- Diffuse large B cell lymphoma: R-CHOP.
- Relapsed lymphoma: R-ICE or R-DiHAP.

Multiple Myeloma
Presentation of multiple myeloma

- Acute renal failure.
- Proteinuria.
- Anemia.
- Bone pain. Pathological fractures.
- Hypercalcemia.
- Monoclonal protein in the blood or the urine.

Febrile Neutropenia

- Medical Emergency
- Neutropenia defined as ANC < 0.5.
- Temp > 100.5 deg F (oral).
- Panculture: blood, urine, sputum, etc.
- CXR.
- Start on abs asap. Gram negative coverage is imperative (eg cefepime). Gram positive coverage if patients have a central line (eg vancomycin).