Hematology and Hematologic Malignancies

Cancer of the formed elements of the blood

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
    - Hodgekins versus non-Hodgekins
  - leukemias
    - Chronic versus acute

Etiology of hematological malignancies

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

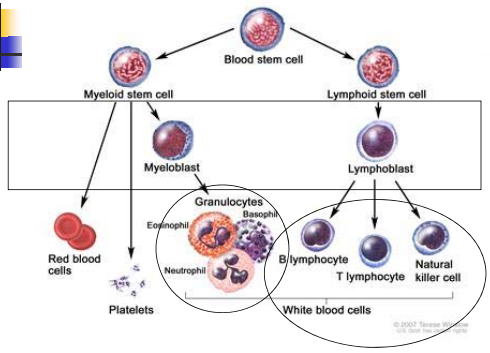
2. **Environmental Factors**
   - **a. Ionizing radiation**
   - **b. Chemicals**
   - **c. Drugs**
   - **d. Viruses**

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.

Leukemias

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

Acute vs Chronic Leukemia

	Acute	Chronic
Age	All ages	Usually adults
Clinical Onset	sudden	insidious
Course (untreated)	6 mo	2-6 yrs
Leukemic cells	Blasts	More mature cells
WBC count	Variable	High

Acute vs Chronic

- Acute Leukemia= Blasts in marrow and often blood.
- Chronic Leukemia= mature appearing cells in marrow and blood.

Acute leukemia

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

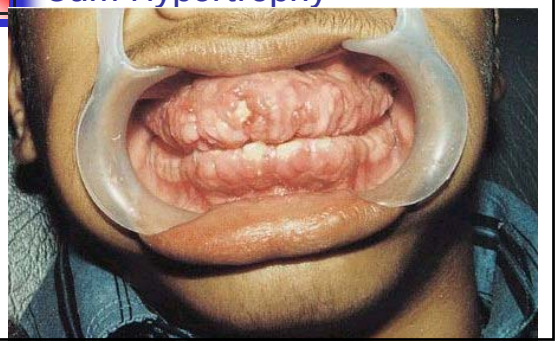
Bone Marrow Failure

- **Leukopenia** : Infections, sepsis
- **Anemia**: Fatigue, Pallor
- **Thrombocytopenia**: Bleeding

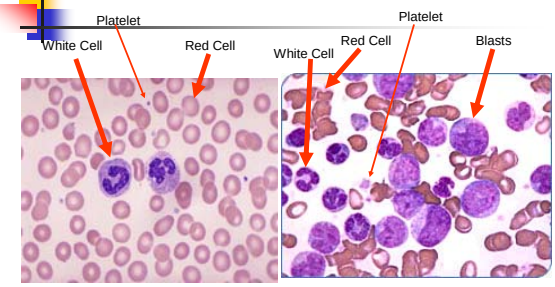
Furthermore, Infiltration of tissues/organs causes:

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

Gum Hypertrophy



Pictures Of Blood



Normal human blood

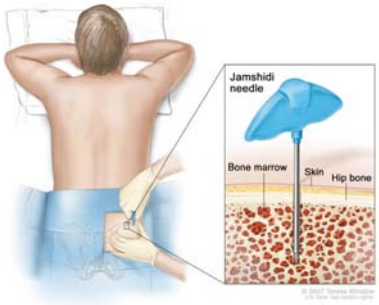
Blood with leukemia

Sources from Arginine.umdnj.edu

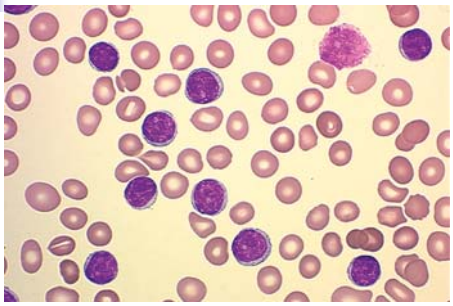
Sources from beyond2000.com

Symptoms

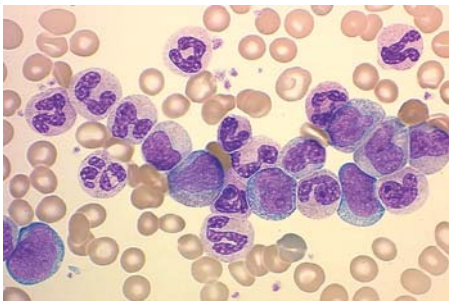
- Anemia
- Infections
- Hepatosplenomegaly
- Fever
- Night sweats
- Enlarged lymph nodes



CLL

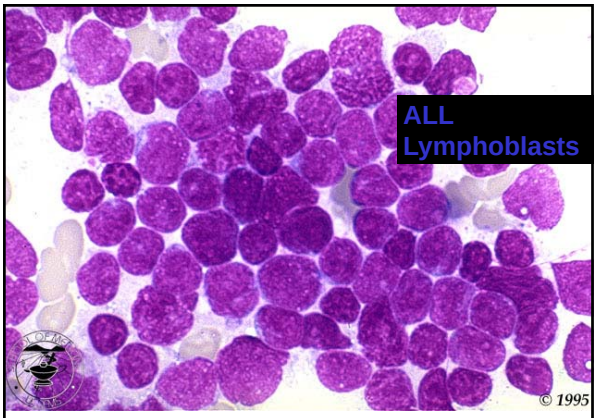


CML



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.
- Cyatarabine 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 lymphoadenopathy

Lymphomas

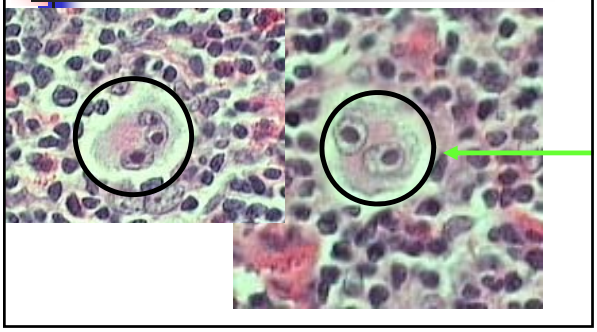
- Could be classified as:
  - Hodgkin's Lymphoma
  - Non-Hodgkin's Lymphoma

Hodgkin's Lymphoma

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

REED-STERNBERG CELLS

Reed-Sternberg Cell



Non-Hodgink'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

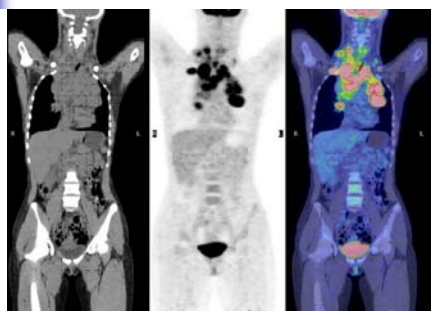
NO REED-Sternberg cells, it could be due to B or T or NK cells involvement.

Comparison of Hodgkin Lymphoma and Non-Hodgkin Lymphoma

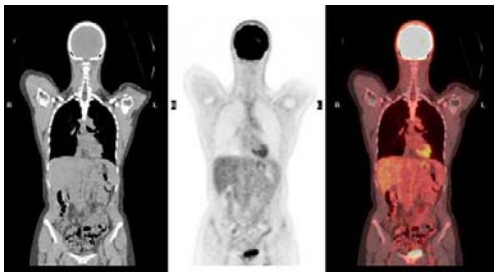
Feature	Hodgkin Lymphoma	Non-Hodgkin Lymphoma
Nodal involvement	Localized to a specific group of nodes	Usually disseminated among > 1 n group
Spread	Tends to spread in an orderly, contiguous fashion	Spreads noncontiguou
Extranodal involvement	Infrequent	Frequent
Stage at diagnosis	Usually early	Usually advan
Histologic classification in children	Usually one with a favorable prognosis	Usually high grade

PET Scan

PET scan in a patient with HD Before treatment

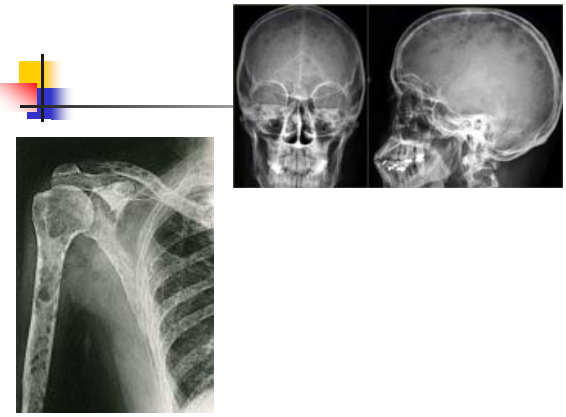


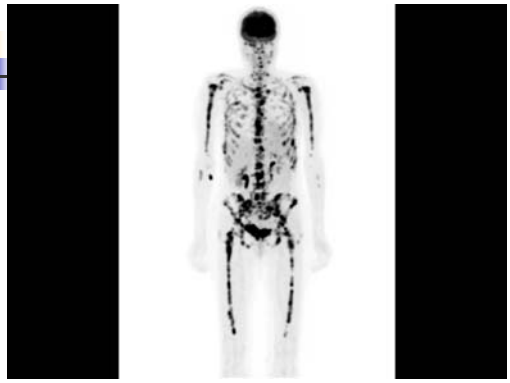
After treatment



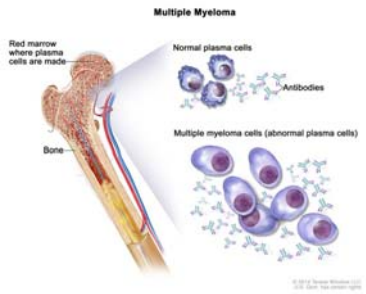
Treatment of lymphoma

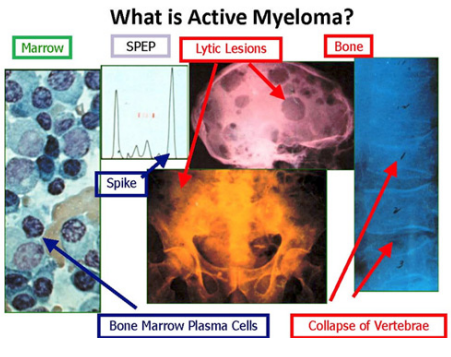
- Hodgkins disease: ABVD or BEACOPP.
- Diffuse large B cell lymphoma: R-CHOP.
- Relapsed lymphoma: R-ICE or R-DiHAP.





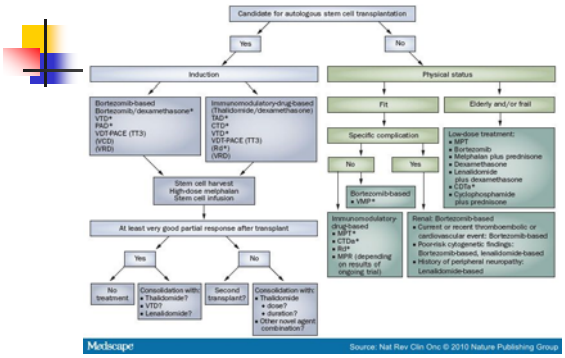
Multiple Myeloma





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).