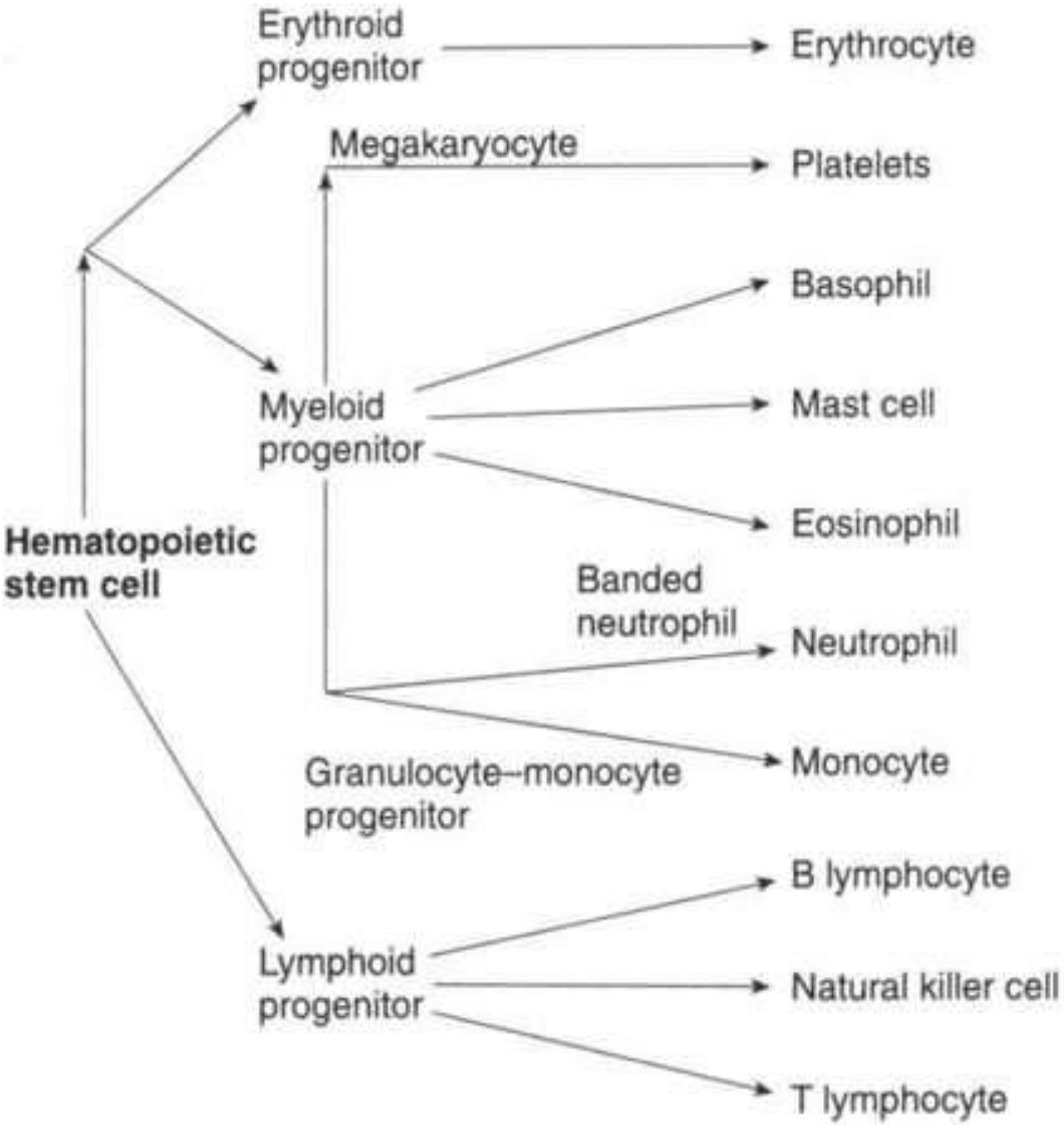
LEUKEMIA

Definition

It is a group of malignant disorder, affecting the blood and blood –forming tissue of the bone marrow lymph system and spleen.

- The word Leukemia comes from the Greek *leukos* which means "white" and *aima* which means "blood".

- The stem cells are committed to produce specific types of blood cells. Lymphoid stem cells produce either T or B **lymphocytes.**
- Myeloid stem cells differentiate into three broad cell types: RBCs, WBCs, and platelets.


Erythroid progenitor
Erythrocyte
Megakaryocyte
Platelets
Basophil
Myeloid progenitor
Mast cell
Eosinophil
Hematopoietic stem cell
Banded neutrophil
Neutrophil
Monocyte
Granulocyte–monocyte progenitor
B lymphocyte
Lymphoid progenitor
Natural killer cell
T lymphocyte

Function of the bone marrow

The bone marrow is found in the inside of bones. The marrow in the large bones of adults produces blood cells. Approximately 4% of our total bodyweight consists of bone marrow.

There are two types of bone marrow:

- 1. Red marrow, made up mainly of myeloid tissue.
- 2. Yellow marrow, made up mostly of fat cells.

- Red marrow can be found in the flat bones, such as the breast bone, skull, vertebrae, shoulder blades, hip bone and ribs. Red marrow can also be found at the ends of long bones, such as the humerus and femur.

- White blood cells (lymphocytes), red blood cells and platelets are produced in the red marrow. Red blood cells carry oxygen, white blood cells fight diseases. Platelets are essential for blood clotting.
- Yellow marrow can be found in the inside of the middle section of long bones.

- White blood cells, which help to body fight infection.
- Red blood cells, which carry oxygen to all parts of the body.
- Platelets, which help in blood clot.
  If a person loses a lot of blood the body can convert yellow marrow to red marrow in order to raise blood cell production.

Leukemia

Definition

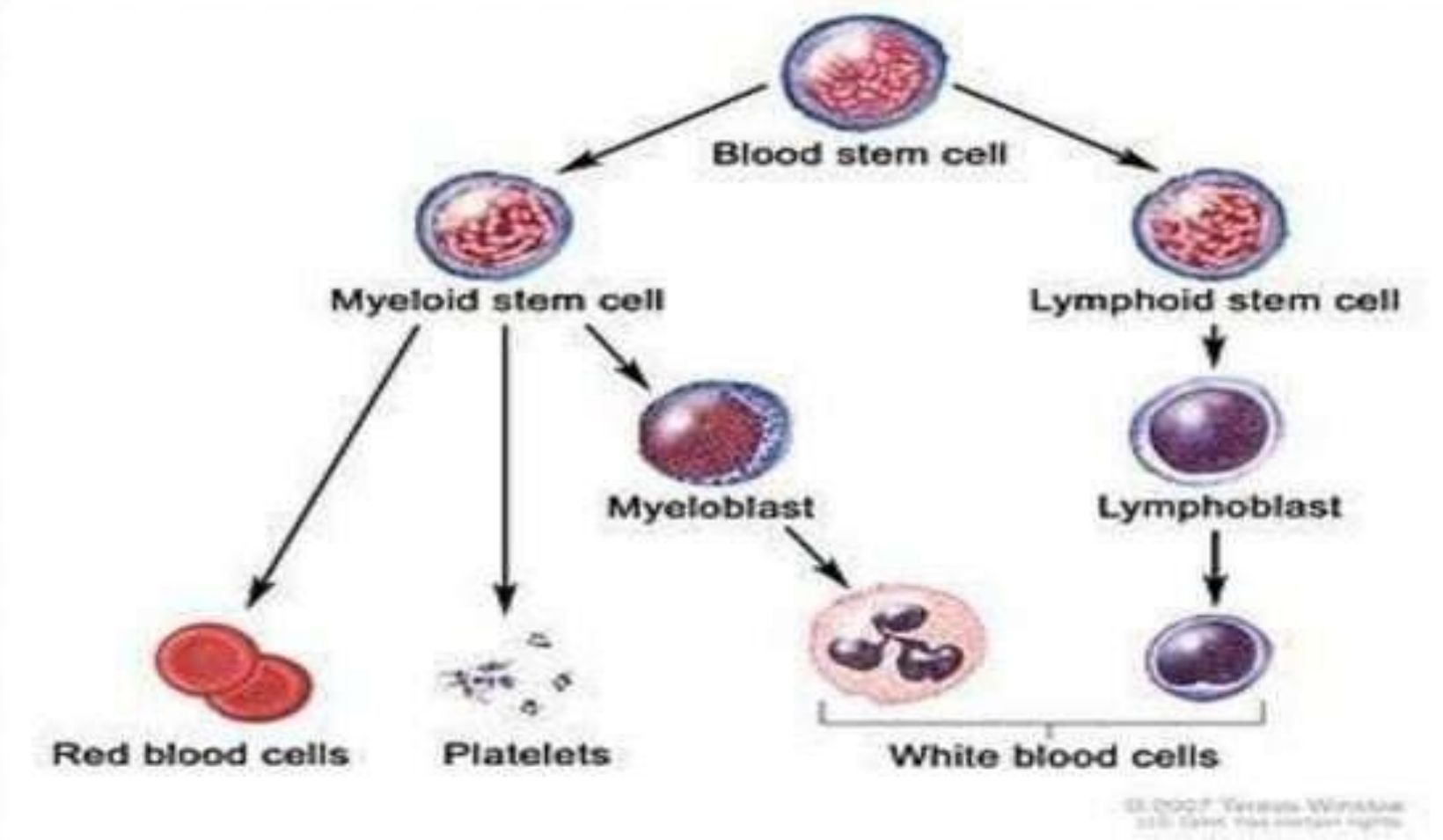
It is a group of malignant disorder, affecting the blood and blood –forming tissue of the bone marrow lymph system and spleen.

etiology

- Combination of predisposing factors including genetic and environmental influences.
- Chronic exposure to chemical such as benzene
- Radiation exposure.
- Cytotoxic therapy of breast, lung and testicular cancer.

- Congenital anomaly
- The presence of primary immunodeficiency and infection with the human T –cell leukemia virus type-1

PATHOPHYSIOLOGY



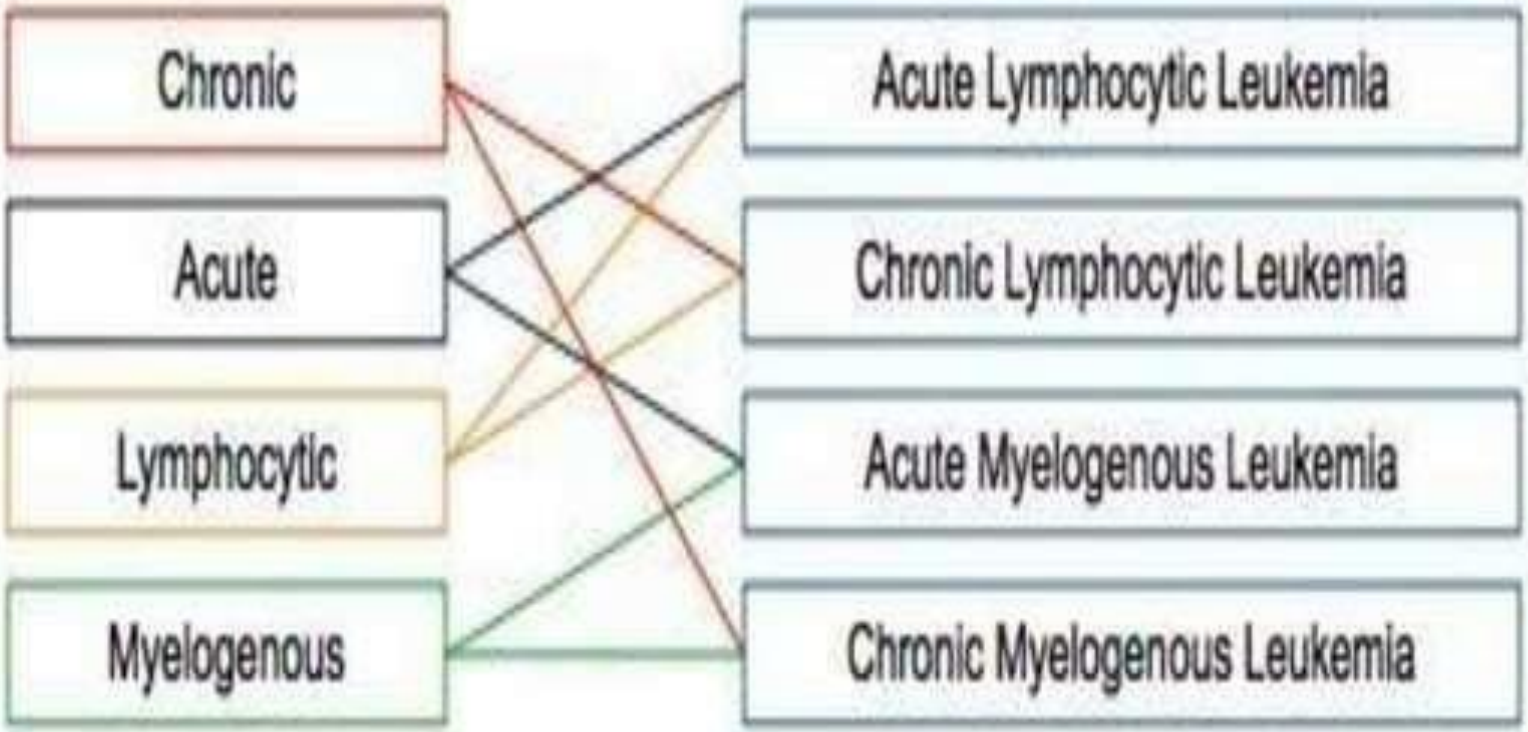
- The lack of control causes –
- nomal bone marrow to be replaced by immature and undifferentiated leukocytes or blat cells . –
- abnormal immature leukocytes then circulates in the blood and infiltrate the blood forming organs (liver , spleen, lymph nodes) and other sites throughout the body.

Different types of leukemia

- It may be acute or chronic. Acute leukemia gets worse very fast and may make feel sick right away. Chronic leukemia gets worse slowly and may not cause symptoms for years.

- Lymphocytic and Myelogenous Leukemias are also subdivided into the type of affected blood cell. If the cancerous transformation occurs in the type of marrow that makes lymphocytes, the disease is called *lymphocytic leukemia*.

- If the cancerous change occurs in the type of marrow cells that produce red blood cells, other types of white cells, and platelets, the disease is called *myelogenous leukemia*


Chronic
Acute
Lymphocytic
Myelogenous
Acute Lymphocytic Leukemia
Chronic Lymphocytic Leukemia
Acute Myelogenous Leukemia
Chronic Myelogenous Leukemia

FRENCH- AMERICAN –BRITISH (FAB) CLASSIFICATION OF ACUTE LEUKEMIA

Acute leukemia: morphological classification

Acute Myeloid (AML)

M_0: minimally differentiated
M_1: without maturation
M_2: with maturation
M_3: hypergranular promyelocytic
M_4: myelomonocytic
M_5: (a) monoblastic, (b) monocytic
M_6: erythroleukemia
M_7: megakaryoblastic
Rare types (e.g. eosinophilic, natural killer)

Acute Lymphoblastic (ALL)

L_1: small, monomorphic
L_2: large, heterogeneous
L_3: Burkitt-cell type

INCIDENCE—

- In adults, chronic lymphocytic leukemia (CLL) and acute myelogenous leukemia (AML) are the most common leukemias.
- In children, the most common leukemia is acute lymphoblastic leukemia (ALL). Childhood leukemias also include acute myelogenous leukemia (AML) and other myeloid leukemias, such as chronic myelogenous leukemia (CML) and juvenile myelomonocytic leukemia (JMML).

- Relate to problems caused by
  - Bone marrow failure
    - Overcrowding by abnormal cells
    - Inadequate production of normal marrow elements
    - Anemia, thrombocytopenia, ↓ number and function of WBCs

- Relate to problems caused by
  - Leukemic cells infiltrate patient's organs
    - Splenomegaly
    - Hepatomegaly
    - Lymphadenopathy
    - Bone pain, meningeal irritation, oral lesions (chloromas)

Classification of leukaemia

1. **1. Acute lymphatic leukaemia (ALL)**

   Usually occurs before 14 years of age peak incidence is between 2-9 years of age, older adult

Pathophysiology

It arising from a single lymphoid stem cell, with impaired maturation and accumulation of the malignant cells in the bone marrow.

Acute lymphatic leukaemia Cont.

Signs and symptoms

Anaemia, bleeding, lymphadenopathy, infection

Clinical manifestation	Clinical manifestation
▪Fever ▪Pallor ▪Bleeding ▪Anorexia ▪Fatigue	▪Weakness ▪Bone, joint and abdominal pain ▪Increase intracranial press.

- Generalized lymphadenopathy
- Infection of respiratory tract
- Anaemia and bleeding of mucus membrane
- Weight lossa
- Mouth sore

Acute lymphatic leukaemia Cont.

Diagnosis

- Low RBCs count, Hb, Hct, low platelet count , low normal or high WBC count.
- Blood smear show immature lymph blasts.

Treatment

Chemotherapeutic agent, it involve three phases

1. **Induction:** Using vincristine and prednisone.
2. **Consolidation:** Using modified course of intensive therapy to eradicate any remaining.
3. **Maintenance**

Acute lymphatic leukaemia Cont.

Treatment Cont.

- Prophylactic treatment of the CNS , intrathecal administration and /or craniospinal radiation with eradicate leukemic cells.

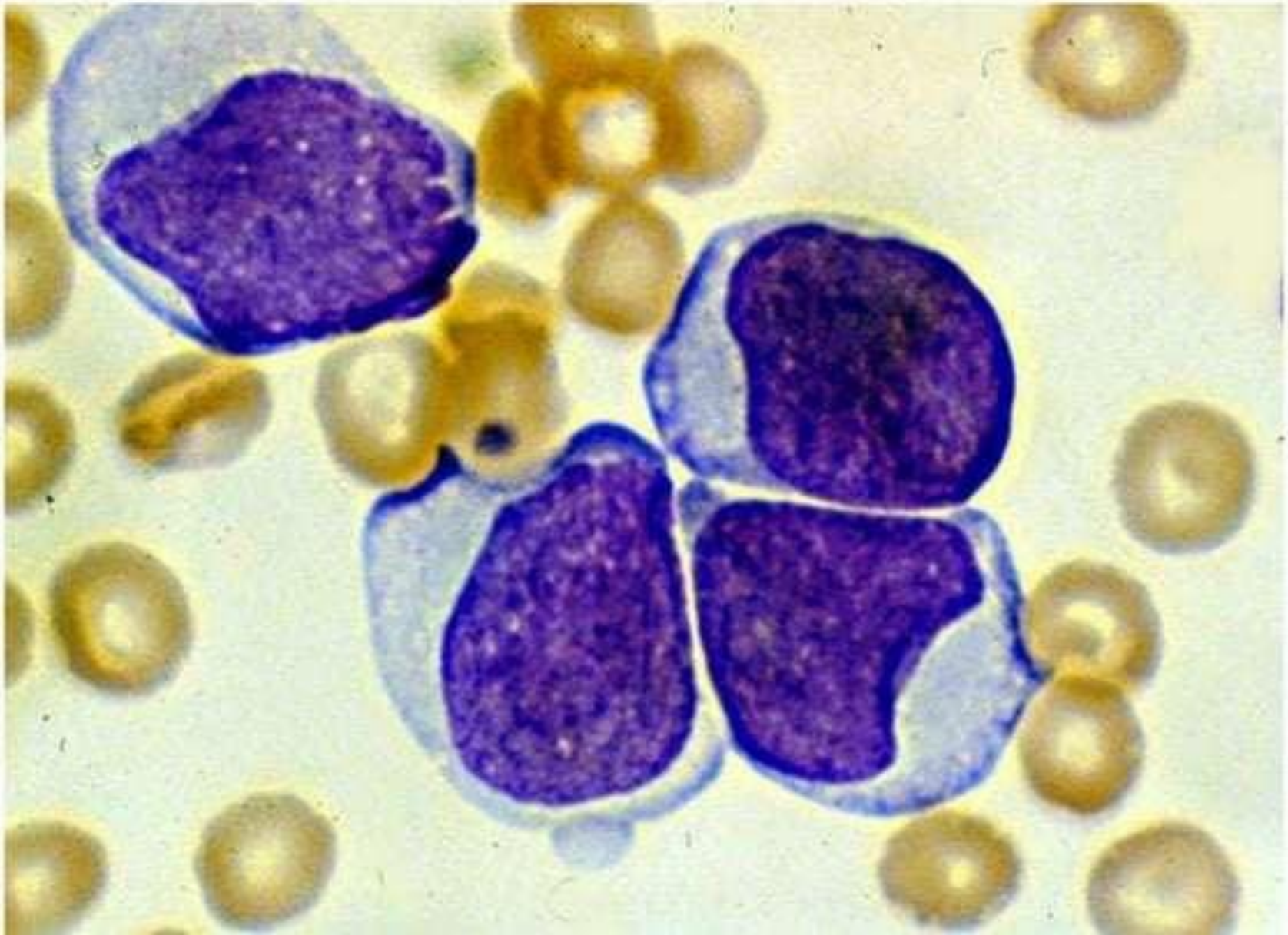
- Eat diet that contains high in protein, fibres and fluids.

Acute lymphatic leukaemia Cont.

Treatment Cont.

- Avoid infection (hand washing, avoid crowds),injury
- Take measure to decrease nausea and to promote appetite, smoking and spicy and hot foods.
- Maintain oral hygiene.

ALL Histology



Acute Myelogenous Leukaemia (AML)

It occurs at any age but occurs most often at adolescence and after age of 55

Pathophysiology

Characterized by the development of immature myeloblasts in the bone marrow.

Clinical manifestation

Similar to ALL plus sternal tenderness.

Management

Diagnosis

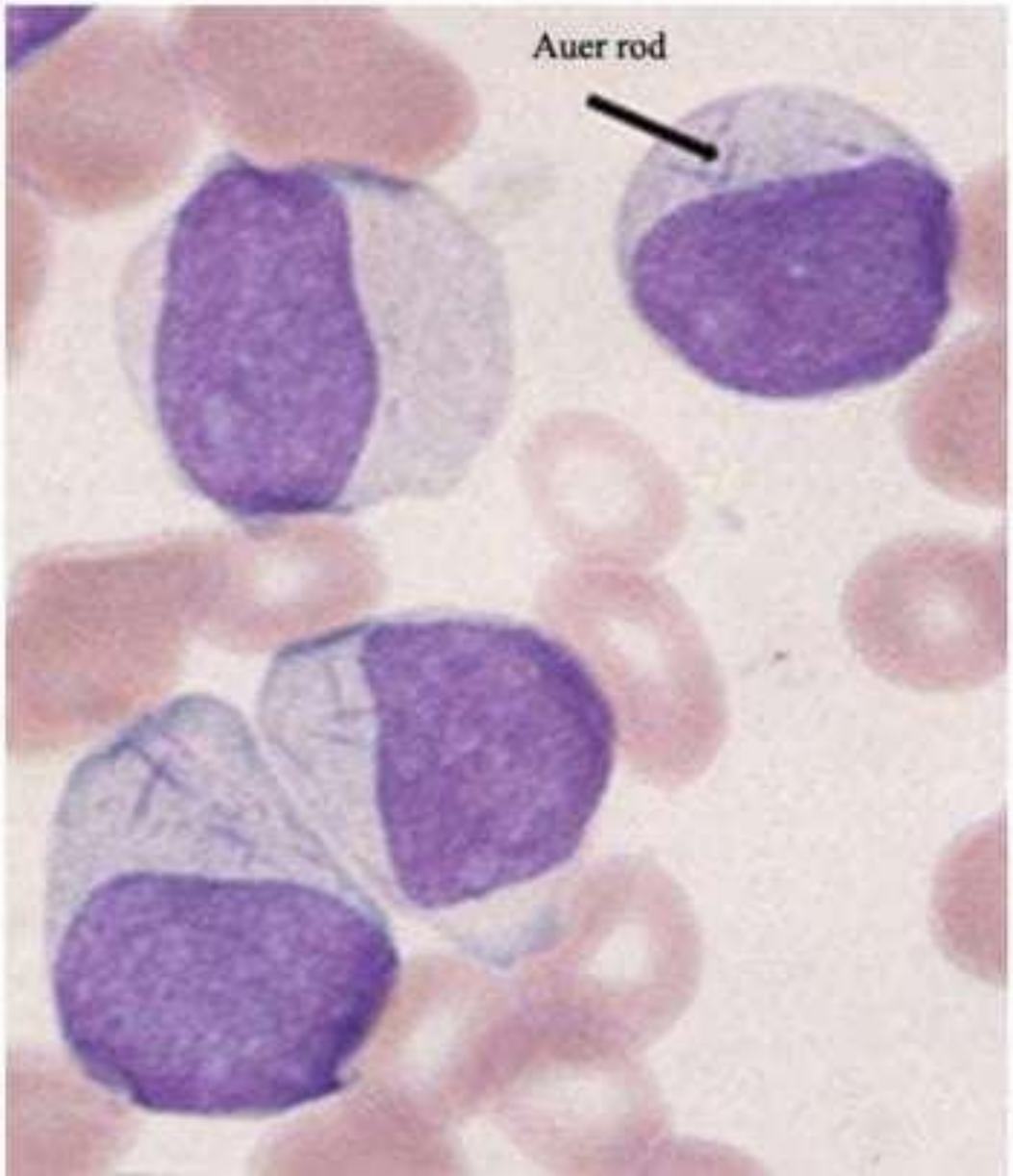
Low RBC, Hb, Hct, low platelet count, low to high WBC count with myeloblasts.

Acute Myelogenous Leukaemia (AML) Cont.

Treatment

- Use of cytarabine, 6-thioquanine, and doxorubic
- The same care of client as All, plus give adequate amounts of fluids(2000 to 3000 ml per day.)
- Instruct client about medication, effects, side effects and nursing measures

AML Histology



Chronic lymphocytic Leukaemia (CLL)

The incidence of CLl increases with age and is rare under the age of 35.It is common in men.

Pathophysiology

- It is characterized by proliferation of small, abnormal , mature B lymphocytes, often leading to decreased synthesis of immunoglobulin and depressed antibody response.
- The number of mature lymphocytes in peripheral blood smear and bone marrow are greatly increased

Chronic lymphocytic Leukaemia (CLL) Cont

Clinical Manifestation

Usually there is no symptoms.

Chronic fatigue , weakness , anorexia, splenomegaly , lymphadenopathy, hepatomegaly.

Signs and Symptoms

- Pruritic vesicular skin lesions .
- Anaemia
- Thrombocytopenia.
- The WBC count is elevated to a level between 20,000 to 100,000.
- Increase blood viscosity and clotting episode.

Chronic lymphocytic Leukaemia (CLL) Cont

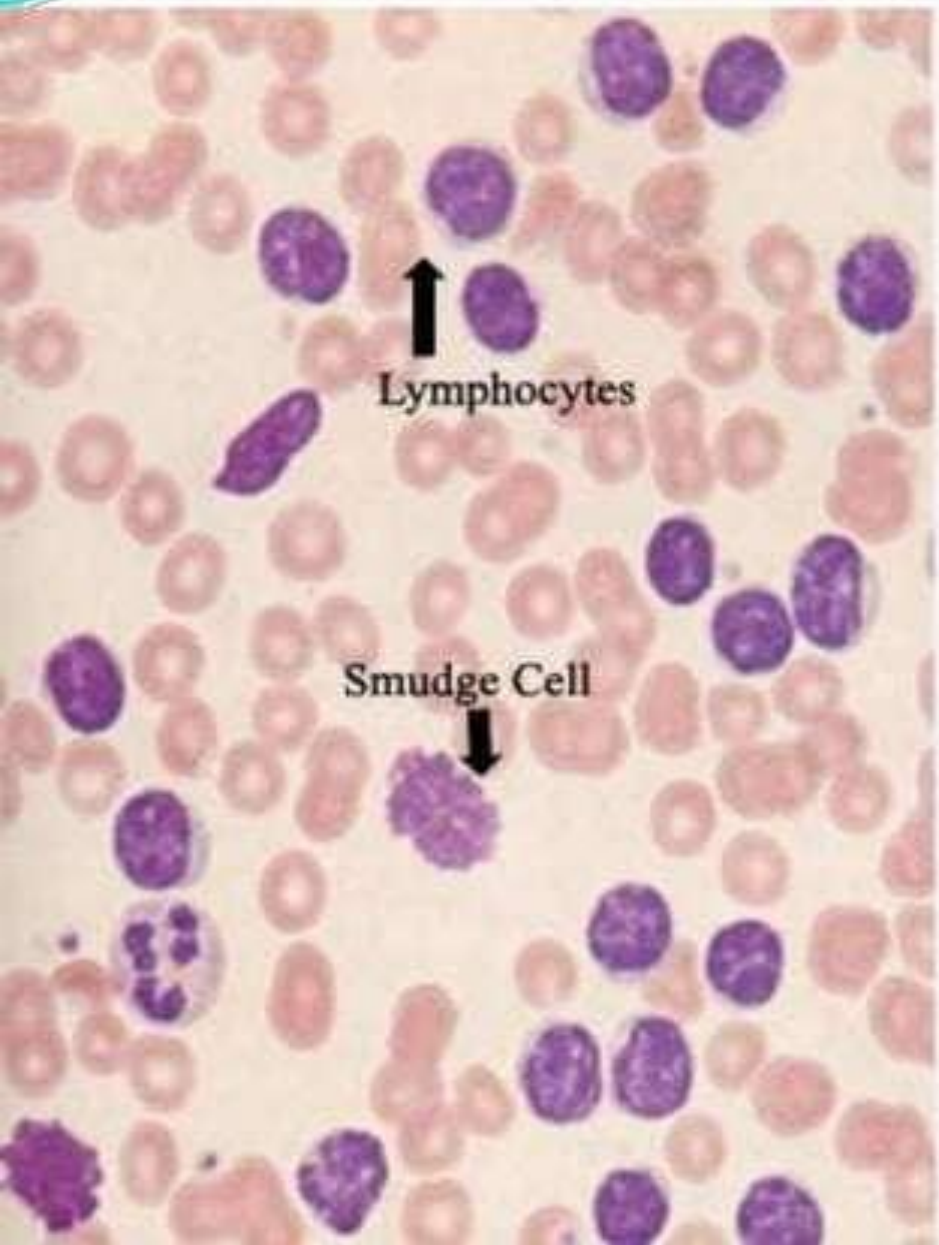
Management

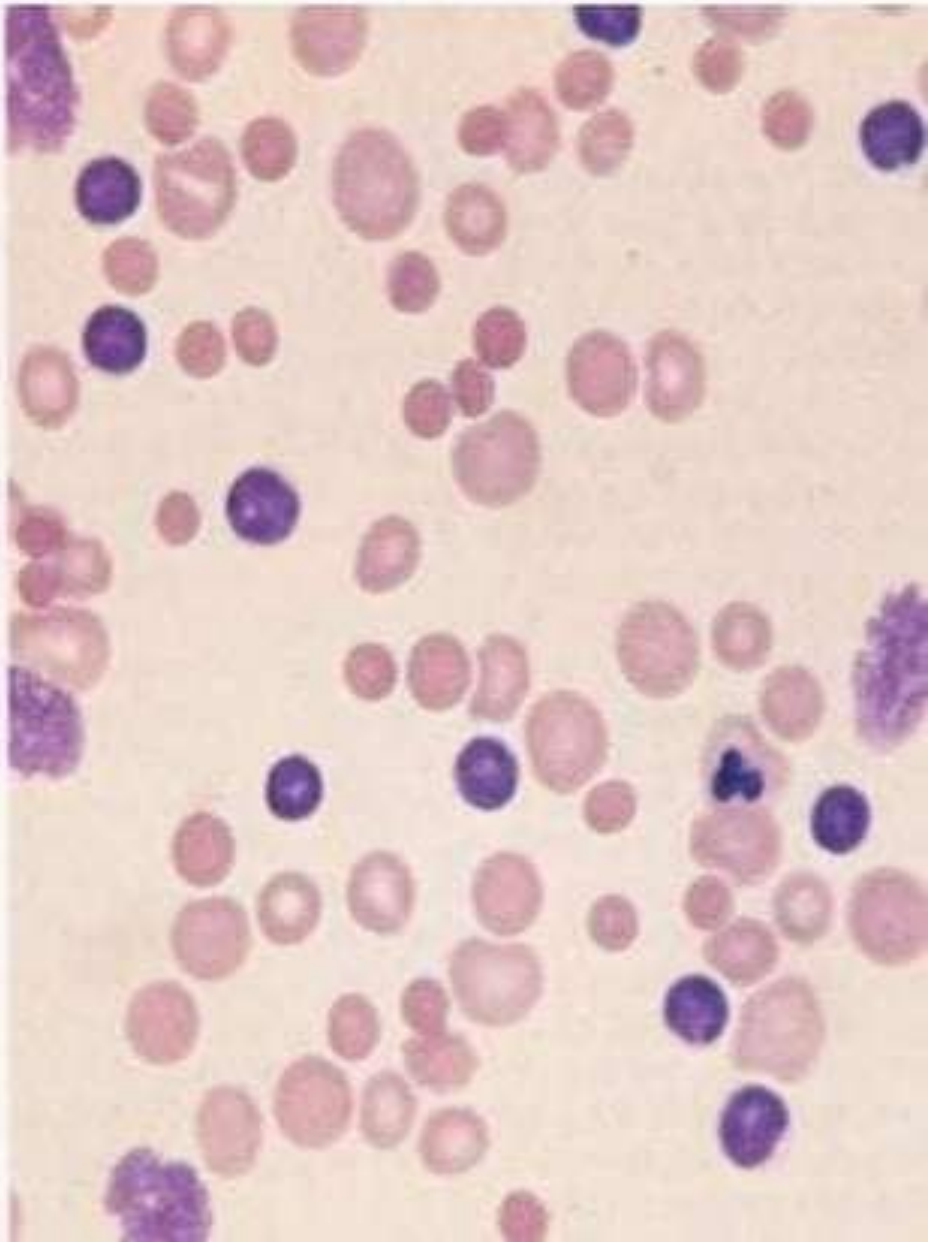
I. Persons are treated only when symptoms, particular anaemia , thrombocytopenia , enlarged lymph nodes and spleen appear.

I. Chemotherapy agents such as chlorambucil , and the glucocorticoids.

I. Client and family education is that describe for AML.

CLL Histology





Chronic Myelogenous Leukaemia(CML)

- *Philadelphia chromosome*
  - The chromosome abnormality that causes chronic myeloid leukemia

Occurs between 25-60 years of age. Peak 45 year

It is caused by benzene exposure and high doses of radiation.

Clinical Manifestation

- There is no symptoms in disease. The classic symptoms, include:
- Fatigue, weakness, fever.
- Weight loss, joint & bone pain.

Chronic Myelogenous Leukaemia(CML) Cont.

Clinical Manifestation Cont.

- Massive splenomegaly
- The accelerated phase of disease(blostic phase) is characterized by increasing number of granulocytes in the peripheral blood.
- There is a corresponding anaemia and thrombocytopenia.

Chronic Myelogenous Leukaemia(CML) Cont.

Diagnosis

Lower RBC count, Hb, Hct, high platelet count early, lower count later.

Normal number of lymphocytes and normal or low number of monocytes in WBC .

Treatment

The commonly drugs are hydroxyurea and busulfan (monitor of WBC count needed with therapy).

The only potential curative therapy of CML is the bone marrow transplant.

Nursing Intervention

Taking measures to prevent infection.

Promoting safety.

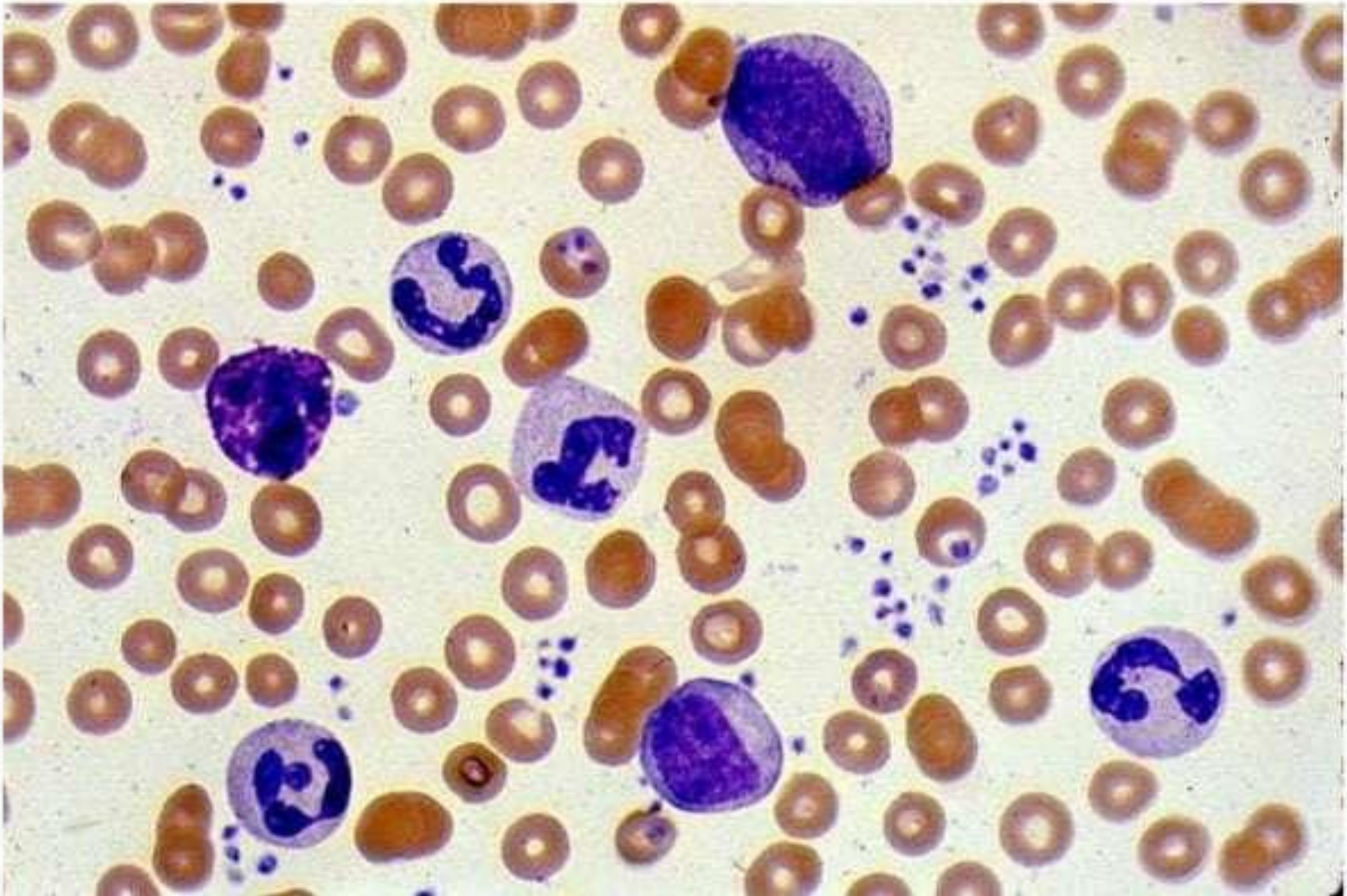
Providing oral hygiene.

Preventing fatigue.

Promoting effective coping.

Client and family education.

CML HISTOLOGY



MANAGEMENT

- watchful waiting,
- chemotherapy,
- targeted therapy,
- radiation therapy, and
- stem cell transplant.

The choice of treatment depends mainly on the following:

- The type of leukemia (acute or chronic)
- Age
- Whether leukemia cells were found in cerebrospinal fluid

WATCHFUL WAITING

- chronic leukemia without symptoms, may not need cancer treatment right away.
- Watch for health closely so that treatment can start when it begin to have symptoms.
- Not getting cancer treatment right away is called **watchful waiting**.

chemotherapy

- People with acute leukemia need to be treated right away.
- The goal of treatment is to destroy signs of leukemia in the body and make symptoms go away. This is called a **remission**.
- After people go into remission, more therapy may be given to prevent a **relapse**.

The 3 phases of treatment protocols are;

- **Induction phase**; the usual criteria for complete remission are 5% of the bone marrow cells and normal peripheral blood counts. Once remission completes the consolidation phase begins.

- **Consolidation phase**; modified course of intensive chemotherapy are given to eradicate any remaining disease. Usually a higher dose of 1 or more chemotherapeutic agents are administered.

- **Maintainance phase**; small dose of different combination of chemotheraptic agents are given every 3 to 4 weeks. This phase may continue for a year or longer and is structured to allow the client to live as normal life as possible

Targeted therapy

- This affects only tumor cells and spare normal cells. hence decreasing the associated toxicities. Gemtuzumab ozofamicin (mylotarg) is an anti D33nmonoclonal antibody linked to calicheamicin, which is potent cytotoxic agent.

STEM CELL TRANSPLANT

Goal;

- Totally eliminate leukemic cells from the body using combinations of chemotherapy with or without total body irradiation
- Eradicates patient's hematopoietic stem cells
- Replaced with those of an HLA-matched (Human Leukocyte Antigen)

- Sibling (is a brother or a sister; that is, any person who shares at least one of the same parents)
- Volunteer
- Identical twin
- Patient's own stem cells removed before

TYPES OF STEM CELL TRANSPLANTATION

1. Allogeneic Stem Cell Transplant

- stem cells are taken from a matching donor. To determine if a donor's stem cells are the right match, the patient undergoes a human leukocyte antigens (HLA) test. Through this test, we compare the patient's blood and tissue type against blood samples from the donor.

Donors may include:

- HLA-matched relative (most often a sibling)
- HLA-matched unrelated donor
- HLA miss-matched family member
- Unrelated umbilical cord blood

2. Autologous Stem Cell Transplant

- In this type of transplant, stem cells are collected from the patient themselves. The stem cells are then harvested, frozen and stored, and then given back to the patient. This type of transplant is rare for leukemia patients and is typically used in select cases of AML.

Nutrition and Physical Activity

- It's important for you to take care of eating well and staying as active.
- right amount of calories to maintain a good weight. enough protein. Eating well may help to feel better and have more energy.

Follow-up Care

- regular checkups after treatment for leukemia.

NURSING MANAGEMENT

Nursing diagnosis

- 1. Impaired oral mucous membrane related to low platelet counts or effect of pathologic conditions and treatment.
- 2. Ineffective therapeutic management related to lack of knowledge of disease process, activity and medication.
- 3. imbalanced nutrition less than body requirement reated to anorexia , pain and fatigue.
- **4.** risk for injury related to low platelet counts and treatment

Overall goals

- Understand and cooperate with the treatment plan
- Experience minimal side effects and complications of disease and treatment
- Feel hopeful and supported during the periods of treatment, relapse, and remission
- Many physical and psychological needs
- Evokes great fear

- **Goals of rehabilitation**
  - Manage
    - Physical
    - Psychosocial
    - Social
    - Spiritual
    - Delayed effects
  - Support groups

CONCLUSION