JSC “Astana Medical University”
Department of internal illnesses №1

Acute leukemia

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Astana 2018

Leukemia

Group of malignant disorders of the hematopoietic tissues characteristically associated with increased numbers of white cells in the bone marrow and / or peripheral blood

Classification

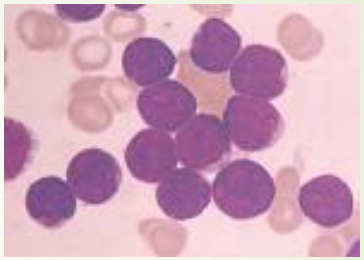
- Classified based on cell type involved and the clinical course

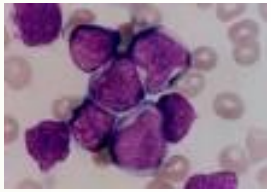
Acute :

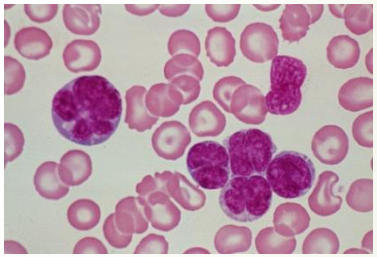
- ALL
- AML

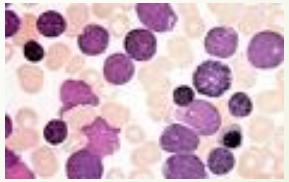
Subclassification

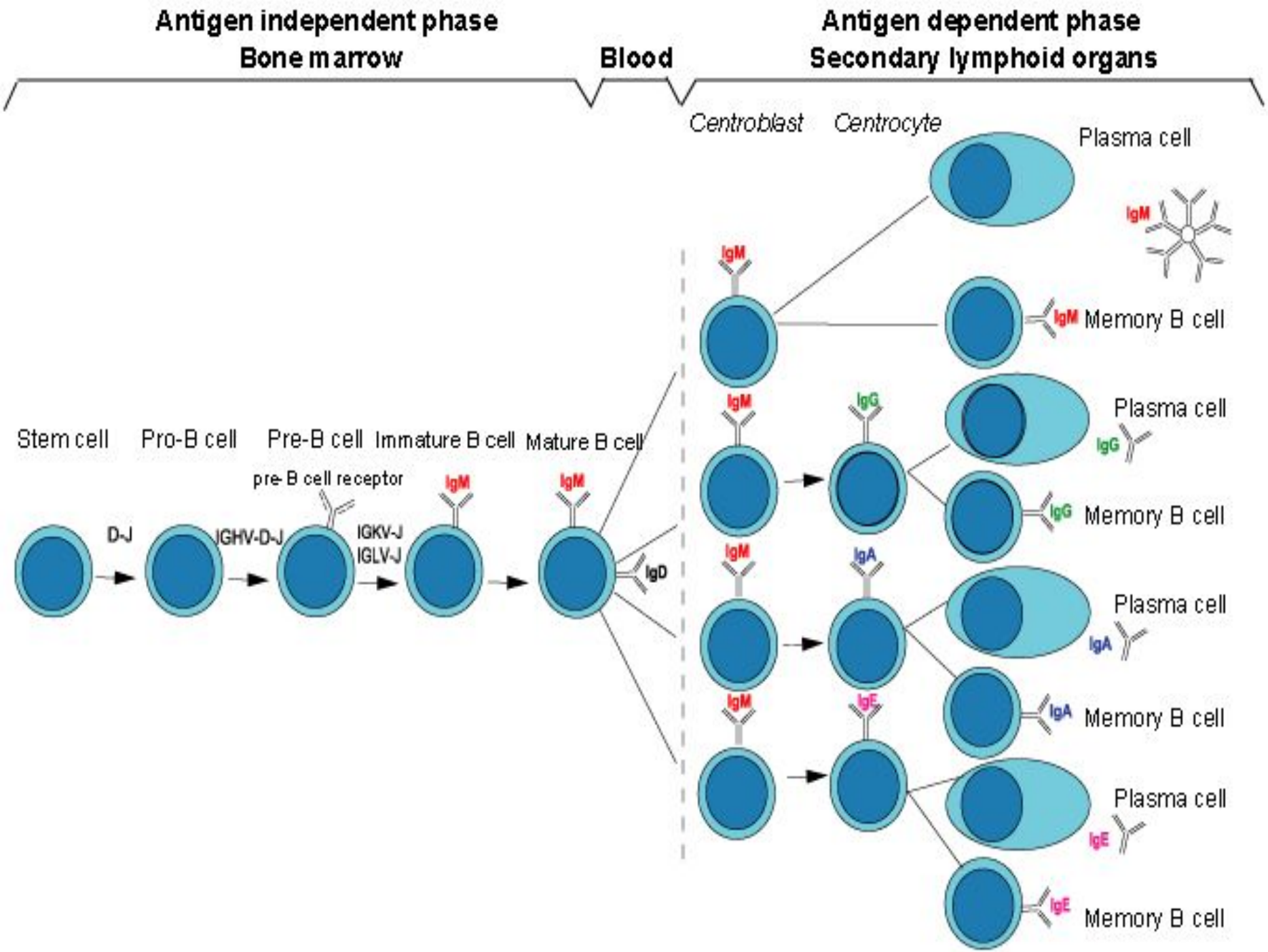
- ALL
  - Common type(pre-B)
  - B-cell
  - T-cell
  - Undifferentiated










Antigen independent phase
Bone marrow
Blood
Antigen dependent phase
Secondary lymphoid organs
Centroblast
Centrocyte
Plasma cell
IgM
IgM
Memory B cell
Stem cell
Pro-B cell
Pre-B cell
Immature B cell
Mature B cell
pre-B cell receptor
D-J
IGHV-D-J
IGKV-J
IGLV-J
IgM
IgM
IgD
IgM
IgG
Plasma cell
IgG
IgG
Memory B cell
IgM
IgA
Plasma cell
IgA
IgM
IgE
IgA
Memory B cell
Plasma cell
IgE
IgE
Memory B cell

STEM CELL

M0

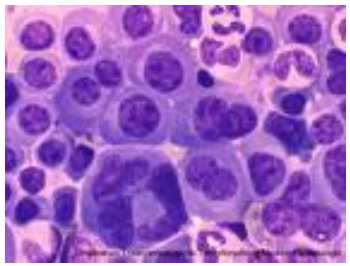
MYELOID

COMMITTED CELL

ERYTHROID

COMMITTED CELL

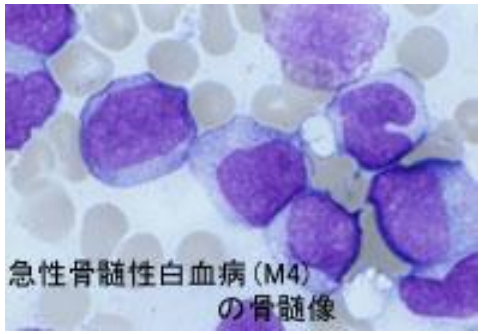
M6



MONOBLAST

M5

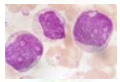
M4



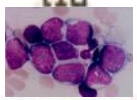
急性骨髄性白血病(M4)
の骨髄像

MYELOBLAST

M1

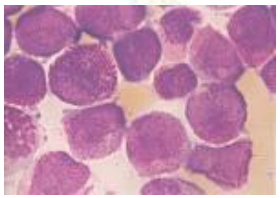


M2



PROMYELOCYTE

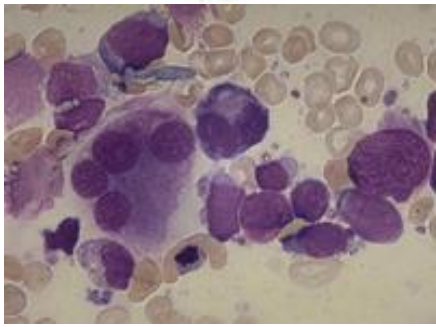
M3



MEGAKARYOCYTIC

COMMITTED CELL

M7



AML

French-American-British (FAB) Classification

M0: Minimally differentiated leukemia
M1: Myeloblastic leukemia without maturation
M2: Myeloblastic leukemia with maturation
M3: Hypergranular promyelocytic leukemia
M4Eo: Variant: Increase in abnormal marrow eosinophils
M4: Myelomonocytic leukemia
M5: Monocytic leukemia
M6: Erythroleukemia (DiGuglielmo's disease)
M7: Megakaryoblastic leukemia

Acute Myeloid Leukemia (AML)

- Malignant transformation of a myeloid precursor cell ;
  usually occurs at a very early stage of myeloid development

- Rare in childhood & incidence increases with age

Etiology

Predisposing factors:

- Ionizing radiation exposure
- Previous chemotherapy : alkylating agents
- Occupational chemical exposure : benzene
- Genetic factors: Down's Syndrome, Bloom's, Fanconi's Anemia
- Viral infection (HTLV-1)
- Immunological : hypogammaglobulinemia
- *Acquired hematological condition -Secondary*

Clinical features

General :

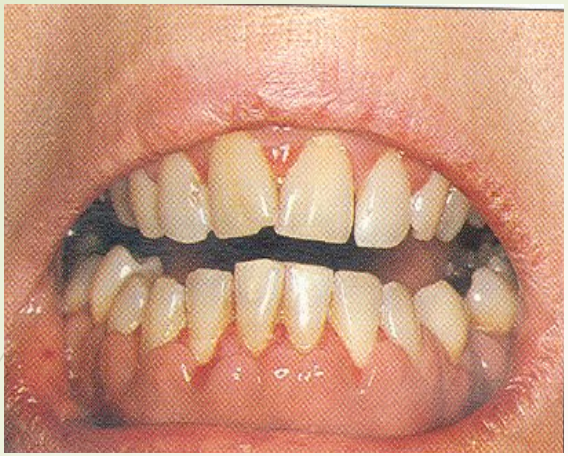
Onset is abrupt & stormy

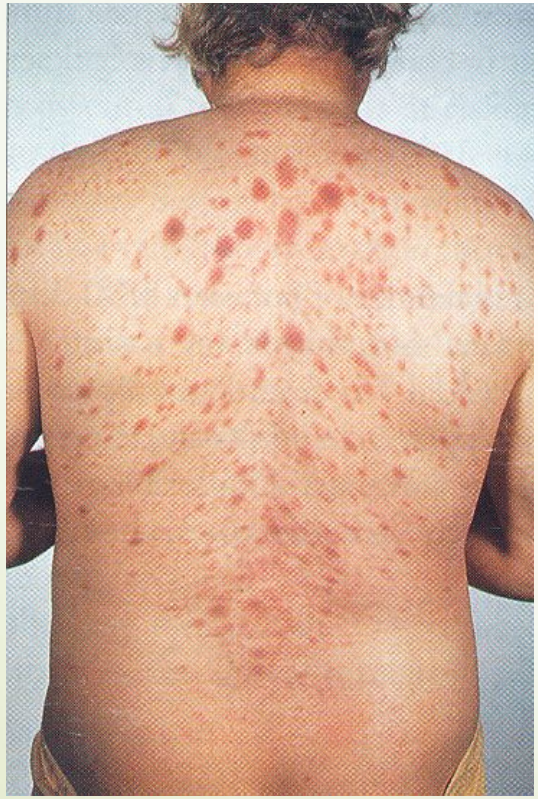
(usually present within 3 months)

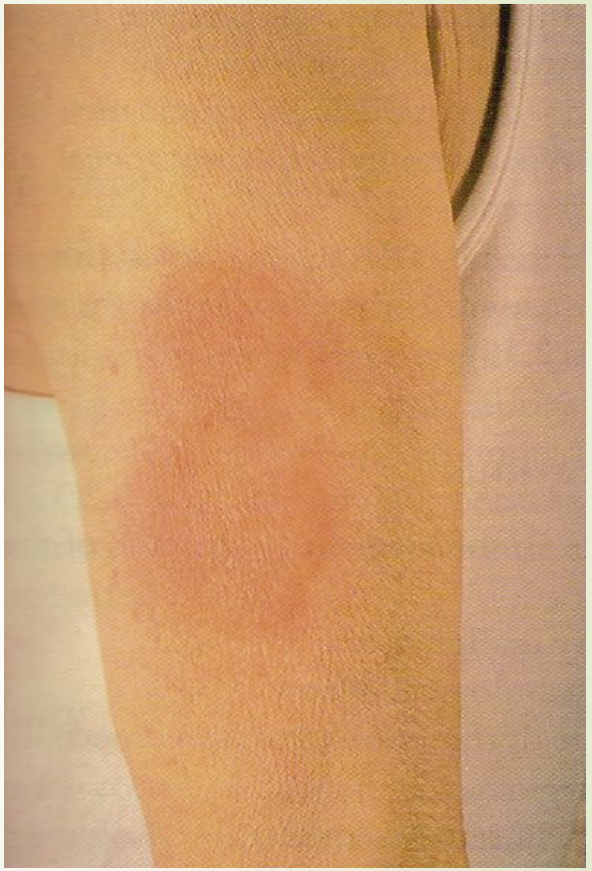
- Bone marrow failure
  (anemia, infection ,bleeding)
- Bone pain & tenderness

Specific:

- M2 : Chloroma:-presents as a mass lesion ‘tumor of leukemic cells’
- M3 : DIC
- M4/M5 : Infiltration of soft tissues, *gum infiltration*, skin deposits ,Meningeal involvement-headache, vomiting, eye symptoms







Diagnosis

Blood count :

- WBC usually elevated (50,000- 1,00,000/ cmm); may be normal or low; often anemia & thrombocytopenia

Blood film : (as above)

- Blast cells

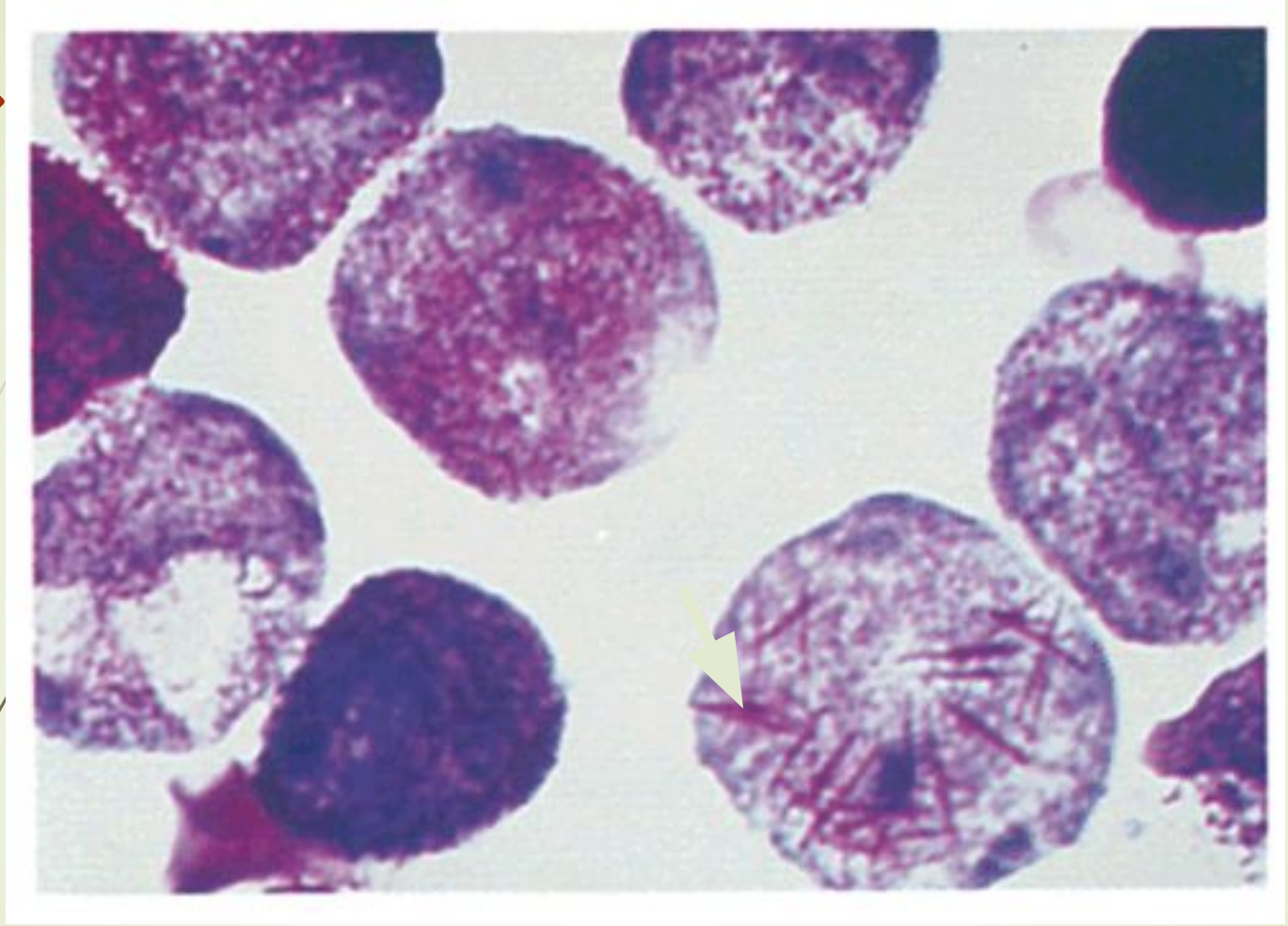
Bone marrow aspirate & trephine:

Hypercellular,

- blast cells *(> 20%),*
- presence of **Auer rods -** AML type

Cytochemistry :

Special stains to differentiate AML from ALL ;
Positivity with Sudan black & Myeloperoxidase (MPO) in AML



Auer Rods in Leukemia cells

Confirmation:

- Immunophenotyping
- Molecular genetics
- Cytogenetics: chromosomal abnormalities

Other investigations:

- Coagulation screen, fibrinogen, D- dimer
- RFT, LFT
- LDH, Uric acid
- Urine
- CXR
- ECG, ECHO

Management

Supportive care

- Anemia – red cell transfusion
- Thrombocytopenia – platelet concentrates
- Infection – broad spectrum IV antibiotics
- Hematopoietic growth factors: GM-CSF, G-CSF
- Barrier nursing
- Indwelling central venous catheter

Metabolic problems

- Monitoring hepatic / renal / hematologic function
- Fluid & electrolyte balance, nutrition hyperuricemia-hydration, Allopurinol
- Psychological support

SPECIFIC THERAPHY:

Chemotherapy :

Induction: (4-6 wks)

vincristine, prednisone,

anthracycline, (idarubicin or daunorubicin)

cyclophosphamide, and L-asparaginase

Consolidation:

(multiple cycles of intensive chemotherapy given over a 6 to 9 month period).

Cytosine arabinoside, high-dose methotrexate, etoposide anthracycline, (idarubicin or daunorubicin)

Maintenance phase:

(18 to 24 months).

LPs with intrathecal MTX every 3 months,

Monthly vincristine,

Daily 6-MP, and weekly MTX.

Complete remission (CR):

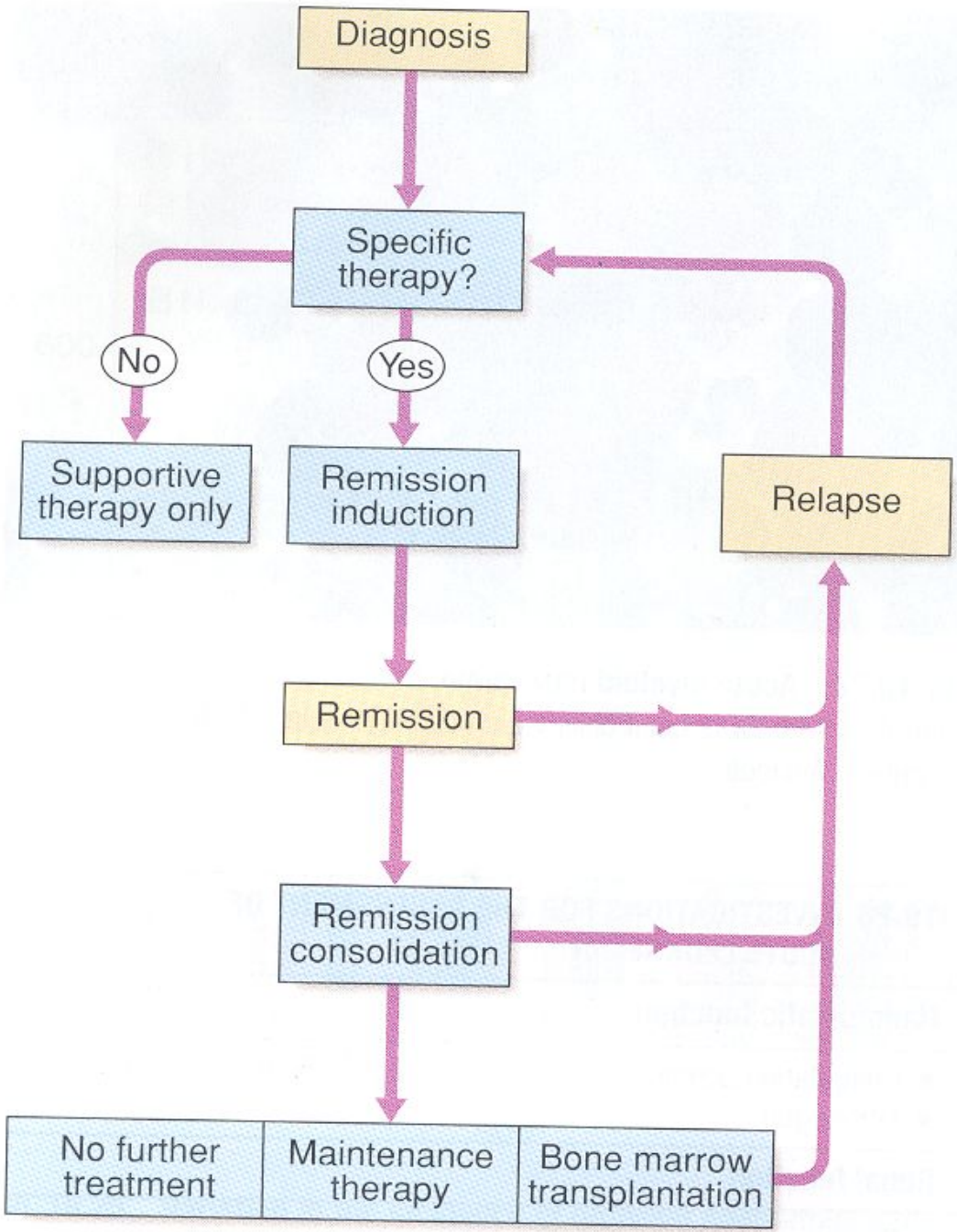
- <5% blast cells in normocellular bone marrow

Autologous BMT :

- Can be curative in younger patient (< 40-50 yrs)

PALLIATIVE THERAPHY

- Chemo, RT, Blood product support


Diagnosis
Specific therapy?
No
Yes
Supportive therapy only
Remission induction
Relapse
Remission
Remission consolidation
No further treatment
Maintenance therapy
Bone marrow transplantation

Prognosis

- Median survival without treatment is 5 weeks
- 30% 5-yr survival in younger patients with chemotherapy
- Disease which relapses during treatment or soon after the end of treatment has a poor prognosis

Poor prognostic factors

- Increasing age
- Male sex
- High WBC count at diagnosis
- CNS involvement at diagnosis
- Cytogenetic abnormalities
- Antecedent hematological abnormalities (eg. MDS)
- No complete remission

Literature:

- 1. Scottish Intercollegiate Guidelines Network (SIGN). SIGN 50: a guideline developer's handbook. Edinburgh: SIGN; 2014. (SIGN publication no. 50). [October 2014].
- 2. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines) Acute lymphoblastic leukemia. www.nccn.org.
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