Acute Leukemias

4th Year Medical Student

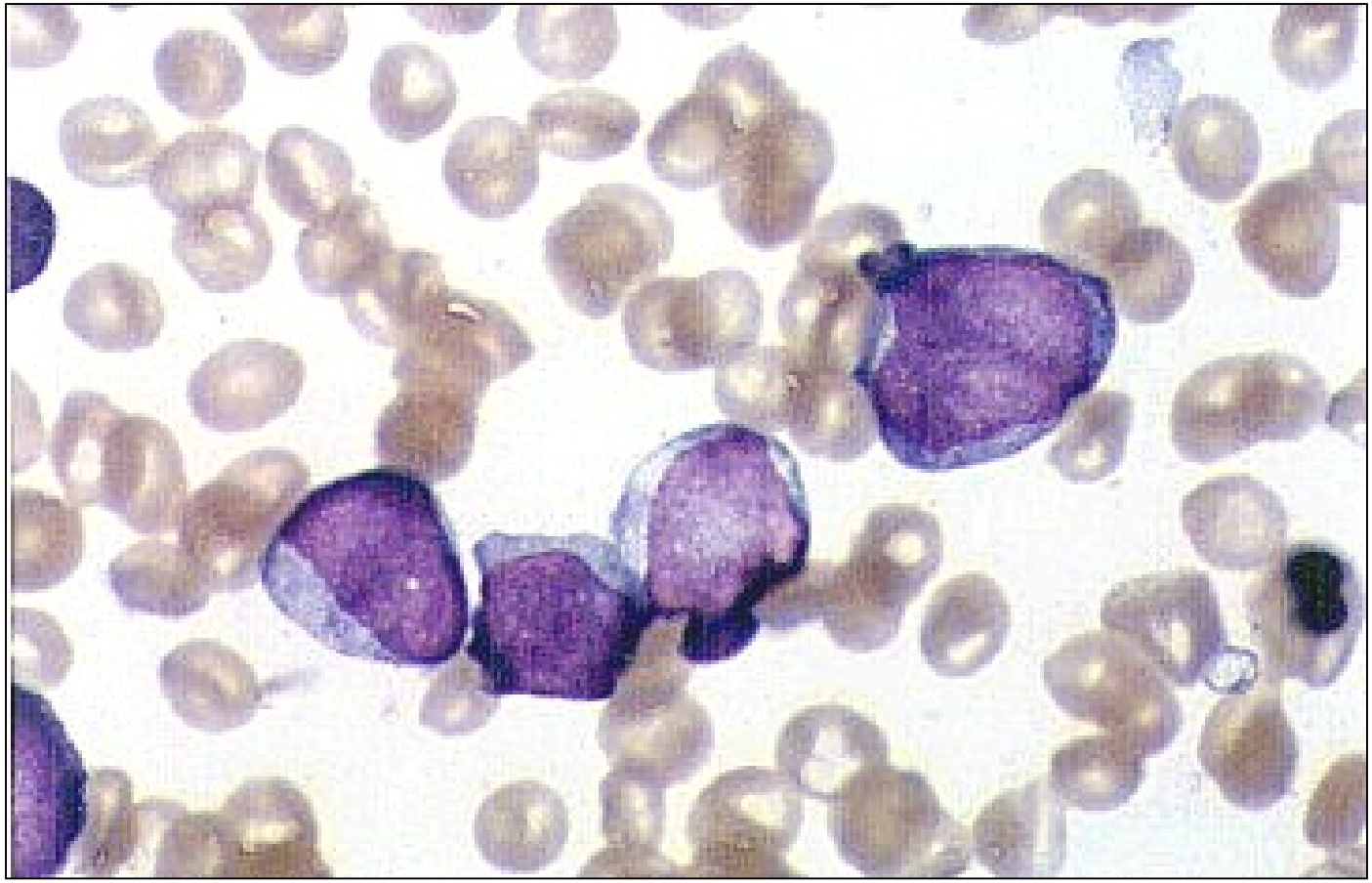
KAU

Acute Leukemia

Is a type of cancer characterized by the production of large numbers of immature, abnormal blood cells (Blasts)that look and act differently from normal blood cells

Acute Leukemia

- accumulation of blasts in the marrow



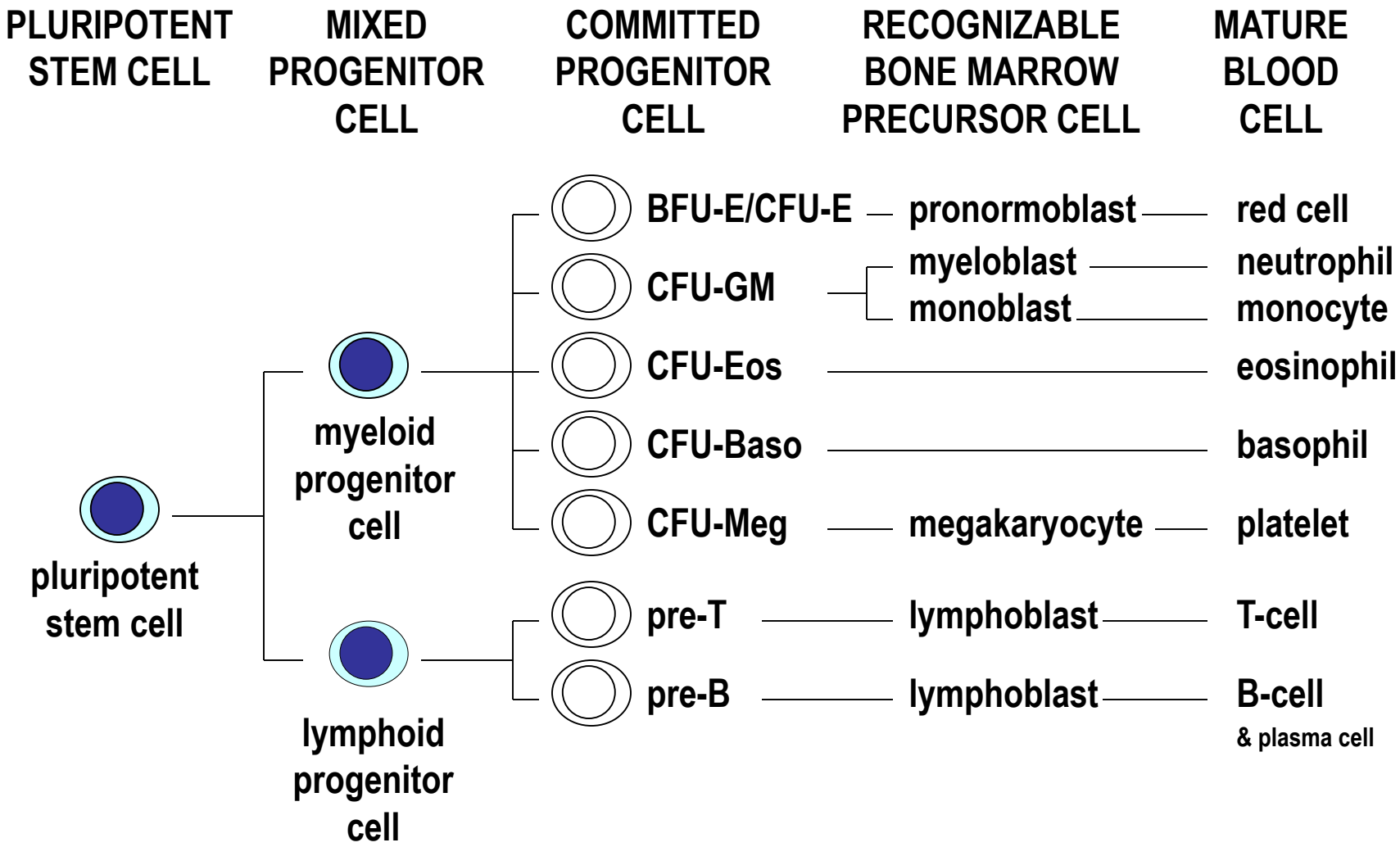
Leukemias

- Subdivided into acute and chronic subsets
- Also subdivided into myeloid (primarily granulocytes) or lymphoid
- Acute: represent arrested stages of differentiation
- Chronic: increased production and lack of apoptosis

Significance of adult acute leukemia

- a hematologic urgency
- usually fatal within weeks to months without chemotherapy
- with treatment, high mortality due to disease or treatment-related complications (unlike childhood acute leukemia)
- notify Hematologist promptly if acute leukemia is suspected

Hematopoiesis



Classification of Acue leukemias

	Acute
Myeloid origin	Acute Myeloid Leukemia (AML)
Lymphoid origin	Acute Lymphoblastic Leukemia (ALL)

Classification of acute leukemias

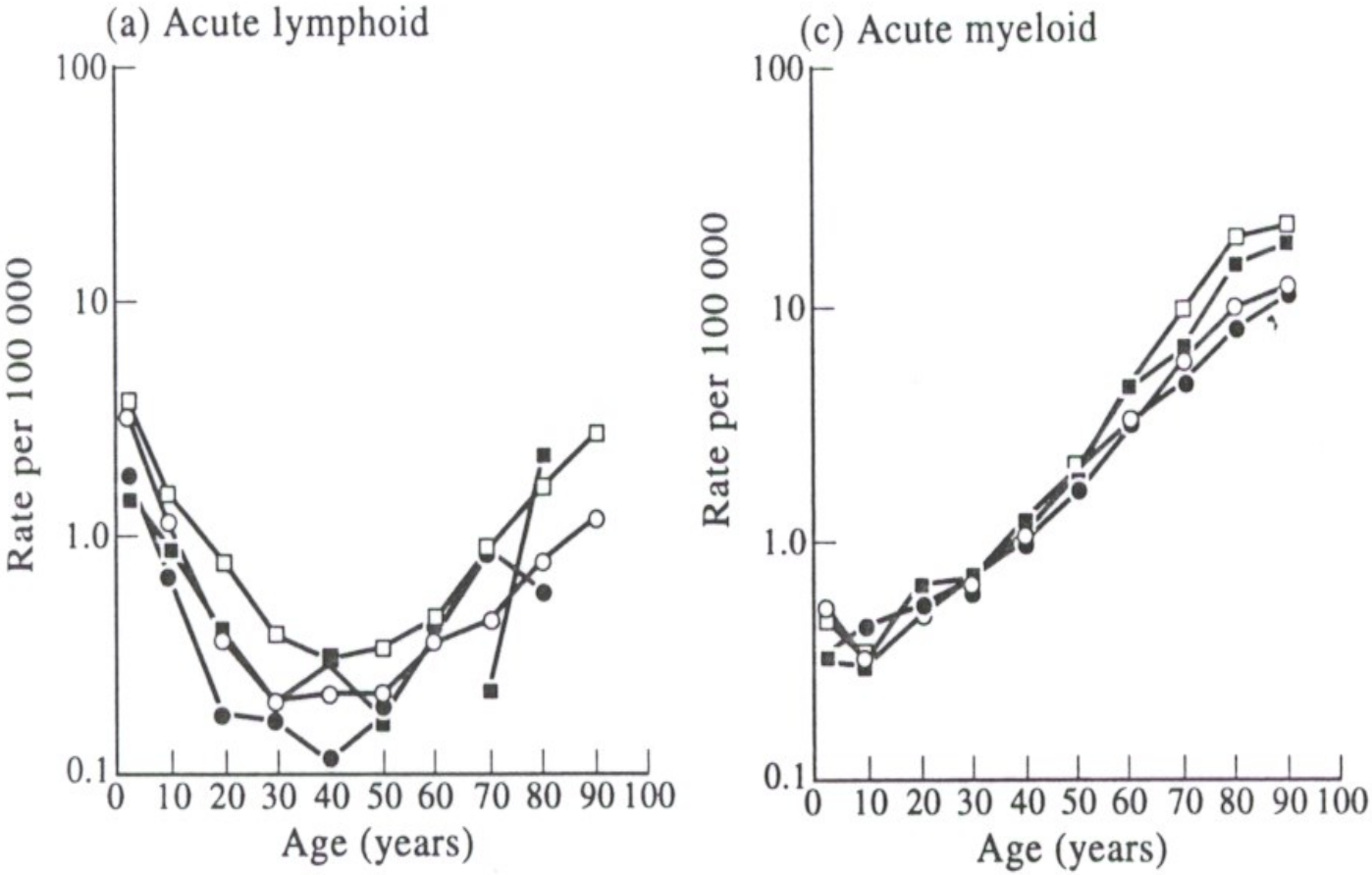
ALL

- mainly children
- M > F
- curable in 70% of children
- curable in minority of adults

AML

- mainly adults
- M > F
- curable in minority of adults

Incidence Acute Leukemias

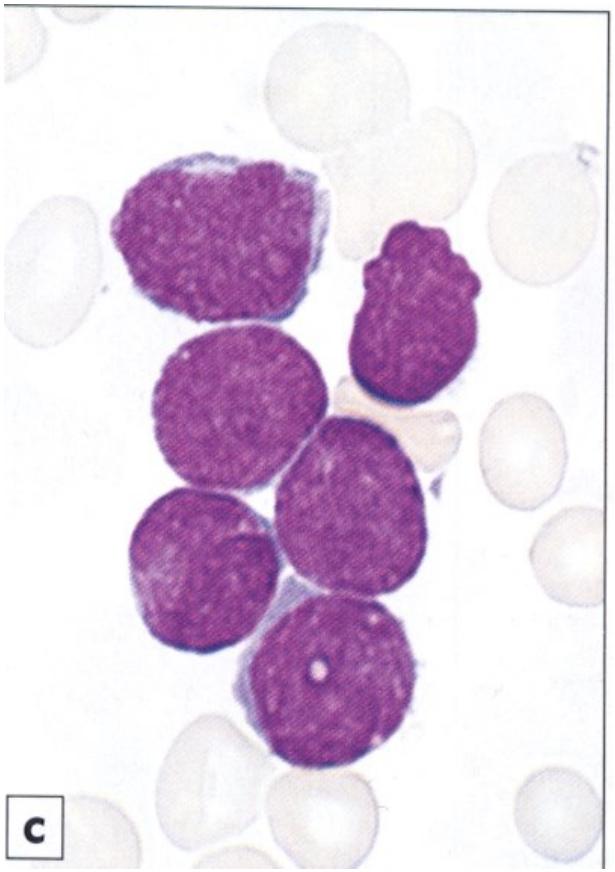


Causes of acute leukemias

- idiopathic (most)
- underlying hematologic disorders
- chemicals, drugs
- ionizing radiation
- viruses (HTLV I)
- hereditary/genetic conditions

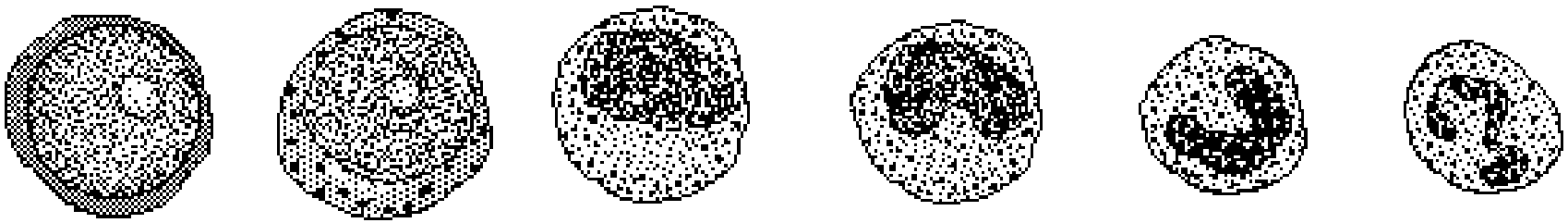
Acute Lymphoblastic Leukemia (ALL)

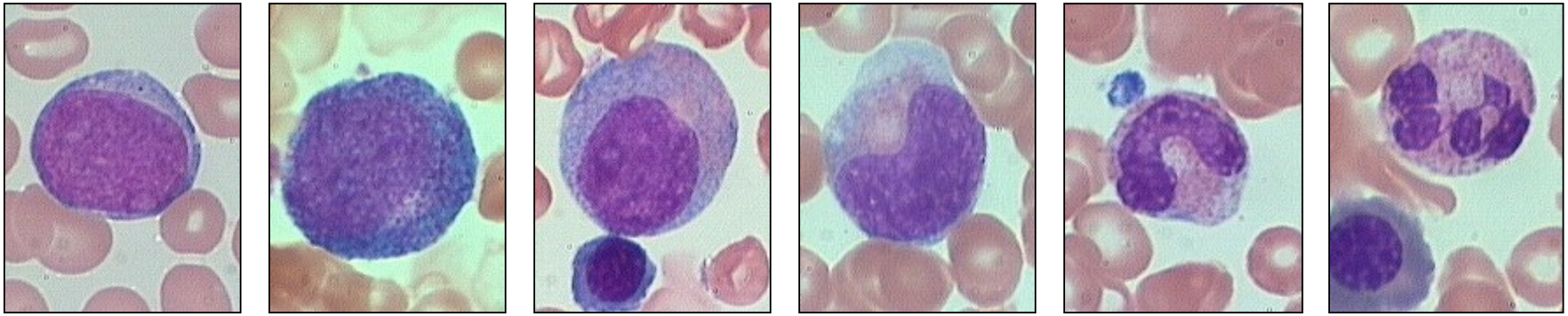
- L1: high nuclear:cytoplasmic ratio; rare nucleoli; 50% adult ALL
- L2: lower nuclear:cytoplasmic ratio; 44% adult ALL
- L3: vacuolated, basophilic cytoplasm; 6% adult ALL



Myeloid maturation

myeloblast promyelocyte myelocyte metamyelocyte band neutrophil





Adapted and modified from U Va website

FAB Classification: AML

- M0: undifferentiated; 2-3% AML
- M1: >3% MPO; 20% AML
- M2: inc gran; Auer rods; 30% AML
- M3: inc promyelocytes; 10% AML
- M4: myelomono; 25% AML
- M5: monoblastic; 5% AML
- M6: erythroleukemia; 4% AML
- M7: megakaryocytic; 1% AML

Clincal manifestations

- symptoms due to:
  - marrow failure
  - tissue infiltration
  - leukostasis
  - constitutional symptoms
  - other (DIC)
- usually short duration of symptoms

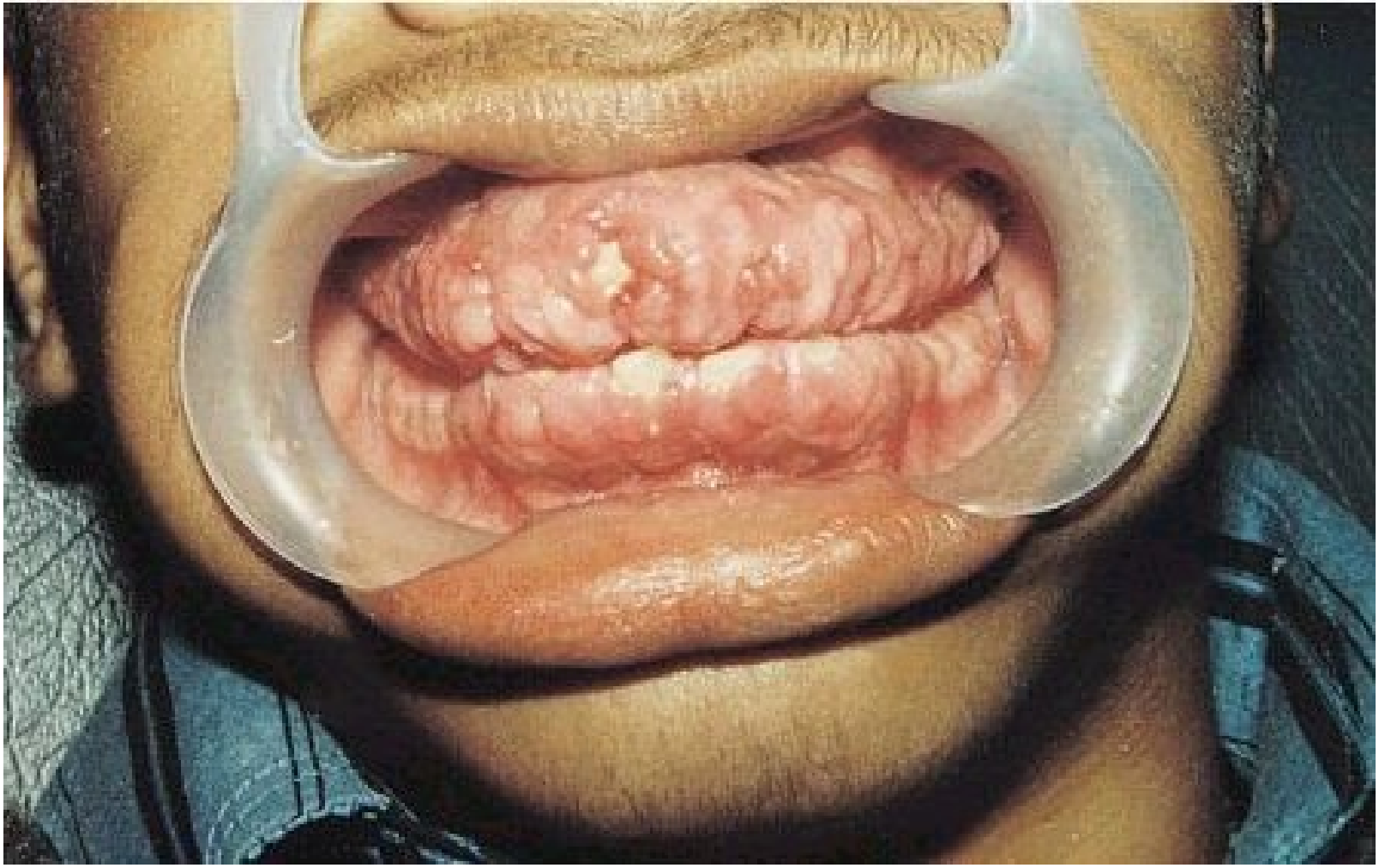
Marrow failure

- neutropenia: infections, sepsis
- anemia: fatigue, pallor
- thrombocytopenia: bleeding

Infiltration of tissues/organs

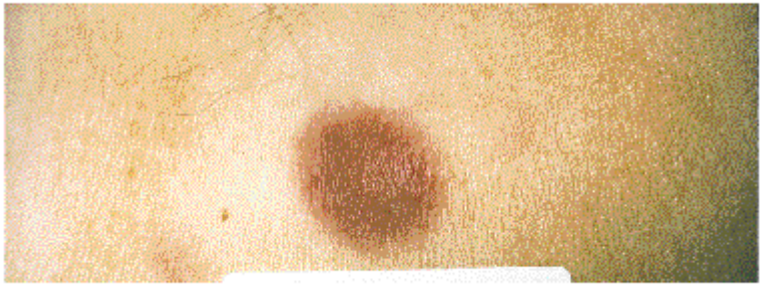
- enlargement of liver, spleen, lymph nodes
- gum hypertrophy
- bone pain
- other organs: CNS, skin, testis, any organ

Gum hypertrophy



Chloromas

A



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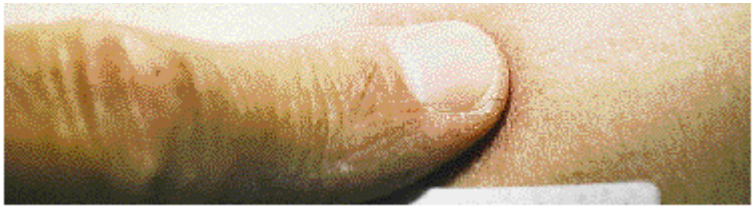

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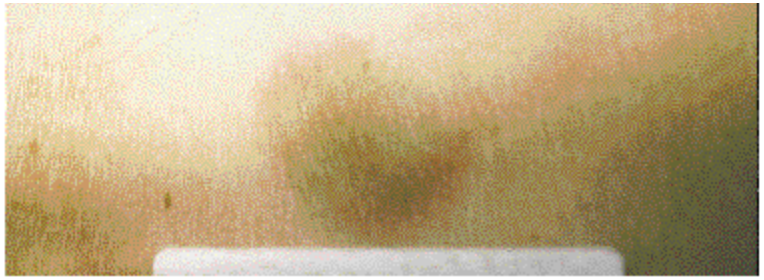


NEJM 1998

Leukostasis

- accumulation of blasts in microcirculation with impaired perfusion
- lungs: hypoxemia, pulmonary infiltrates
- CNS: stroke
- only seen with WBC >> 50 x 10^9/L

Constitutional symptoms

- fever and sweats common
- weight loss less common

Laboratory features

- WBC usually elevated, but can be normal or low
- blasts in peripheral blood
- normocytic anemia
- thrombocytopenia
- DIC

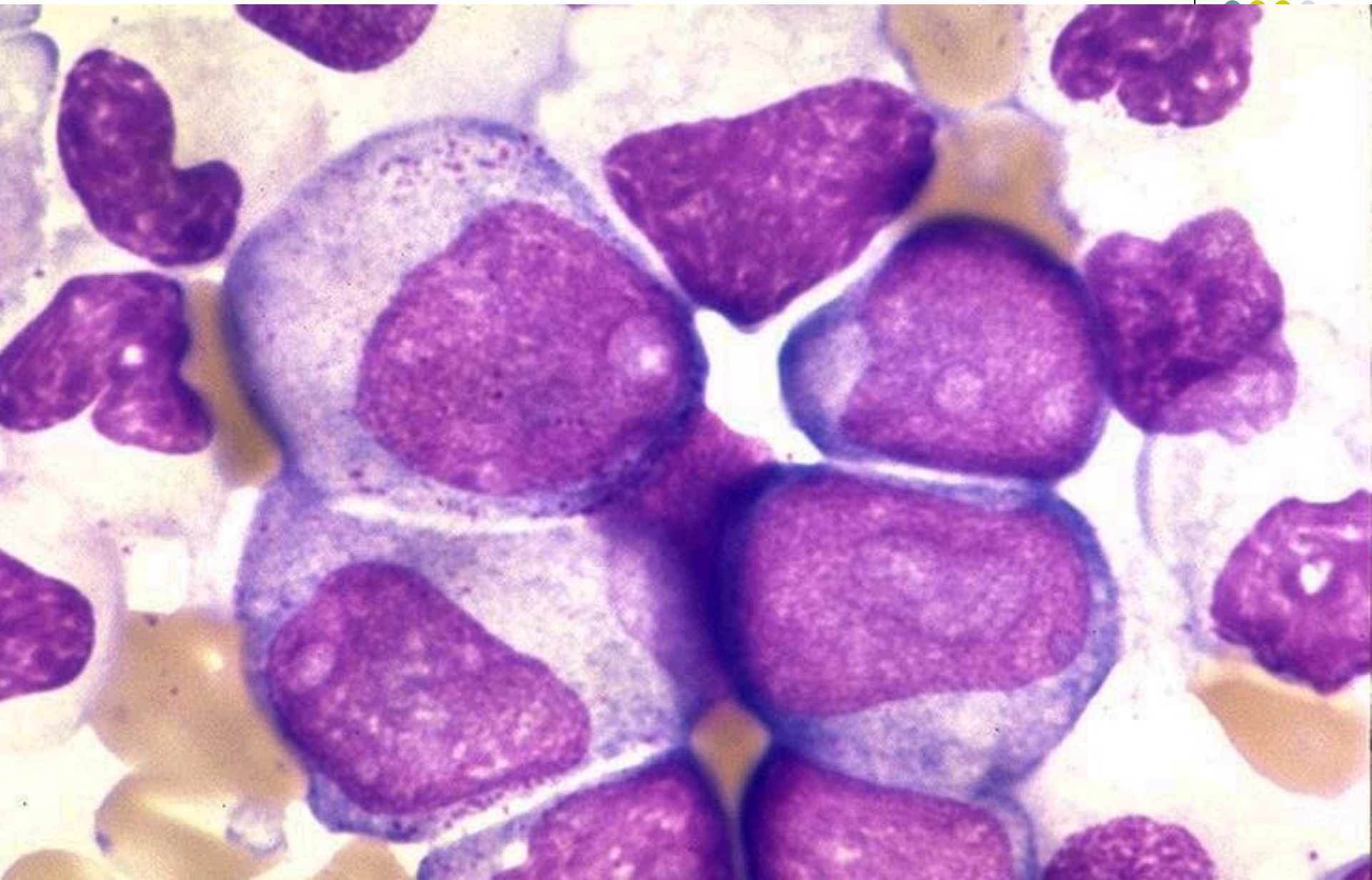
Bone marrow in acute leukemia

- necessary for diagnosis
- useful for determining type
- useful for prognosis
- Acute leukemias are defined by the presence of > 20% blasts in bone marrow (% of nucleated marrow cells)

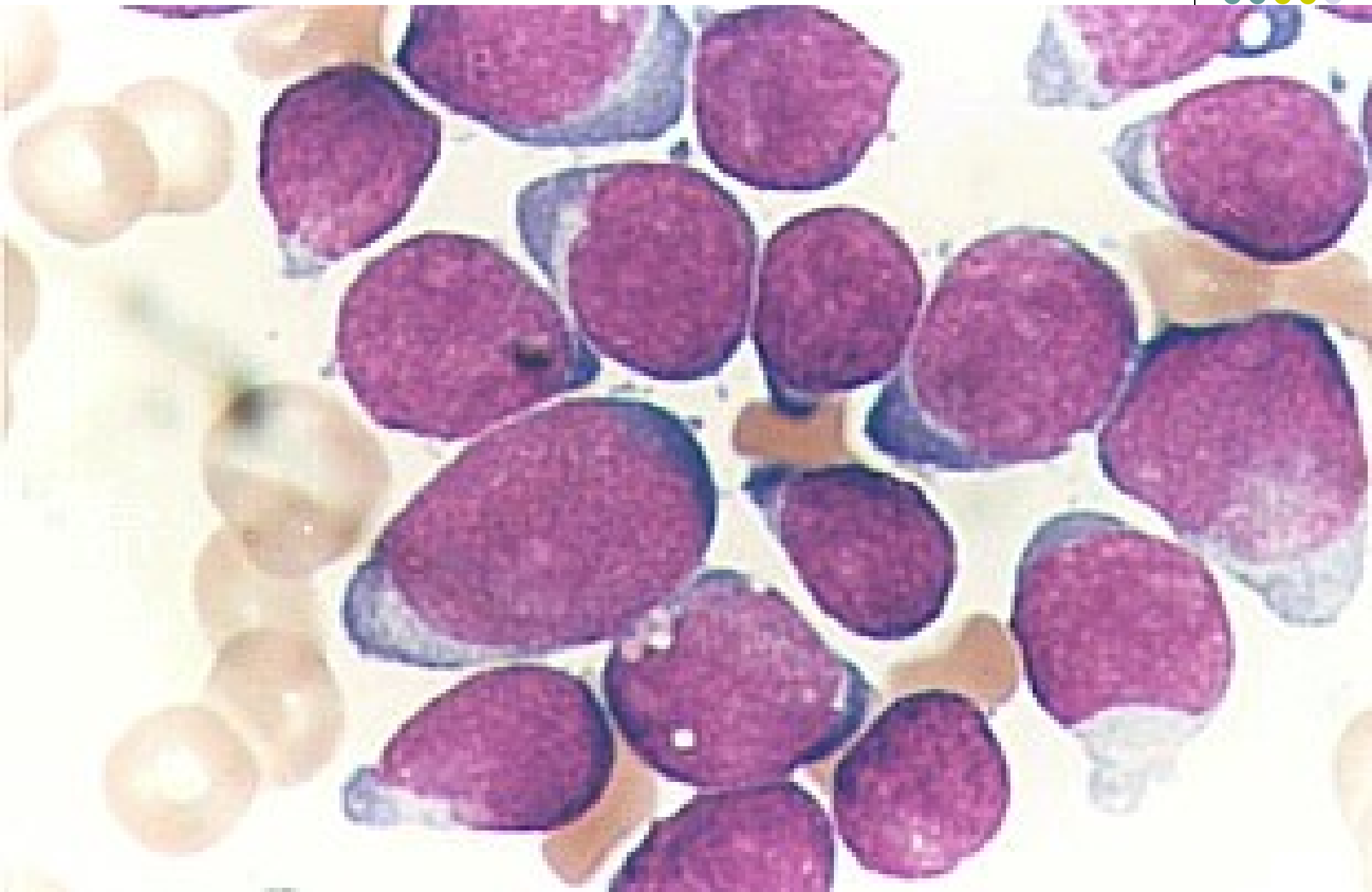
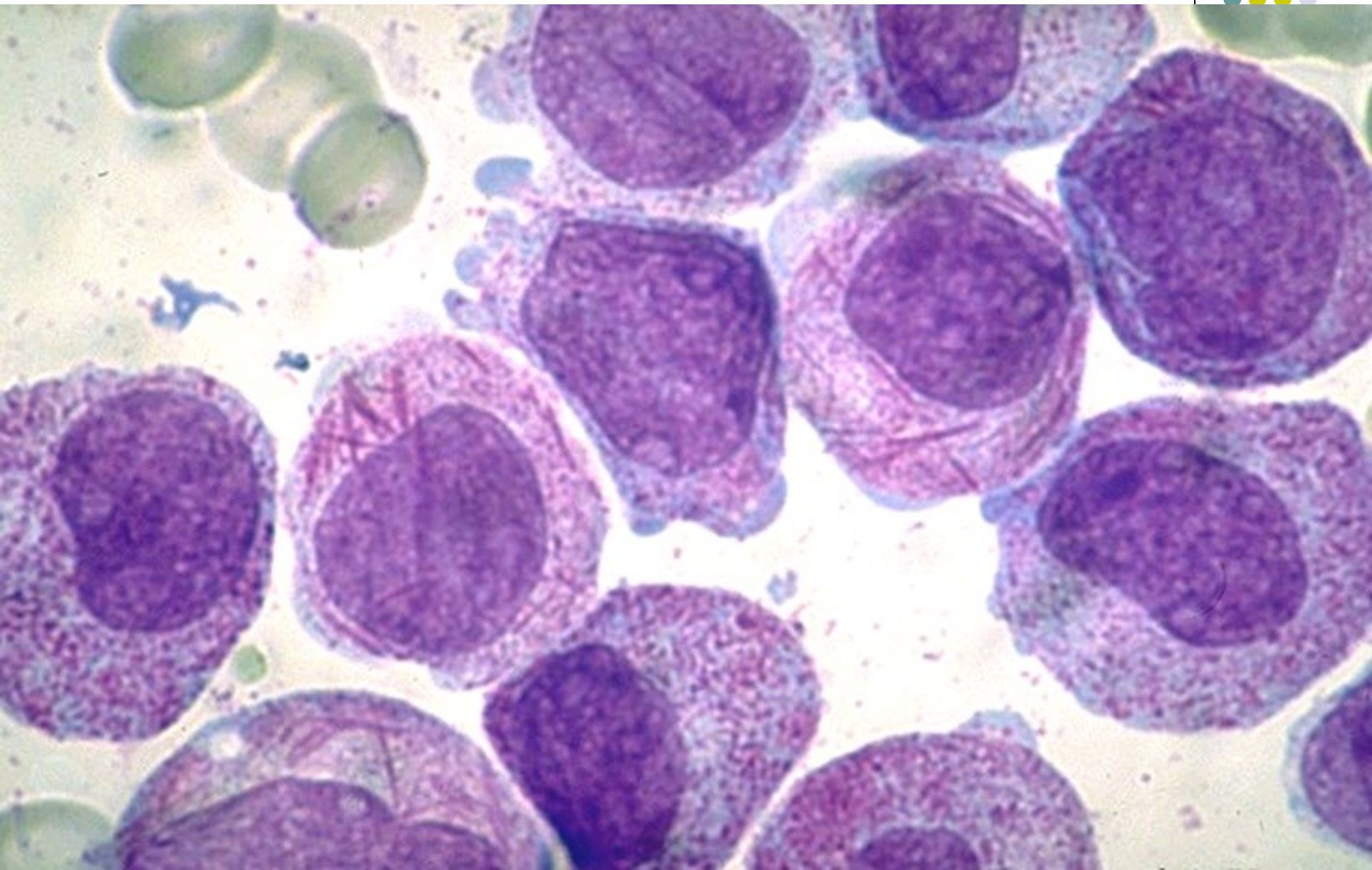
Distinguishing AML from ALL

- light microscopy
  - AML: Auer rods, cytoplasmic granules
  - ALL: no Auer rods or granules.
- special stains (cytochemistry)
- flow cytometry

AML



ALL



Auer rods in AML