ACUTE LEUKEMIAS

ACUTE MYELOGENOUS LEUKEMIA

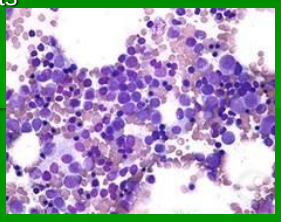
- Malignant neoplastic proliferation and accumulation of immature and nonfuctional hematopoietic cells in the BM
- Defect affects the myeloid stem cells
- The following are used to differentiate into subtypes
  - Cell Morphology
  - Cytochemical
  - Immunological probes for cell markers
  - Cytogenic and Molecular testing

LABORATORY FINDINGS

- Variable
- Blasts on Blood Smears
- Decreased RBC, Plt
- Auer Rods
- Hyperuremia, hypercalcemia

BONE MARROW

- Hypercellular , ↓ fat
- > 30 % Blasts



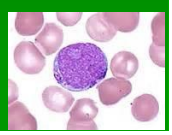
CLASSIFICATION

- FAB Classification = 8 Subtypes M0, M1, M2, M3, M4, M5, M6, M7
- WHO Classification = 5 major AML groups with variants and subtypes

BLAST CLASSIFICATION

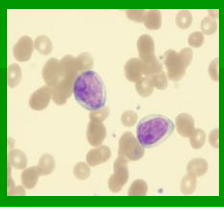
- Type I - typical myeloblasts with lacy open chromatin, nucleoli, deep blue cytoplasma and no granules
- Type II – Same as Type I except for up to 20 discrete azurophilic granules
- Type III – Same as Type I except numerous azurophilic granules





AML-MO Acute Myeloblastic Leukemia

- Myeloblasts without granules
- Negative reactions with Cytochemical Stains
- CD13, CD33, CD 34

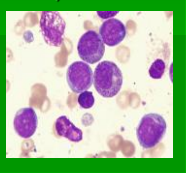


AML-M1 Acute Myeloblastic Leukemia with Minimal Maturation

- Myeloblasts with or without granules
- Positive Sudan Black B, Myeloperoxidase, Chloroacetate
- Trisomy 8(+8), t(9;22), t(6;9)
- ≥ 90% myeloblasts

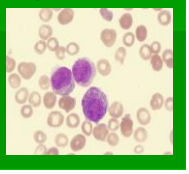
AML-M2 Acute Myeloblastic Leukemia with Maturation

- Myeloblasts with granules, promeyelocytes, few myelocytes
- Auer Rods and Phi bodies
- Pos Peroxidase, Sudan Black B, & Choloacetate Esterase
- t(8;21)



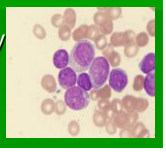
AML-M3 Acute Promyelocytic Leukemia

- Promyelocytes with prominent granules
- Faggot cells, Auer rods
- Pos Peroxidase, Sudan Black B, Chloroacetate Esterase, Nonspecific Esterase
- t(15;17)



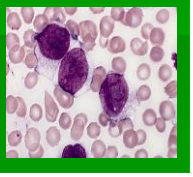
AML-M4 Acute Myelomonoblastic Leukemia

- Myeloblasts & promyelocytes >20% marrow cells; Promonocytes & monoblasts >20 %
- Pseudo-Pelger-Huet nuclei
- Pos Peroxidase, Sudan Black B, Chloroacetate Esterase, nonspecific esterase
- Serum and urinary lysozyme
- Increased monocytes peripherally



AML-M5a Acute Monoblastic Leukemia without differentiation

- Lg Monoblasts with lacy nuclear chromatin and abundant cytoplasm
- Pos Nonspecific Esterase
- Increase in serum & urine muramidase
- > 80% monoblasts

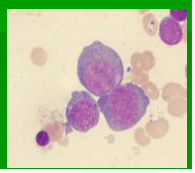


AML-5b Acute Monoblastic Leukemia with differentiation

- Monoblasts, promonocytes, monocytes
- Pos Nonspecific Esterase, Alpha-naphthyl esterase
- Monocytosis

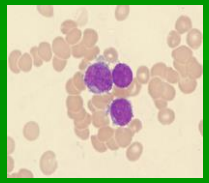
AML-M6 Acute Erythroleukemia

- Megaloblastic erythroid precursors > 50%
- Pos Myeloperoxidase, Sudan Black B, Alpha-naphthyl Acetate Esterase
- PAS diffuse positivity
- Immunophenotype CD71
- Glycophorin A Positive



AML-M7 Megakaryocytic Leukemia

- Megakaryoblasts, “lymphoid” morphology, cytoplasmic budding
- Pos Nonspecific Esterase, Chloroacetate Esterase
- Plt peroxidase positive
- CD41, CD61



THERAPY

- Chemotherapy to reduce tumor load
- BM transplants
- Research – monoclonal antibodies, gene therapy, destruction of cellular matrix that supports the neoplastic tissue

ACUTE LYMPHOBLASTIC LEUKEMIA

- 2-5 yr old – insidious
- Adult - Abrupt

ALL PERIFERAL BLOOD

- Variable Leukocyte count, neutropenia
- Immature Lymphoid cells
- Normocytic, normochromic anemia

ALL BONE MARROW

- Hypercellular
- >30% Lymphoblasts (FAB), > 20% Lymphoblasts (WHO)

WHO CLASSIFICATION OF AML AML with certain genetic abnormalities

- AML with a translocation between chromosomes 8 and 21
- AML with a translocation or inversion in chromosome 16
- AML with changes in chromosome 11
- APL (M3), which usually has translocation between chromosomes 15 and 17

WHO AML with multilineage dysplasia

- (more than one abnormal myeloid cell type is involved)

WHO

- AML related to previous chemotherapy or radiation

WHO AML not otherwise specified

- Undifferentiated AML (M0)
- AML with minimal maturation (M1)
- AML with maturation (M2)
- Acute myelomonocytic leukemia (M4)
- Acute monocytic leukemia (M5)
- Acute erythroid leukemia (M6)
- Acute megakaryoblastic leukemia (M7)
- Acute basophilic leukemia
- Acute panmyelosis with fibrosis
- Myeloid sarcoma (also known as granulocytic sarcoma or chloroma)

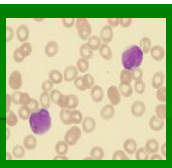
WHO Undifferentiated or biphenotypic acute leukemias

- (leukemias that have both lymphocytic and myeloid features). Sometimes called ALL with myeloid markers, AML with lymphoid markers, or mixed lineage leukemias.

ALL- L1

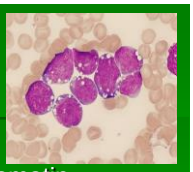
- Small Cell
- Fine or Clumped chromatin, but homogenous
- Regular nucleus shape, occ clefting or indentation
- None or small nucleoli
- Scant cytoplasma, slight or mod basophilia, variable vacuolation

ALL-L2



- Large heterogeneous Cell
- Variable- heterogeneous
- Irregular nucleus shape, clefting or indentation
- One or more large and prominent nucleoli
- Variable cytoplasma, Variable basophilia, variable vacuolation

ALL -L3



- Large Cell
- Fine and homogenous chromatin
- Regular nucleus shape, round or oval
- One or more large and prominent nucleoli
- Moderately Abundant cytoplasma, Very deep basophilia, prominent vacuolation

IMMUNOLOGICAL CLASSIFICATION OF ALL

- T cell ALL – Most L1
- B cell ALL – L3

TERMINAL DEOXYNUCLEOTIDYL TRANSFERASE (TDT)

- DNA polymerase
- Found in early lymphocytes

CYTOGENETIC ANALYSIS OF ALL

- Abnormal karyotypes in 75% of the cases – more common in B cell
- 10-15% of children with ALL have Philadelphia chromosome
- L3 – t(8;14)

OTHER ALL

- Acute Leukemia with Lineage Heterogeneity
- Unclassified ALL (U-ALL)
- Acute Undifferentiated Leukemia (AUL)
- Myeloid/Natural Killer Cell Acute Leukemia

THERAPY

- Chemotherapy
- Radiation
- Bone Marrow and Stem Cell Transplants