

Acute Leukemias

Key:

morphology
+ blood counts
clinical findings
pathophys. +
underlying cause

≥ 20% blasts
pancytopenia
↑ WBC
blood chem. abn.
bone pain

dx:

- CBC w/ diff.
- bone marrow bx
- flow cytometry
- cytogenetic + molecular analysis

Lymphoid - ALL

B-lymphoblastic leukemia OR T-lymphoblastic leukemia

commonest childhood cancer

M > F

rapid onset: bone pain, CNS, testes

flow cytometry

precursor B-cell
85%

good prognosis:

- hyperdiploidy
- age 2-10, ↑ WBC
- t(12;21)-TEL/AML1

poor prognosis:

- hypodiploidy
- age <1 or >10, ↑ WBC
- t(9;22)-BCR/ABL
- t(4;11)-AF4/MLL
- MLL-11q23

precursor T-cell
15%

mediastinal, M > F

Myeloid - AML

Auer rods, flow cytometry, enzyme stains

Recurrent Genetic Abnormalities

- t(8;21)-core binding factor
good prognosis
- inv(16) or t(16;16)-
core binding factor
abn. marrow EOS.
good prognosis
- t(15;17)-PML/RARα
defective retinoic acid receptor
bilobed promyelocyte
tx w/ ATRA → good prognosis DIC
- 11q23 abn. - histone protein
poor prognosis

Myeloid Sarcoma (extramedullary AML)

AML-NOS

- AML - minimally differentiated
- AML w/out maturation (<10% maturing)
- AML w/ maturation (>10% maturation)
- Acute myelomonocytic leukemia
- Acute monoblastic/monocytic leukemia
- Acute erythroid leukemia
- Acute megakaryoblastic leukemia

Myelodysplasia-related

morphologic dysplasia
hx of prior MDS
w/ MDS type CG abn.

Therapy-related

chromosome 5,7 loss → alkylating agent related
11q23 rearrangement → topoisomerase related
poor prognosis

Normal karyotype AML:

- FLT-3 dup. - bad prognosis
- NPM1 mut. - good prognosis
- CEBPA mut. - good prognosis

Chronic Leukemias

Key:
morphology
+ blood counts
clinical findings
pathophys. +
underlying cause

Myeloid

wbc, rbc, plt

splenomegaly
cell proliferation + maturation
marrow hypercellularity
↑ CBC
tyrosine kinase driven (BCR-ABL, JAK2)
may progress to fibrosis

Lymphoid

CLL/SLL

M > F, > 50 y.o.
indolent, may be asymptomatic
splenomegaly
p53 del. → bad prognosis
cytopenia, "soccer ball" chromatin
immune dysfn → (+) Coombs 15%
hypogammaglobulinemia 50%

Hairy Cell

M > F > 40 y.o.
splenomegaly
BRAF mut. common
pancytopenia
"fried egg" appearance

Essential Thrombocythemia

indolent
thrombotic + hemorrhagic episodes
exclude PV, CML, MDS, reactive thrombocytosis
↑ plt, ↑ enlarged mature megakaryocytes
JAK2 mut. ~ 50%

Polycythemia Vera

HSM, hyperviscosity
thromboses/infarcts
headache, dizziness
JAK-2 mut. > 95%
↑ red cell mass
↑ Hg, Hct ↓ EPO
exclude 2° + relative

Chronic Idiopathic Myelofibrosis

adults
Sx from marrow failure
JAK2 mut. ~ 50%
related to growth factors released
by abnormal megakaryocytes
anemia w/ teardrop cells
leukoerythroblastosis
(immature rbc/wbc)

Chronic Myeloid Leukemia

age 26-60
↑ immature WBC
4-5% blasts
eosinophilia, basophilia
+ (9;22): BCR-ABL
Ph chromosome
* doesn't block maturation
untreated → ↑ blasts
myeloid OR lymphoid crisis

Myelodysplastic Syndrome

adults > 50, may occur after chemo, may progress → AML
exclude vit. def., reversible cause
clonal stem cell disorder w/ ineffective hematopoiesis,
dyspoiesis, < 20% blasts
hypercellular marrow, pancytopenia
infxns, anemia, bleeding
many causes, therapy-related has worst prognosis

Leukocytosis

Neutrophilia

infxn, steroids, epi., inflammation

Lymphocytosis

virus

Leukemoid reaction

↑ WBC w/ immature granulocytes
infxn, toxic changes

Leukoerythroblastic reaction

immature grains + nucleated rbc's, teardrops
marrow-replacing processes

Eosinophilia

parasites, allergy, drug rxn, lymphoma, MPN

Basophilia

MPN, renal failure

Monocytosis

chronic infxn (TB, IBD, collagen
vascular dz)

Leukopenia

Neutropenia

drug effects
accelerated removal

Lymphopenia

less common
Hodgkin lymphoma
immunodeficiency