Ranheim's AML Boardorama

Genetics	Prognosis	Differentiation	Phenotype	Other Hints
t(8;21) [Runx1]	Good	Granulocytic	Myeloid plus CD19, cCD79a, PAX5	Auer rods and large, salmon-pink granules common
inv(16;16) [CBFB-MYH11]	Good	Myelomonocytic	Often two populations of myeloid and mono	Numerous eos w/ basophilic granules
t(15;17) [PML-RARa]	Very good (if survive initial coagulopathy); treated with ATRA / arsenic compunds	Promyelocytic	Low absent CD34, DR; high MPO	Numerous Auer rods and prominent granules; in microgranular variant hard to see but have bi-lobed nuclei
t(1;22) [RBM15-MLK1]	Medium-good w/ intense chemo	Megakaryocytic	CD61	Assoc. w/ Downs, usually very young kids, may have lower blast count, fibrosis
Chromosome 5, 7 or complex	Poor	Granulocytic with dysplasia	Myeloid	Assoc. w/ hx of MDS or concurrent dx., therapy related w/ 7+ year lag
11q23 abnl [MLL]	Poor	Often monocytic/ monoblastic	CD64, CD4, CD13hi, CD33low	"Congenital" leukemia, adults 2-5 yrs. following etoposide chemo
t(6;9) [DEK-NUP214]	Poor	Granulocytic	Typical myeloid markers, 50% with TdT	Dysplasia and basophilia (>2%), younger adults, maybe <20% blasts
CEBPA mutations	Improved if no FLT3 if homozygous			Assoc. w/ normal cytogenetics
NPM1 mutations	Improved if no FLT3			Assoc. w/ normal cytogenetics
FLT3-ITD or TK domain mutations	Worse			Assoc. w/ normal cytogenetics
KIT mutations	Worse than others in same category			Assoc. w/ t(8;21) and inv(16)

AML Classifications

WHO	FAB	Frequency	Definition	Other
AML with minimal differentiation	M0	<5%	Little no evidence of differentiation except by flow, >20% blasts	
AML without maturation	M1	5-10%	>3% MPO+ cells, usually >90% immature blasts	
AML with maturation	M2	10%	>20% blasts, >10% maturing neutrophil lineage cells and <20% monocytic cells	
AML with t(8;21)	M2	5%	t(8;21)	Better outcomes
AML with t(6;9)	M1-2, M4	1%	DEK-NUP214	Basophilia, dysplasia
Acute promyelocytic leukemia with t(15;17)	M3	5-8%	RARA translocation	Good outcome; coagulopathy
Acute myelomonocytic leukemia	M4	5-10%	>20% blasts (including promonocytes) and >20% monocytic differentiation	Tendency to go to extramedullary tissues like skin, gums
AML with inv 16	M4	5-8%	CBFP-MYH11	Atypical eos, younger pts.; better outcomes
AML with t(9;11)	Usually M4-5	10% peds, 2% adult	MLLT3-MLL	Intermediate (better than other 11q23)
Acute monoblastic leukemia	M5a	<5%	>20% blasts, >80% monoblastic	Typically uniform round cells w/ immature mono markers CD64+
Acute monocytic leukemia	M5b	<5%	As above but with monocytic maturation	Typically folded, reniform nuclei, some CD14+; tendency to occur in skin/gums
Erythroleukemia (erythroid/myeloid)	M6a	Rare	>50% erythroid, >20% of non-erythroid cells myeloblasts	Careful of B12 deficiency
Pure erythroid leukemia	M6b	Rare	>80% erythroid cells	CD71 high
Acute megakaryoblastic leukemia	M7	Rare	>20% blasts of which >50% are mega lineage	Excludes t(1;22), inv 3, t(3;3) or Downs-related (they have separate dx); marrow fibrosis common
AML with myelodysplasia-related changes (and Therapy-related)	Any	25-35%	>20% blasts, MDS hx, MDS cytogenetics, or dysplasia in 2 lineages >50% of cells; for Therapy related, obviously need therapy	Assoc. w/ chrom 5, 7, 13q, 11q, etc abnormalities

Ranheim's ALL Boardorama

WHO	Definition	Epidemiology	Phenotype	Other Hints
B lymphoblastic Leukemia/lymphoma	Proliferation of immature clonal B cells; typically >20% blasts	Common in kids	CD19, 10, 22, 79a+, 20 variable, 34 +/-, sIg neg	CD13 or 33 may be positive; doesn't matter
B lymphoblastic leukemia/lymphoma with t(9;22)	BCR-ABL translocation, usually	25% adult ALL, 2% peds	Usual, CD13/33 more likely	Bad outcomes
B lymphoblastic leukemia/lymphoma with t(v;11q23) [MLL]	MLL rearrangement	Most common in <1 y.o. group, very high WBC, CNS involvement	Usual but CD10-; can be CD15+	Bad outcomes
B lymphoblastic leukemia/lymphoma with t(12;21)	TEL-AML1 (ETV6-RUNX1)	25% of peds B-ALL	Usual, CD34+ CD20-, often CD13+	>90% cure rate
B lymphoblastic leukemia/lymphoma with hyperdiploidy	>50 chromosomes, often 21, X, 14, 4 , 10, 17, duplicated	25% of peds B-ALL	CD34+ and often CD45 neg	Good outcome especially with trisomy 4, 10, 17
B lymphoblastic leukemia/lymphoma with hypodiploidy	<45 chromosomes, can be near haploid in kids	1-5%	Usual	Bad outcomes
B lymphoblastic leukemia/lymphoma with t(5;14)	IL3-IgH translocation	Rare, associated with reactive increase in eos	Usual	Even small numbers of B blasts in eosinophilia should suggest this dx
B lymphoblastic leukemia/lymphoma with t(1;19)	E2A-PBX1 translocation	6% of B-ALL in kids	Usual	Intermediate outcome
T lymphoblastic leukemia/lymphoma	Proliferation of marrow or LN immature T precursors	15% of peds ALL, 25% of adult, esp. adolescent-20s males	CD2,cCD3,CD7+ Early T Precursor (ETP) poor outcomes, 34+,4-8-, 13 or 33+ often, 5 weak Cortical 34-DR-4+8+ Medullary 4 or 8+	Assoc. w/ normal cytogenetics
8p11.2 syndromes	FGFR1 translocations	Eosinophilia, myeloid hyperplasia/AML and T-ALL in some order		