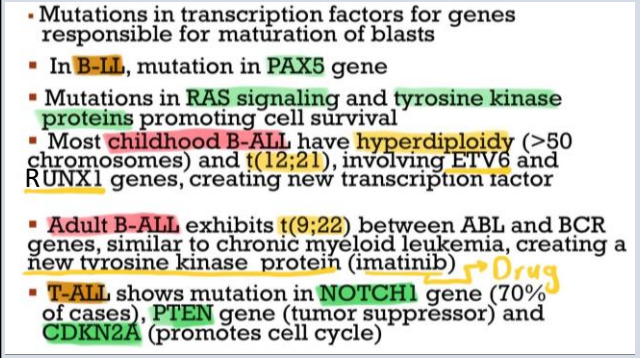
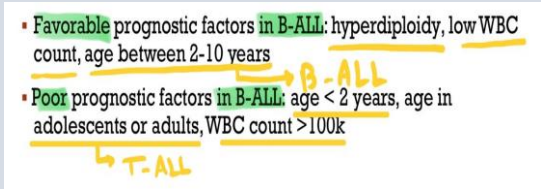
Disorder	Infected cell	mutation	prognosis	treatment
Acute myeloid leukemias (AML)	Myeloblasts (CD- 13,33,34 MPO)	1) Transcription factors 2) Tyrosine kinase pathway (RAS) 3) Epigenic mutation : isocitrate dehydrogenase (IDH) * Mutation is arrested at myeloblast stage.	1) Poor , <30% responds to chemotherapy 2) Worse than ALL 3) P53 mutation : worse outcome	IDH inhibitors
Acute promyeloid leukemias (APL) (AML-M3)	Promyelocytes (-ve for CD -34)	t(15:17) = inhibits the action of retinoic acid (Vit A) = blocks promyelocyte maturation. • Maturation is arrested at promyelocyte stage. • PML gene on Ch15. • α retinoic acid receptor (RARA) on Ch 17.	1) Overrelease of tissue factor, causing DIC 2) Bleeding	ATRA (Vit A analogue) , effect is synergistic with arsenic trioxide.
Langerhans cell histocytosis (LCH)	Langerhans cells (CD- 1a and langerin)	Acquired mutation in serine/ threonine kinase (BRAF) >function mutation = hyperactive	1) Multisystemic : extensive BM infiltration = pancytopenia 2) Unisystemic : a) Unifocal : Asymptomatic , sometimes painful, b) Multifocal : Hand-schuller-Christian triad > DI, exophthalmos.	1) Multisystemic : chemotherapy. 2a) Unifocal : surgical excision 2b) Multifocal : chemotherapy, sometimes spontaneous regression.

Disorder	Infected cell	mutation	prognosis	Treatment
Precursor B&T cells neoplasms = acute lymphoblastic lymphoma (ALL)	B lymphoblasts (more in children) T lymphoblasts (more in adolescents) *both express CD34 & TdT		Aggressive neoplasm 	T(9,22)B-ALL > imatinib (TK inhibitor)
Hemophagocytic lymphohistocytosis (HLH)	CD8+ T cell and NK	Defective genes related to the function on cytotoxic T cells and NK -> engaged with their target (virus-infected cell) for long time-> Excess IFN γ -> activates macrophages -> release TNF and IL 6 -> systemic inflammatory response syndrome (SIRS)		
HLH- type one (Infant & young children)	CD8+ T cell and NK	Homozygous defects in PRF-1 gene that encodes perforin.		

Disorder	Infected cell	mutation	prognosis	Treatment
HLH- type two (adolescents & adults)	CD8+ T cell and NK	X-linked lymphoproliferative disorder in which the trigger is EBV infection.	Defects in signaling lymphocyte activation molecule (SLAM-associated protein). Inefficient killing of EBV-infected B lymphocytes.	
Associated with systemic inflammatory disorders (e.g. rheumatologic disease)	CD8+ T cell and NK	Heterozygous genetic defects in genes required for cytotoxic T cell.		
T cell lymphomas	CD8+ T cell and NK	Malignant T-cells produce aberrant cytokines	Leading to dysregulation of normal T-cytotoxic	
Thrombotic Thrombocytopenic Purpura (TTP)		Deficiency in metalloproteinase ADAMTS-13	Normally, cleaves large multimer vWF molecule preventing thrombosis.	
Von Willbrand Disease		Autosomal Dominant	Most common inherited bleeding disorder. Normal count of platelets but dysfunction. *in Homozygous disease, severe F VIII deficiency resemble hemophilia A.	

Disorder	Infected cell	mutation	prognosis	Treatment
Hemophilia A		X-linked disease. Deficiency in F VIII	Most common cause of inherited serious bleeding. Prolonged PPT.	
Hemophilia B		F IX deficiency	Less common	
Diffuse Large B Cell Lymphoma (DLBCL)	B cells CD20	1) 2/3 activating mutation of Bcl6 promoter gene. 2) 30% t(14:18) , (IgH:Bcl2) results in overexpression of Bcl2-> prolonged survival. 3) Few mutations in MYC gene.	High grade , rapidly growing.	
Follicular Lymphoma	B cells CD20, Bcl2, Bcl6.	1) t(14:18) , (IgH:Bcl2) results in overexpression of Bcl2-> prolonged survival. 2) 1/3 Mutations in histone-modifying proteins (Epigenetic change)	Follicles contains a) Centrocytes -> small, cleaved lymphocytes -> predominance -> Low grade. b) Centroblasts -> Large -> increased with time -> High grade.	Ineffective with conventional chemotherapy.

Disorder	Infected cell	mutation	prognosis	Treatment
Burkitt lymphoma	B cells CD20, Bcl6.	1) t(8:14) ;(MYC: IgH) -> overexpression of MYV transcriptional factor which is potent regulator of Warburg metabolism (aerobic glycolysis)	Aggressive, monomorphic, lipid vacuoles in cytoplasm -> Tingible body macrophage	Responsive to chemotherapy.
Hairy cell leukemia	B cells	Mutation in serine / threonine kinase BRAF gene	Pancytopenia -> inhibits hematopoiesis.	Very sensitive to chemotherapy
SLL & CLL	B cells In CLL-> CD20,Bcl2, CD5.	1) Deletion in genes encoding microRNA -> Increases Bcl2 expression. 2) Autonomously activated BCR -> activates Burton tyrosine kinase-> promoting cell survival 3) RARE translocation mutation. *P53 mutation and Richter transformation -> worse prognosis.	In SLL, there are proliferation centers containing large number of prolymphocytes. In CLL, smudge cells appear. Many pts are asymptomatic.	

Disorder	Infected cell	mutation	prognosis	Treatment
Mantle cell lymphoma	Naïve B cells in mantle zone.	t(11:14) ; (cyclin D1 gene fuses with IgH -> overexpression of cyclin D1 -> progression of cell cycle.	Contains small centrocytes.	
Multiple myeloma / plasma cell myeloma	Plasma cells	1) t(11:14) ; (cyclin D1 and cyclin D3 gene:IgH -> overexpression of cyclin D1 -> progression of cell cycle. 2) MYC gene mutation in late disease.	Activates NF-kB ligand (RANKL) -> activates osteoclasts -> bone resorption -> hypercalcemia -> kidney stone -> renal failure. CRAB, amyloidosis, rouleax formation. In advanced stages : pancytopenia, plasma cell leukemia and visceral damage.	Landlidomide : inhibits oncogenic proteins. Proteasome inhibitors.
Chronic myeloid leukemia CML	All BM cells	Harbor t(9;22) (Philadelphia chromosome) results in fusion of Bcr/Abl genes -> production of a tyrosine kinase that results in prolonged cell survival	Leukocytosis >100k	Imatinib: tyrosine kinase inhibitors. *Accelerated phase is resistant to imatinib.

Disorder	Infected cell	mutation	prognosis	Treatment
Essential thromboctthemia		JAK2 mutaion	Good outcome , no BM fibrosis. Splenomegaly.	
Primary myelofibrosis (PMF)		JAK-STAT pathway is active in all cases due to: 1) 50% JAK2 mutation 2) 5% in MPL gene (thrombopoietin receptor) 3) 50% in CALR gene -> calreticulin -> activates MPL	RBCs appear as tear drop cell. Megakaryocytes secrete PDGF and TGF β -> BM fibrosis and angiogenesis. Clusters of abnormal megakaryocytes with large and hyperchromatic nuclei (cloud like).	JAK2 inhibitors -> decrease splenomegaly and symptoms
Myelodysplastic syndrome		1) Chromosomal aberration in 50% of cases 2) mutations in epigenetic factors that regulate DNA methylation and histone modifications 3) mutations in RNA splicing factors: abnormal RNA processing-> ring sideroblasts 4) mutations in transcription factors 5) 10% have P53 mutation	Refractory anemia Iron accumulation (ring sideroblasts) Hyposegmented nuclei of PMNs Hypolobated nuclei of megakaryocytes	