Myeloid stem cell disorder	**Definition & diagnosis**	**Etiology**	**Presentation**	**Therapy**
Aplastic anemia (AA)	Peripheral blood *pancytopenia* w/ *marrow hypocellularity* No clonal cytogenetic abnormality (hypocell acute leukemia, MDS) Marrow biopsy w/ aspirate necessary for diagnosis	Radiation, chemo, benzene, drugs (sulfa, NSAID), viruses (EBV), pregnancy, immune-mediated diseases (transfusion GVHD), PNH, inherited (fanconi's anemia) Maybe autoimmune (neo-ag)	Marrow failure, chronic anemia, thrombocytopenic hemorrhage, infections Inherited: café au lait spots, short stature, thumb abnormalities, renal malformations (fanconi's anemia) No adenopathy or splenomegaly	Supportive: abx prophylaxis Allo HSCT Immuno-suppression: ATG, ALG, steroids, cyclosporine Androgens (erythropoiesis), G-CSF, GM-CSF
Myelodysplastic syndrome (MDS)	Peripheral blood *cytopenias* w/ marrow cell dysplasia *Hypercellular marrow* (ineffective hematopoiesis) Smear: aniso, poikilo, macro, teardrop Marrow: *auer rods*, hypo & hyperseg pmn, megaloblastic, accelerated apoptosis FAB, IPSS classification	Benzene, chemo, radiation, AA, AML, auto HSCT for NHL (treatment-related MDS) Cytogenetic defect (30-70%) Younger patients often w/ familiar hematologic disorder or congenital defect in DNA repair (fanconi's anemia)	Singular cytopenias, bicytonemia or pancytopenia Adenopathy, splenomegaly more common than AA Most succumb to neutropenic infections or thrombocytopenic hemorrhages Incident increases w/ age May progress to AML	Allo HSCT only cure GM-CSF, G-CSF, Epo Immunosuppressive regimens, chemo (like AML)
Chronic myelogenous leukemia (CML)	Clonal stem cell disorder of all myeloid elements (B cells variably, T cells rarely) Smear: leukocytosis, thrombocytopenia (10%) or thrombocytosis (50%), normal granulocytes & RBC, left shift, basophilia Marrow: hypercellular w/ 20:1 myeloid-erythroid ratio, megakaryocytic hyperplasia *Low LAP*	*Philadelphia chrom* t(9;22) w/ enhanced TK activity, radiation	Half asymptomatic, fatigue, weight loss, ab fullness or pain, easy bruising or bleeding, hepatosplenomegaly *Blast crisis* (>30% blasts in blood or marrow, 2/3 myeloid & 1/3 lymphoid): fever, sweats, weight loss, bone pain Slightly more common in men, peaks 40-60 yrs May progress to AML or ALL	Chronic phase: observation, splenectomy, pheresis, chemo (bisulfan, hydroxyurea), *interferon-alpha* (may delay blast crisis), allo HSCT (GVLE) only cure, STI571 (inhibits TK) Accelerated, blast crisis: myeloid crisis resistant to AML therapy, lymphoid crisis better response to ALL therapy
Chronic lymphocytic leukemia (ALL)	Clonal stem cell disorder of lymphocytic origin w/ lymphocytosis in peripheral blood and marrow		Stage I: lymphocytosis, enlarged nodes Stage II: lymphocyt, spleen & liver +/- nodes Stage III: lymphocyt, anemia +/- above Stage IV: lymphocyt, thrombocytopenia +/- above 2:1 male/female ratio	Low-grade lymphoma therapy (aggressive to observation) Auto/allo HSCT to salvage
Polycythemia vera (PCV)	Erythrocytosis w/ *low Epo* *Diagnosis of exclusion*, RBC mass assay to distinguish from relative polycythemia, Marrow: hyperplasia of all 3 myeloid lineages	Cytogenetic clonal abnormalities (20%, bad prognosis)	Ruddy complexion, conjunctival plethora, left upper quad ab pain from splenomegaly, *hyperviscosity* (thromboses), hemorrhage, iron deficiency, pruritis Spent phase: *myelofibrosis* May progress to AML	Phlebotomy to maintain hematocrit < 45% Hydroxyurea Interferon-alpha *Anagrelide* for thrombocytosis
Essential thrombocythemia (ET)	Thrombocytosis *Diagnosis of exclusion*	Some cytogenetic clonal abnormalities	May be asymptomatic, thrombotic complications, hemorrhagic sequelae (qualitative platelet defects), splenomegaly (30-50%) Bimodal incidence (50-60, 30 yrs) May progress to AML (less than w/ PCV)	Observation if asymptomatic Hydroxyurea Interferon-alpha Anagrelide (non-myelosuppressive) Platelet pheresis
Myelofibrosis with agnogenic myeloid metaplasia (MMM)	Smear: leukoerythroblastosis, immature granulocytic precursors, erythroblasts, teardrop cells, large platelets Marrow biopsy necessary: collagen & reticulin fibers produced by fibroblasts	Some cytogenetic clonal abnormalities (bad prognosis)	Weight loss, fever, night sweats, fatigue, left upper quad ab pain, anemia, hepatosplenomegaly, portal hypertension, splenic infarct, pleural or pericardial effusions (extramedullary hematopoiesis of serosal surfaces) Variable WBC & platelet counts May progress to AML	Hydroxyurea (control of organomegaly, leukocytosis, thrombocytosis) Androgens Interferon-alpha Surgical splenectomy Auto & allo HSCT

Acute leukemia	Definition & diagnosis	Etiology	Presentation	Therapy
Acute myelogenous leukemia (AML)	Malignant transformation of a myeloblast w/ increased rate of self-renewal and limited ability to differentiate *Auer rods* in blast cytoplasm	Radiation, chemo, benzene, smoking, chromosomal disorders (down's, fanconi's), chronic marrow disorders (MPD, MDS, AA, PNH, MM)	Marrow failure, infections, leukostasis (pulmonary & cerebral), hyperleukocytosis, myeloblastoma or EM leukemia (solid tumor of myeloblasts), leukemic infiltration of tissues, DIC, tumor lysis syndrome Higher incidence in elderly (poor prgnosis)	Induction chemo w/ complete remission Post-remission: low dose maintenance, high dose consolidation, allo/auto HSCT Supportive
Acute promyelocytic leukemia (APL)	Marrow: >30% myeloblasts, >20% abnormal hypergranular promyelocytes, *auer rods*, faggot cells Cytochem: MPO+	Cytogenetic abnormality t(15;17) w/ PML-RAR-alpha fusion	Leukpopenia, coagulopathy, DIC Younger median age	All-transretinoic acid (ATRA, vitamin A therapy) followed by chemo (arsenic trioxide) and allo HSCT (only cure)
Acute lymphoblastic leukemia (ALL)	Malignant transformation of a lymphoblast w/ increased rate of self-renewal and limited ability to differentiate	Radiation, *viruses* (EBV & burkitt's, HTLV-1 & adult T cell leukemia/lymphoma), congenital (down's, fanconi's), abnormal chrom (1/3 w/ *philadelphia chromosome*), CML	Hepatosplenomegaly more common than AML Higher incidence in kids (good prognosis) Good prognosis: t(12;21), t(8;21), t(15;17), inv(16), T cell ALL Poor prognosis: 11q23 translocation, philadelphia chromosome	Induction chemo w/ complete remission Post-remission: intensive consolidation, intrathecal (CNS pophylaxis), prolonged low dose maintenance, allo HSCT (only cure) if high risk