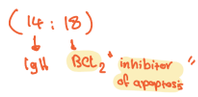
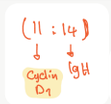
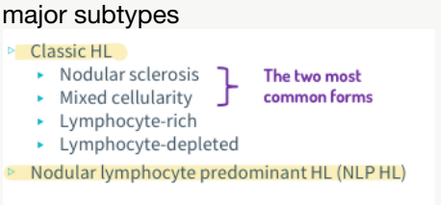
Cell or tumor		:Cluster of differentiation antigin (CD)
Mature	B-cell markers	CD19, CD79, and CD20
	T-cell markers	CD3 (either CD4 or CD8)
Blast	marker of early lymphoid origin (B & T lymphoblasts)	TdT
Blast ALL	Pre–B cell (ALL)	▷ Hyperdiploidy (> 50 ▷ t(12;21). ▷ t(9;22) involving ABL & BCR genes.
	Pre–T cell (ALL)	▷ NOTCH1 mutations chromosomes/cell) ▷ CDKN2A mutations
	Worse prognosis	▷ Younger than 2 ▷ Older than 10 ▷PB WBC count > count 100,000 ▷ t(9;22)
	Favorable prognosis	▷ Age between 2-10 ▷ PB Low WBC ▷Hyperdiploidy ▷▷ t(12;21)
CLL/SLL	• If PB involvement count exceeds 5000 cells/μL • CD5	
Follicular	1. (14;18) translocation 2. B-cells markers (mature B cell neoplasm) 3. CD10 -> GC marker	
Mantal	1. (11;14) translocation 2. B cell markers 3. CD5	 stimulates growth by promoting the progression of cell cycle from G1 to S phases)
Extranodal Marginal Zone Lymphoma	. B-cell markers.	
Diffuse Large B Cell Lymphoma	1. Mutations & rearrangements of the BCL6 gene -> increased levels of BCL6 protein 2. BCL6 protein, an important transcriptional regulator of gene expression in GC B-cells 3. CD10 4. B-cell markers	
Burkitt Lymphoma	1. translocations involving MYC gene on chr. 8 [master regulator of Warburg metabolism (aerobic glycolysis)] [The fastest growing human tumor] 2. CD10 3. B-cell markers	
Hodgkin Lymphoma	In Classic:	Typical RS cells : 1- express CD15 2- express CD30 3- fail to express B-cell & T-cell markers.
	n NLP HL	RS variant cells: 1- express B cell markers (e.g., CD20) 2- fail to express CD15 and CD30
	Both	RS cells express high levels of PD ligands -> factors that antagonize T cell responses. (inhibit T cell function)
Mycosis Fungoides and Sézary Syndrome	1- CD4 +T cells home to the skin. 2- CD8 -	
	only SLL & MCL express it)	CD5
	expressed in Burkitt lymphoma, B- ALL & some DLBCL)	CD10 ? GC marker

Cell or tumor	Histology
Blast ALL	1. scant basophilic cytoplasm and nuclei 2. delicate, finely stippled chromatin 3. small nucleoli
CLL/SLL	1. "soccer ball" appearance: small lymphocytes with dark, round nuclei, **clumped chromatin** & scanty cytoplasm 2. prolymphocytes:large lymphocytes with prominent centrally located nucleoli
Follicular	1. Lymph nodes usually are effaced by a distinctly nodular (follicular) 2. Two types of neoplastic cells: a- the predominant called centrocytes have angular "cleaved" & indistinct nucleoli b- the other centroblasts, larger cells with vesicular chromatin, several nucleoli
Mantal	1- composed of cells resembling the naive B cells found in the mantle zones of normal lymphoid follicles. 2- The tumor cells are slightly larger than normal lymphocytes 3- with irregular nucleus, inconspicuous (not clear) nucleoli 4-sometimes arises in the GIT as multifocal polyps (lymphomatoid polyposis).
Extranodal Marginal Zone Lymphoma	1. lymphoepithelial lesions : B-cells characteristically infiltrate the epithelium of involved tissues (in small aggregates) 2. tumor arises most commonly in epithelial tissues (e.g. GIT, salivary glands, lungs,..) 3. tumor cells accumulate abundant pale cytoplasm or exhibit plasma cell differentiation 4. example of a cancer arises within & is sustained by chronic inflammation: a. autoimmune disorders (salivary gland in Sjögren syndrome & thyroid gland in Hashimoto) b. Chronic infection (such as H.pylori gastritis) 5. Ex: Gastric MZL (MALT lymphoma)
Diffuse Large B Cell Lymphoma	1. Diffuse infiltration by large neoplastic B cells (three to four times the size of resting lymphocytes) 2. vary in appearance
Burkitt Lymphoma	1. "starry sky" pattern: These benign macrophages often are surrounded by a clear space 2. Intermediate size lymphocytes (Variable cytoplasm, several nucleoli). 3. numerous mitoses & tissue macrophages containing ingested nuclear debris 4. Very high rates of proliferation and apoptosis (high turnover)
Hodgkin Lymphoma	1. Reed-Sternberg (RS) cell: a very large cell with an enormous multilobate nucleus, exceptionally prominent nucleoli (inclusion-like) & abundant cytoplasm. 2. surrounded by a heterogeneous inflammatory infiltrate containing small lymphocytes, eosinophils, plasma cells, and macrophages. 3. These characteristic nonneoplastic, inflammatory cells are generated by cytokines secreted by RS cells (IL-5,TGF-β, & IL-13).
Mycosis Fungoides Sézary Syndrome	1. cerebriform appearance : infiltration of epidermis & upper dermis by neoplastic T cells with marked infolding of the nuclear membranes 2. tumor cells (Sézary cells) in the peripheral blood 3. generalized exfoliative erythroderma

Cell or tumor	Presentation
Blast ALL	1. Symptoms related to depression of marrow function; anemia, neutropenia & bleeding. 2. Mass effects ? neoplastic infiltration; bone pain 3. CNS manifestations headache, vomiting, and nerve palsies. 4. Aggressive but curable (85% cure rate in children) 5. Neoplasms composed of immature B (pre-B) or T (pre-T) cells ? called Lymphoblasts 6. 85% B-cells , commonly manifest as acute LEUKEMIA The most common cancer of children (Peak : 3 years) 7. 15% T-cells, commonly manifest as thymic LYMPHOMA Peak: adolescence 8. In pre-B & pre-T ALLs the blasts are identical in routine stains (immunophenotype is needed)

Cell or tumor	Presentation
CLL/SLL	1. Often asyptomatic 2. But symptoms are nonspecific; easy fatigability, weight loss, anorexia, generalized lymphadenopathy & hepatosplenomegaly. 3. 10-15% develop autoimmune hemolytic anemia & thrombocytopenia. 4. An indolent, slowly growing tumor {increased tumor cell survival is more important than tumor proliferation) } {cure may only be achieved with hematopoietic stem cell transplantation (HSCT) } 5. CLL & SLL are essentially identical.
Follicular	1. Older than 50 2. Generalized painless lymphadenopathy 3. Bone marrow is involved in 80% of cases 4. 40% transform into DLBCL 5. Prolonged survival, not curable disease (indolent) 6. dismal prognosis
Mantal	1. fatigue & lymphadenopathy 2. involving the bone marrow, spleen, liver, and (often) GIT. 3. Moderately aggressive & incurable. ▷ The median survival is 4-6
Extranodal Marginal Zone Lymphoma	1. Present as swelling of the salivary gland, thyroid or orbit or are discovered incidentally in the setting of H. pylori–induced gastritis.
Diffuse Large B Cell Lymphoma	1. Median > 60 years of age (but Can occur at any age) 2. Generalized lymphadenopathy 3. Can occur in extranodal sites (GIT) 4. An aggressive and rapidly fatal lymphoma if not treated 5. 50% cure with treatment.
Burkitt Lymphoma	1. The fastest growing human tumor!! 2. Both types affect children & young adults. 3. Usually arises at extranodal sites: a. Endemic ? maxillary or mandibular masses, b. Sporadic ? abdominal tumors (bowel & ovaries) 4- Highly aggressive; can be cured with very intensive chemotherapy regimens
Hodgkin Lymphoma	1. they arise in a single lymph node or group a .Cervical and mediastinal b. Rarely tonsils, Waldeyer ring or extranodal sites 2. spread in a stepwise fashion to anatomically contiguous nodes. 3. major subtypes  4. Manifests as painless lymphadenopathy 5. advanced disease (stages III & IV) are more likely to exhibit a. B symptoms (fever, weight loss, night sweats) b. pruritus & anemia. 6. is very good, the 5- year survival rate for patients with stage 1-2 disease is more than 90%.
Mycosis Fungoides Sézary Syndrome	1- form of cutaneous T cell lymphoma. 2- Usually manifests in three stages: a. A nonspecific erythrodermic rash (patches) b. Progresses in time to a plaque phase. c. A tumor phase. 3. Sézary syndrome: a clinical variant of MF characterized by: a. generalized exfoliative erythroderma b. tumor cells (Sézary cells) in the peripheral blood 4. Patients diagnosed with early- stage MF survive for many years. 5. Patients with tumor- disease, visceral disease, or Sézary syndrome survive on average for 1-3 years.