**Lymphoma**
Lecture : 20
Dr : Tareq
Slide : #2
refer to the slides I only wrote the ''extra notes''. -

Lymphoma is one of the hardest topics in medicine so is Leukemia.

slide 10 :
Lymphoma is Cancer of lymphocytes ( malignant neoplasm that arises from lymph nodes) we don't have to say malignant lymphoma because there is no a benign lymphoma, lymphoma's always a malignant tumor.
we call the benign one ''reactive hyperplasia'' not lymphoma !-
most lymphomas arise in lymph nodes , however, they can arise from any organ like immune cells which gives us extranodal lymphomas and they are less common.
don't forget that lymphocytes are circulating cells.

We have so many classifications but generally classified as :

**A.non-Hodgkin(more common ) and B. Hodgkin.**B and T cells have similar morphology but we differentiate them using special stain.
B-cell lymphomas express CD20 on their surface.
T-cell lymphomas express CD3 [first marker]
CD3 is expressed in both B and T cells , also B-cells takes long time to stain.
 Hodgkin lymphomas express CD30 , they don't express CD20 or CD3.
In lymphoma we have a huge number of lymphocytes but they aren't functioning well so patients with lymphoma have disturbed immune system.

slides 11 :
**A.non-Hodgkin** Lymphomas are divided into : Low-grade and high-grade; according to the speed of progression and mitosis.
The doctor will only talk about the B-cell non-Hodgkin lymphoma

**1.Follicular lymphoma**
low grade; it takes long time to develop, affects elderly.
it's generalized affecting neck , axilla , and abdomen.
arises from the follicles ( germinal center B-cell ) , it's because of mutation in germinal center B-cells ''translocation'' mutation , when bcl2 gene translocates to igH gene , with each igH we have a bcl2.
**bcl2** : an anti-apoptotic protein , it prevents cell death.
**IgH** : it's responsible for Ig's production.
those cells have long half life.

**Lymphadenopathy :** enlargement of the lymph nodes
after 10-15 years more mutations will happen leading to hybrid lymphoma.

slide 12 :
we see crowded follicles and we also can see normal T-cells inside them and that's area called (paracortical area)
this slide will give us a +ve result when we stain it by bcl2.

slide 13 :
**2. Diffuse Large B-cell lymphoma**most common in adults and most common in our region.
it arises either without previous causative or as a transformation which is less common.
The cells here are large.
*- Lymphocytes are the smallest nucleated cells in the body.*
We don't treat low grade lymphoma until the symptoms appear, however , we have to treat high grade using chemotherapy because it's fatal.

slides 14 :
normal lymphocytes are dark , small , and round, but the DLBCL cells are larger ( double or triple nuclear size ).

slide 15 :
**3.Chronic lymphocytic leukemia**it's low-grade because it's chronic (the cells are very mature).
arises from bone marrow , then the cells circulate in the blood (it's not in the lymph nodes it's in the blood).
here we have a huge number of cells with normal morphology.
most common in elderly, plus it's not a translocation mutation here the gene bcl2 became more active.
 sometimes cells go to the lymph nodes , when they do so we call that case ''small lymphatic lymphoma''
10% transforms into high-grade lymphoma.
Normal WBC's count [4,000-10,000] but in chronic lymphocytic leukemia the count is [50,000-100,000]

slide 16 :
we see a lot of lymphocytes , but the cells here are fragile (smudge cells).

We finished talking about B-cell non-Hodgkin lymphoma , now let's talk about the Hodgkin one.

slide 17 :
**B. Hodgkin Lymphoma**common in children and young adults.
More often **localized** to a single axial group of nodes (cervical, mediastinal, axillary).
this lymphoma has unique and special characteristics, it only happens in lymph nodes , its spreading is unpredictable and contagious , its cells are huge (2 nucleoli in 1 cell ) ,

- NHL : Non-Hodgkin Lymphoma.
line 2 the word should be **aspects**\* not respects.

slide 18 :
here we see very huge neoplastic cells unlike the normal size of lymphocytes.
RS-cells : Reed-Strenberg ; two nuclear lobes, large eosinophilic nucleoli , and abundant cytoplasm. when we see RS-cells we know it's a HL.
They are **few** , they also attract all the immune system cells, they are like a magnet. The only cancer with few number.
note: even after staining they gave us -Ve result ( -Ve CD20) so nobody thought it's a lymphoma but recently they discovered that it arises from B-cell.

slide 19 :
**Acute Lymphoblastic Leukemia**
( it's in between disease and it's like the opposite to CLL )
lymphocytes come from lymphoblasts and other cells come from myeloblasts.
ALL is an aggressive, high-grade type of lymphoma.

B-ALL is the most common cancer is **children**, arises

from BM .

T-ALL occurs mainly in **male adolescents**, arises from

thymus.
in ALL we only see blasts (no lymphocytes) and blasts start destroying the cells around them.
 Patients present with sudden fever (infection; the serious one ), bleeding (thrombocytopenia) , anemia , fatigue , and shortness of breath.

we finished talking about lymphoid now let's talk about myeloid.

slide 20 :
**Acute Myeloid Leukemia**
myeloblasts normally give 3 cell lines : erythrocytes , WBC's and migratory cells.
**[ large number of blasts with no differentiation ]**
acute myeloid leukemia arises in myeloblasts in Bone Marrow , and then its cells circulate in blood ( normal blood doesn't contain blasts), **acquired mutation**  ( mutation in myeloblasts ), and it affects all age groups.
Bone marrow become filled with blasts, which destroys the normal cells and cause bone marrow failure.
Patients present with fever , anemia , or thrombocytopenia.

slide 21 :
A : lymphocytes : have fine chromatin, minimal agranular cytoplasm .
B : myeloblasts : more abundant cytoplasm, can be granular, and prominent nucleoli are noted
both of them are blasts.

slide 22 :
**Myelodysplastic syndrome** ( MDS )
Dysplasia : pre-cancer stage , dysplasia means in Arabic الورم اللابد
MDS [ Pre-leukemic stage ] ,it's acquired genetic mutations in the myeloblasts, which inhibit the normal maturation ( cells don't mature normally ) , it affects elderly, here Myeloblasts are **not** increased in number , but in Leukemia the number is more than 20%.

Patients with MDS develop refractory anemia ( everything is normal so even if you give the patient anything you won't solve the problem cause the mutation in the myeloblasts and you can't cure RBC's ), thrombocytopenia and neutropenia.

slide 23 :

**Chronic Myelogenous Leukemia** ( its like the CLL but here in myeloid )
 A chronic leukemia in which myeloblasts have translocation between chromosome 9 (ABL gene) and 22 (BCR) , the new chromosome is known as **Philadelphia chromosome** ,the new fusion gene (BCR-ABL) gain a new “Tyrosine-Kinase” function, which activates cell proliferation and prolonged its survival . [ first mutation had been discovered ].
Bone marrow and blood become filled with myeloid cells of all stages of maturation (from blasts to neutrophils) we'll have huge number of neutrophils.
neutrophils half life up to 5 days but in CML they'll have a long half life.
WBC's count here [ 40,000-80,000] and they are all neutrophils.

slide 24 :

BCR+ABL => Philadelphia chromosome ( in chromosome 22 )
again Tyrosine-Kinase proteins promote cell survival .

slide 25 :
 we recognize them mostly from their numbers , we see a lot of neutrophils we also can see precursors ( before neutrophils ) we see them in blood.

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Sorry for any mistake.