Extra Notes 3

***The numbers of the slides are according to the last year slides.**

Slide 33

Autoimmune hemolytic anemia : Abnormal circulating antibodies that target normal antigen on the RBC and cause lysis.
- Coombs test identifies the abnormal antibodies (autoimmune antibodies) . In Coombs test we mix the blood of the patient with synthetic antibodies (antibodies against the autoimmune antibodies) . If there are autoimmune antibodies on RBC membrane , the synthetic antibodies will bind to them and there will be agglutination of the RBCs.

- There are two types of Autoimmune hemolytic anemia according to their location in the body where they cause the disease : 1) Warm 2) Cold .

	Warm	**Cold**
The location	In the core (center) of the body , where the temperature is 37 °C .	In the periphery of the body (fingers , toes , tip of the nose and tips of the ears) , where the temperature is very much lower than the center of the body.
The abnormal antibodies class	igG class	igM class

-IgM is bigger than igG.

Slide 34
- The common target for the autoimmune antibodies in the this type is the Rh antigen on RBCs.
Mechanism : autoimmune antibodies attach to the Rh antigen on RBCs > then these RBCs will circulate until they reach to the spleen > macrophages in the spleen (these macrophages have receptors for igG) will remove igG on the RBCs and bench with it part of the cell membrane > RBCs will look like spherocytes > spherocytes will circulate > when they come back to the spleen , they will be destroyed .

-The cause of anemia : the conversion to spherocytes .
-The patients have extravascular hemolysis .

Slide 35
α- methyldopa is an anti-hypertensive drug , used mainly for hypertensive pregnant women .

Slide 36
- IgM antibodies bind weakly to the RBC at low temperature and they will be dissociated at higher temperature (warm areas) .

- IgM antibodies attract c3b for a short period .

- The causes of cold hemolytic anemia : **1- acute :** follows infection . The most common bacteria that causes cold hemolytic anemia is Mycoplasma pneumoniae .
2- chronic : associated with B-cell lymphoma , severe .
B cell function normally to produce antibodies . In B cell lymphoma , B cells produce massive production of antibodies which lead to persistent hemolytic anemia .

slide 37
RBCs agglutinate in different dimensions .
also we see spherocytes but agglutination is more apparent .

In multiple myeloma, clumps are in linear direction .

slide 39
Schistocytes : trauma to RBCs .
Schistocytes are torn cells , appear in different shape .

- Hemolytic Anemia Resulting from Trauma to Red Cells happens in :

1) Cardiac valve prosthesis :
Cardiac valves are usually metal (it's different from the body environment) , so with each pulse certain number of RBCs will be broken .

2) vigorous Exercises (minor) :
As in marathon runners due to repetitive mechanical motions (when the runner hits the ground , certain number of RBCs will be broken) , also it occurs in military marching .

3) Microangiopathic hemolytic anemia (common):
it's an emergency setting .
Problems in the small circulation (in the capillaries and around them). There will be marked thrombosis in all over the body (thrombosis all over the capillaries) secondary to different diseases (examples : TTP , HUS and TTP) . These are different disease but they share the same end > marked thrombosis in all over the body > they

consume all the platelets agglutination factors > they will form thrombi (platelets+ RBCs) >patients will end up with anemia , thrombocytopenia and schistocytes .
So first thrombosis , it will consume all the platelets so the patient will end up with bleeding .

Slide 40
- Schistocytes are not bite cells.

Slide 46
Thalassemia is an inherited disease .
HbA normally comprises over 90% of the total red blood cell hemoglobin.
The most common thalassemia in the middle east is β- thalassemia whereas in India is α – thalassemia.

Slide 47
The most common mutation in β- thalassemia is point mutation whereas in α – thalassemia is deletional mutation .
There are two copies of the β – globin gene in each cell (one on each chromosome 11) .
When one gene is defective we call it minor β – thalassemia. When both genes are defective we call it major β- thalassemia .

Slide 50
Patients have extravascular and intravascular hemolysis.

Slide 51
- There will be bone changes (the skull will be enlarged , the facial bones become wider than normal) in children who have major β- thalassemia .
- With continuous erythropoietin stimulation , it activates all stem cells outside the bone marrow (in the spleen and liver) and they start doing the erythropoiesis . So these patients will have hepatomegaly and splenomegaly.

-As a result of iron overload , iron will accumulate in ferritin, ferritin will accumulate as hemosiderin and hemosiderin will cause systemic hemosiderosis . The heart and the kidney can't tolerate hemosiderin so they will be damaged .

Slide 53
Patients who have intermedia β – thal don't need blood transfusion .

Slide 55
- MCV is 76-78 fL in silent carriers .
-Hemoglobin H Disease equal intermedia β- thal.

Slide 56
Target cells are not specific to thalassemia , it can occur in any abnormal hemoglobin diseases(as in iron deficiency anemia and sickle cell anemia).
In thalassemia the cells are hypochromic microcytic but they are all the same.

In iron deficiency anemia the cells are hypochromic microcytic but with different shapes .

Slide 59

Sickle cell anemia is common in Africa and the middle east .

Slide 60

HbA is zero in sickle cell disease .

Slide 61

- Any change in the environment around HbS (such as hypoxia , dehydration, acidity and stress) causes it to polymerize .
- HbA and HbF prevent polymerization of HbS .
- Sickle cells when they are circulating , they can fit with each other and form a mass which leads to thrombus (Vaso-occlusive crisis) > which will end up with infraction .

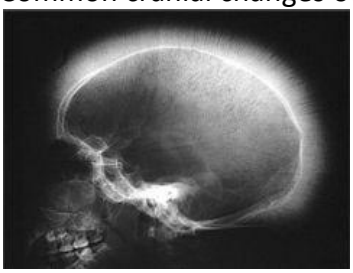
Slide 68

Entrapment of sickled red cells in the cords and sinuses of the spleen leads to hypovolemia .

Slide 71

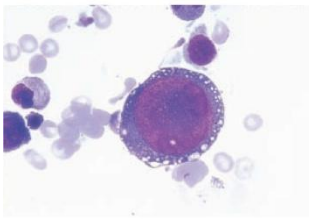
- Aplastic crises are common in sickle cell anemia and thalassemia .
- How we diagnose aplastic crises ? by BM examination ; because the main target cell of parvovirus B19 is the pronormoblast .

Common cranial changes occur in sickle cell anemia and major β- thal.



Erythroid hyperplasia causes crew cut appearance of skull bones, it occurs in sickle cell anemia and major β- thalassemia.

The shadow in the figure is the shadow of erythroid cells .



This figure shows pronormoblast infected by parvovirus (occurs both in thalassemia and sickle cell anemia) .

Pronormoblast : is the earliest stage in the development of the red blood cells.

It's large and blue . It has white inclusions In its nucleus .