

# PBL – Clinical Cases – HLS



Done By

Dana Obeidat

Corrected By

Dana Obeidat



النادي الطلابي  
كلية الطب

# Problem Based Learning 2

Feras Fararjeh MD

03.11.2021



# Case 1

- A 19-year-old male college student. Presents with history of yellowish discoloration of sclera, exertional fatigue and shortness of breath. Additionally, there is left sided abdominal pain. He has family members with similar symptoms.

In this case symptoms suggest anemia, and there's an indication of jaundice and combination (anemia + jaundice) should make you think of hemolytic anemia, and since he has a family history it should suggest that the hemolytic anemia is congenital, and the left-sided abdominal pain refers to a secondary splenomegaly

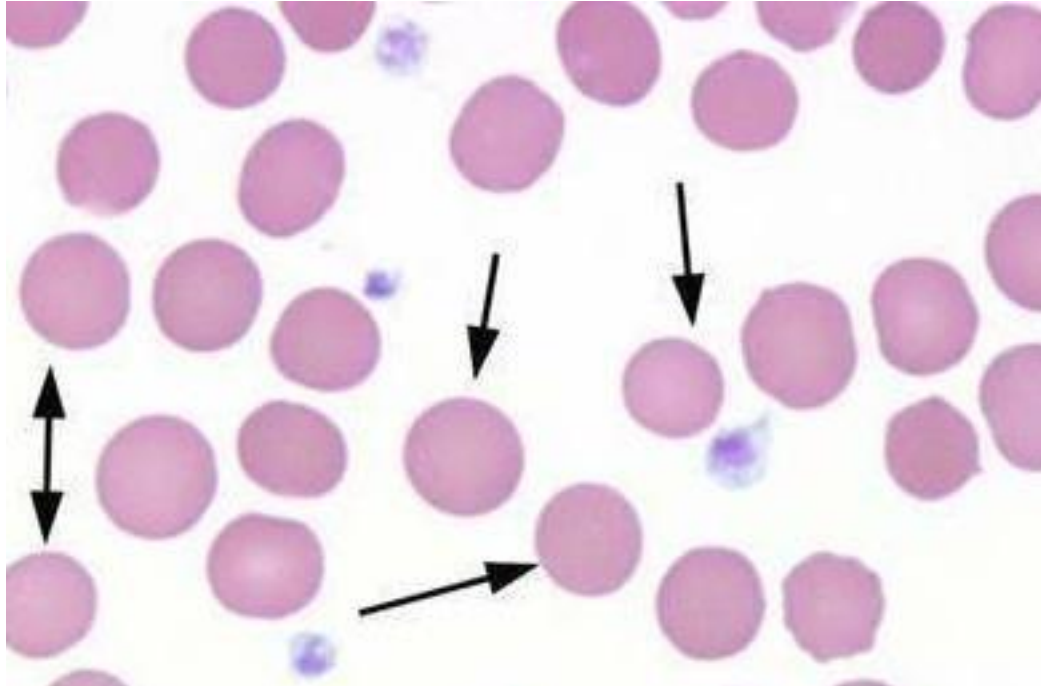


# Case 1

- Findings:
  1. Pallor
  2. Jaundice (yellowish discoloration)
  3. Splenomegaly (enlarged spleen)
  4. Abnormal red cells on blood film



# Case 1



Abnormal red cells on blood film (spherocytes) because they lack the pale in the center area, the abundance of spherocytes ((here they are so many)) should make us think of a condition called "Hereditary spherocytosis"

# Case 1

- **Hereditary spherocytosis:**
- A familial hemolytic disorder of red cell membrane. Generally inherited as an autosomal dominant disease
- The patient presents with mild anemia and jaundice, with a modestly enlarged spleen.
- There is a genetic heterogeneity of the disease and this is reflected in the clinical presentation

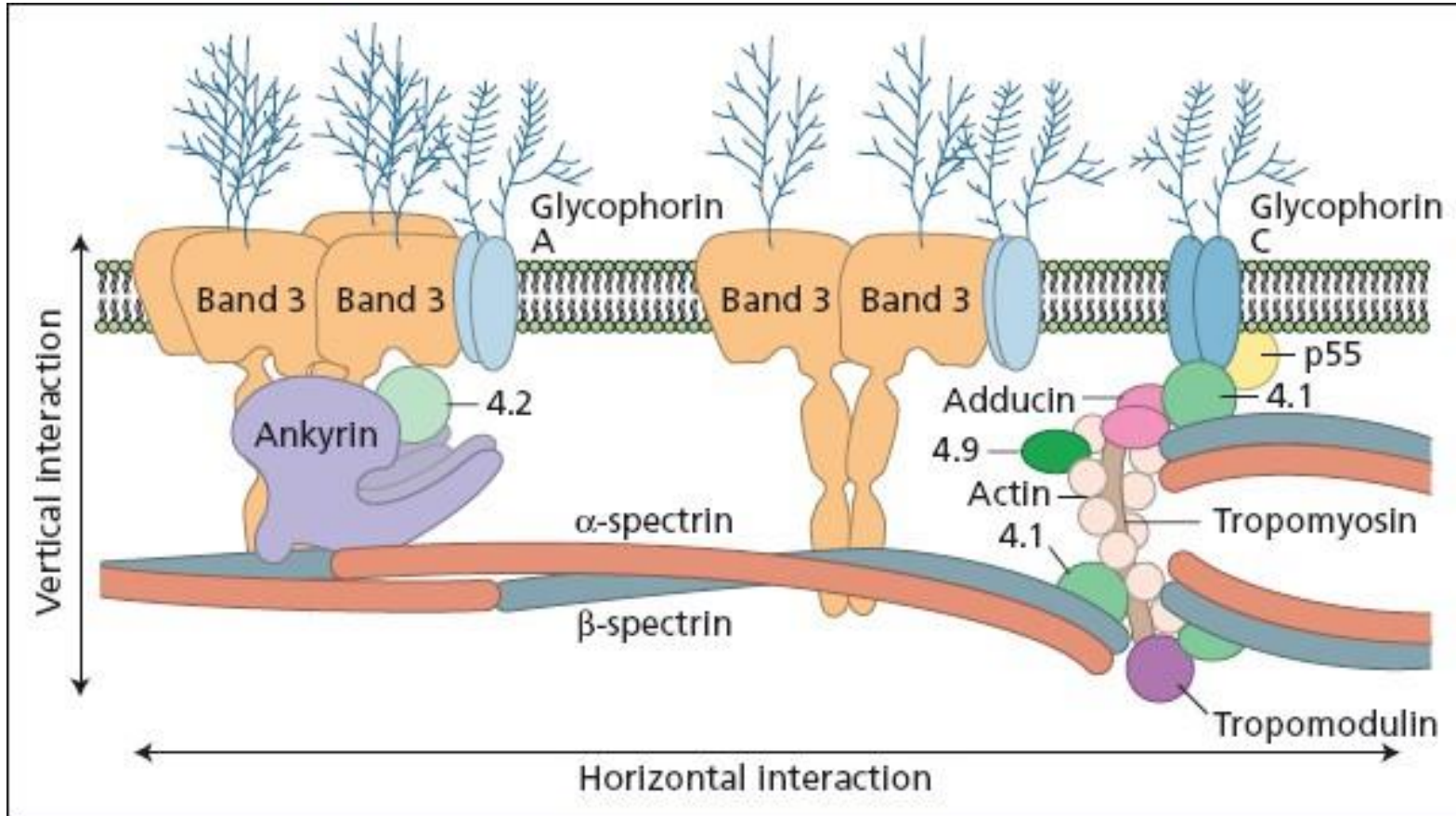


# Case 1

- The main site of red cell destruction is the spleen so the spleen size reflects the severity of hemolysis
- In addition to the clinical features described above, the blood film shows small spherocytic red cells lacking area of central pallor



# Case 1



Arrangement of RBC membrane proteins. 60% of HS cases result from a defect in ankyrin-spectrin complex. The remainder involve a deficiency in band 3 or protein 4.2.

It's caused by an abnormal protein/s, a in more than 50% case of hereditary spherocytosis there's a defect in the ankyrin-spectrin complex, the other 50% it's either a defect in band3 protein or 4.2 protein, however all these mutations make the RBC lose its elasticity and become rigid more susceptible to hemolysis.





# Case 1

- Diagnosis is by **Osmotic fragility** test or by identification of protein abnormalities or gene defects.
- **In this test, we decrease the tonicity of the solution we put the sample in and see how will can the cell tolerate this decrease and as you know these cells are rigid and do not have a bi concave surface so they will lyse much faster than normal RBCs**



# Case 2

- A 24-year-old male. Presents with new onset yellowish discoloration of sclera with exertional fatigue and shortness of breath. **Urine is very dark.**
- Patient **was normal before attack**, He had fava bean 1 day before onset of symptoms.

In this case, there's a similar symptom to the previous patient except that this patient has dark urine & that he was normal before the attack which suggests that something has triggered his symptoms and this trigger is Fava beans.



# Case 2

- Findings:
  1. Pallor
  2. Jaundice (yellowish discoloration)
  3. Abnormal red cells on blood film ( they are called bite cells)



# Case 2

- **Glucose-6-phosphate dehydrogenase (G6PD) deficiency:**
- Episodic acute hemolytic anemia following exposure to triggering factors.
- The most common enzymatic disorder of red blood cells, affecting 400 million people worldwide.
- Inherited as **X-linked recessive disease**. The gene for G6PD is located on the X-chromosome with more than **150 variants** (of mutations) identified associated with **variable degrees** of hemolytic severity.
- In females it's mainly asymptomatic



# Case 2

- G6PD catalyzes the first step of the pentose phosphate pathway which is the major generator of reducing power within red cells. **Oxidative stress** that exceeds red cell ability leads to acute hemolysis and anemia in affected patients.
- Denatured hemoglobin forms **Heinz bodies** in red cells. Such cells get recognized by macrophages in the spleen where the precipitate and a small piece of the membrane get removed, leading to characteristic **bite cells** on standard blood film. (H&E does not stain these Heinz bodies we need supravital stain to see it)



# Case 3

- A 20-year-old female college student presents with acute pain in the back, shoulder, and extremities.
- She reports this is not the first time (we have previous episodes of this attack) ;attacks are **more frequent in cold and stressful conditions.**
- On a previous occasion, she was admitted with respiratory symptoms and had her blood exchanged.

This is straight-up classical history from a Sickle cell anemia patient which is congenital hemoglobinopathies that leads to a chronic hemolytic anemia



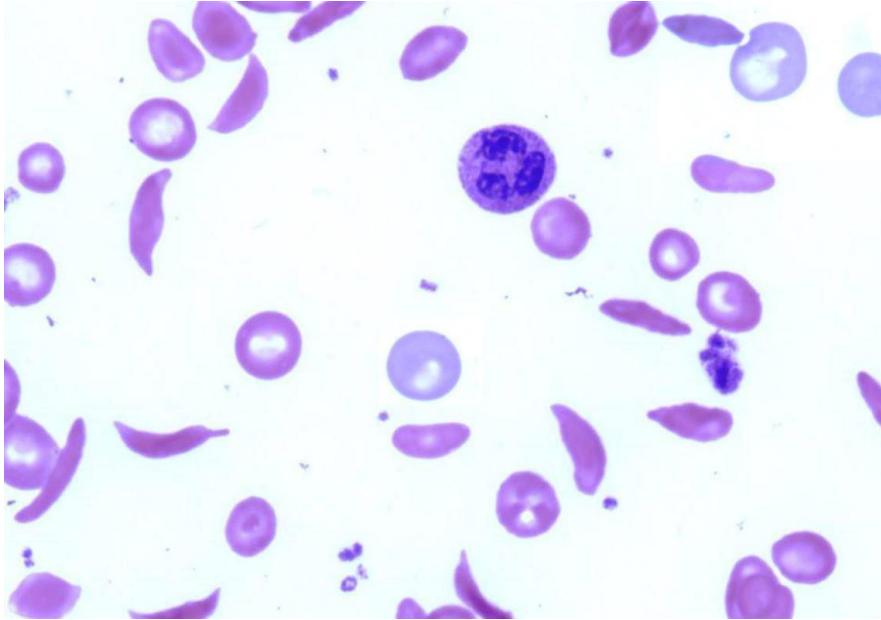
# Case 3

- **Findings:**

1. Pallor
2. Jaundice
3. Underweight
4. Skeletal abnormalities (medullary and epiphyseal infarction, dactylitis, marrow hyperplasia)
5. Leg ulcers (**venous insufficiencies**)
6. Abnormal red cells on blood film



# Case 3



In this figure you can see Sickle cells (boat cells) and a special feature called polychromasia which indicated that there's a reticulocytosis.





# Case 3

- **Sickle cell disease**
- An inherited chronic hemolytic anemia with different clinical manifestations arising from the tendency of hemoglobin to deform red blood cells into the characteristic sickle shape.
- This property is due to a single nucleotide change in B-globin gene leading to **substitution of valine for glutamic acid** at position 6 of the B-globin chain.



# Case 3

- Clinical Features:
- Anemia
- Acute painful episodes ( due to repeated sickling which is also caused by a trigger of Hypoxia like dehydration, inflammation or smoking etc...)
- Abnormal growth and development Infections.
- Neurological manifestations
- Pulmonary complications.
- Sickle cell retinopathy and nephropathy.
- Leg ulcers.



# Case 4

- A 29-year-old housewife presents with exertional fatigue, shortness of breath, and palpitations. This started a few months ago but is progressive. She had 3 complete pregnancies in the last 5 years. Her menstrual blood loss is heavy. She has no bleeding or infective symptoms. Her diet sounds balanced, and she has no nausea, vomiting, or altered bowel habits.

It looks like she has anemia, and she is losing a lot of blood in menstruation and the fact that she doesn't have bleeding or infective symptoms excludes any bone marrow failure conditions.



# Case 4

- Findings:
  1. Pallor
  2. Hair loss
  3. Koilonychia
  4. Angular stomatitis
  5. Abnormal red cells on blood film



# Case 4

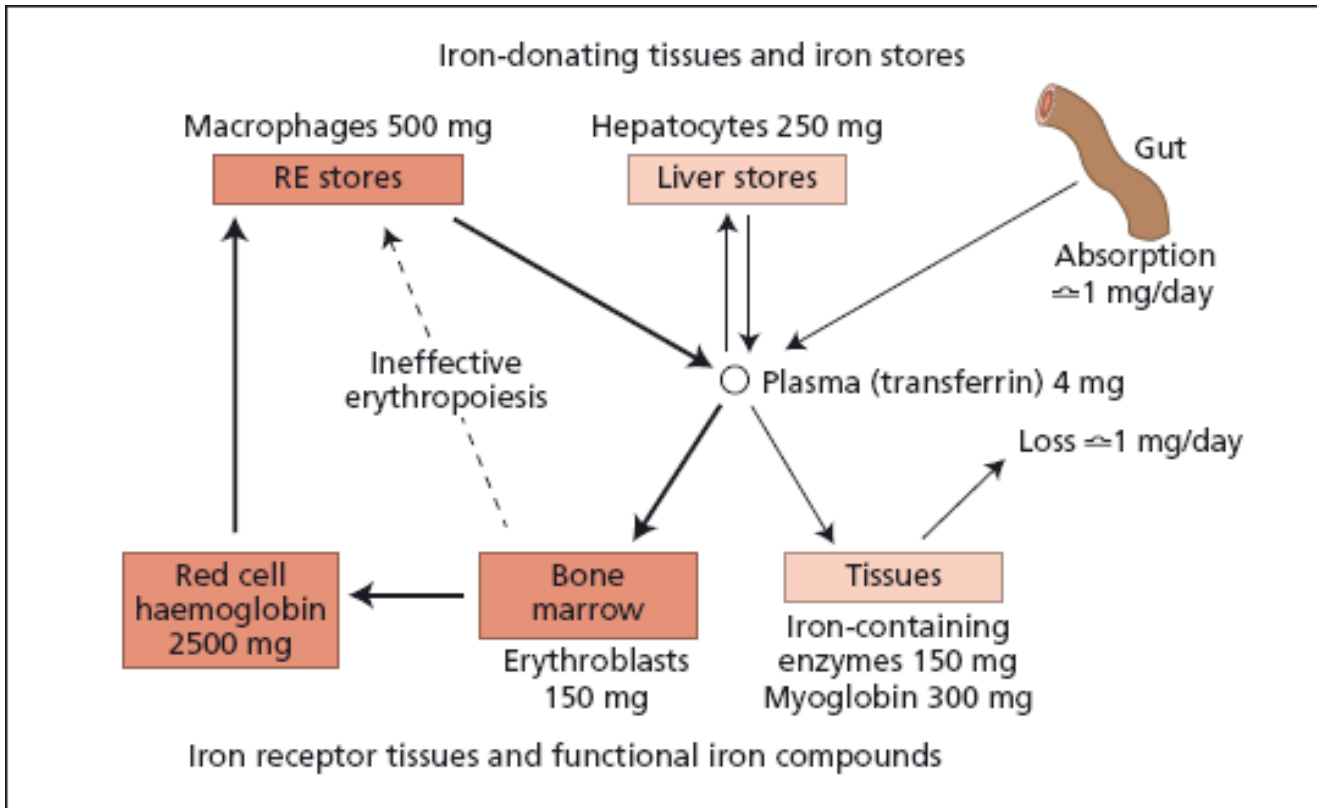


**Hypochromic Microcytic Anemia (iron deficiency)**



# Case 4

- Iron deficiency anemia



**Figure 3.1** The major compartments of iron in a 70-kg man. Iron supply for erythropoiesis and release of iron from senescent red cells dominate internal iron exchange. RE, reticuloendothelial.

So, all these findings lead to Iron deficiency anemia secondary to blood loss in heavy menstruation and the consumption of iron in her 3 pregnancies. And here in this figure you can see the iron cycle in the body.

"Repeated so many times no need to explain it again :)"

باختصار الحالة واضحة ما بدها فلسفة

# Case 4

•Causes of iron deficiency anemia:

1. Blood loss (either from GUS or GIS)
2. Increased requirements (Pregnancies or adolescence)
3. Diet (not enough iron in the diet)
4. Malabsorption (any problem in the parts where iron is absorbed in the ileum will cause a deficiency)



# Case 5

- A 62-year-old retired engineer. He has new symptoms of exertional **fatigue** and shortness of breath. This started around 2 months ago. He also noticed **a change in his bowel habits** recently and thinks he is losing weight.
- He is **not vegetarian** and his diet sounds balanced.

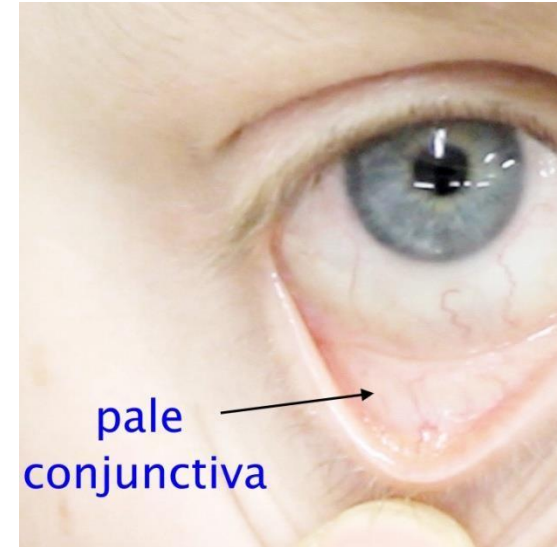
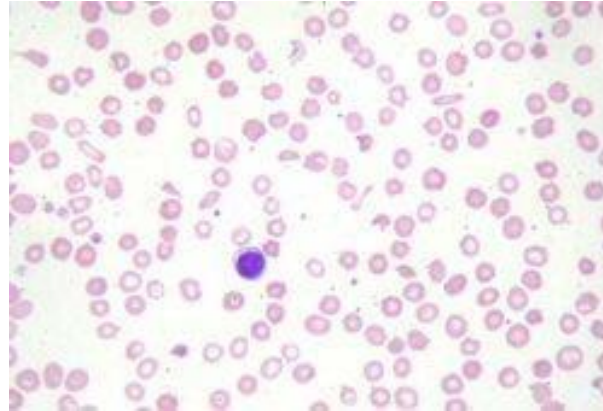




# Case 5

- Findings: Pallor

Here again we are suspecting IDA, and here you can see microcytic anemia and very pale RBCs. Even though it's the same condition of case 4 here there's a different cause, and since he has altered bowel habits this may suggest bleeding in the GIS and because of that, we should consider doing an endoscope for this patient.



What is the next thing to do?



# Case 5

•Causes of iron deficiency anemia:

1. Blood loss
2. Increased requirements
3. Diet
4. Malabsorption.



# Case 6

- A 42-year-old female with a history of surgery done 10 years ago for morbid obesity (gastric bypass) presents with exertional fatigue and shortness of breath.
- She reports some mental sluggishness and an inability to walk normally. Her family thinks she is becoming depressed and more forgetful.
- She is not attending her scheduled clinic visits and not taking her prescribed medications.

Here we can see that this lady has anemia  
and neurological symptoms

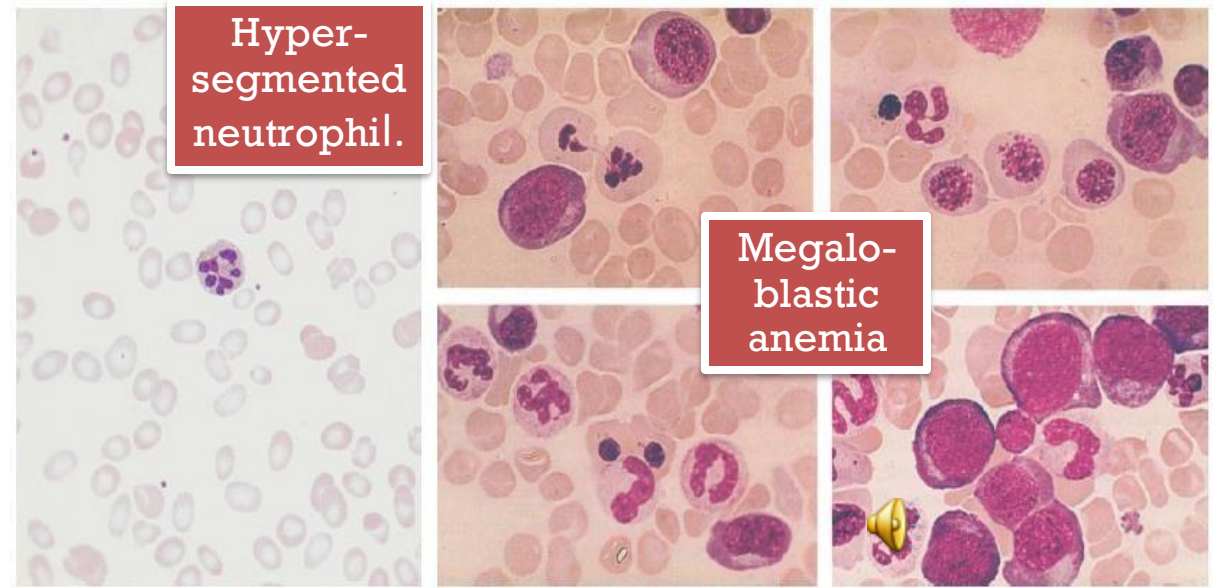


# Case 6

- Findings:
  1. Pallor
  2. Mild jaundice
- Symmetric paresthesia /numbness Shuffling gait (neurological symptoms)
- So here we think of Vit B12 deficiency.

What is the next thing to do?

We must corrected by given the patient supplements immediately



# Case 6

## **Vitamin B12 deficiency:**

- Main causes are dietary and malabsorption.
- In addition to anemia, neurological symptoms can occur and should be corrected as soon as possible once the disease is suspected. Such symptoms can occur regardless of presence of anemia
- In severe cases, ineffective erythropoiesis and hemolysis occur.



# Case 6

Table 5.5 Causes of cobalamin deficiency causing megaloblastic anaemia.

---

*Nutritional*

Vegans

*Malabsorption*

Pernicious anaemia

*Gastric causes*

Congenital intrinsic factor deficiency or functional abnormality

Total or partial gastrectomy

*Intestinal causes*

Intestinal stagnant loop syndrome: jejunal diverticulosis, ileocolic fistula, anatomical blind loop, intestinal stricture, etc.

Ileal resection and Crohn's disease

Selective malabsorption with proteinuria

Tropical sprue

Transcobalamin deficiency

Fish tapeworm

---

# Case 7

- A 64 year old lady presents with acute onset of symptoms that started one week ago:

1. Fatigue
2. Palpitations
3. Shortness of breath
4. Fever
5. Cough with sputum
6. Gum bleeding
7. Skin bruising

When we have a wide range of symptoms in a patient like this lady, we should think of **pancytopenia not only anemia.**

No previous episodes and no family history of similar conditions



# Case 7

- Findings:
  1. Pale
  2. Documented fever
  3. Skin bleeding (Ecchymosis, petechial rash)
  4. Abnormal blood film and bone marrow
  5. Bone marrow is **hypercellular** and replaced by **abnormal cells**

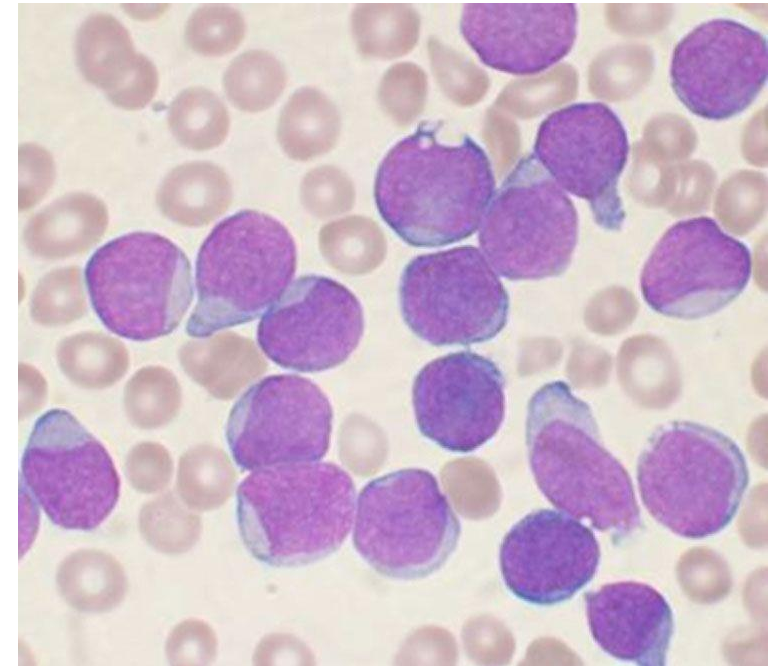




# Case 7



These are the abnormal cells characterized by a high N/C ratio, open chromatin (suggesting active proliferation) and prematurity.



# Case 7

- The triad of anemia, infection and bleeding suggests pancytopenia.
- In this case, pancytopenia is due to **replacement of normal bone marrow by abnormal immature cells (blasts)** indicating presence of acute leukemia
- Acute leukemias are either **myelocytic** or **lymphocytic**.
- Differentiating both conditions clinically can be difficult and certain additional tests are needed to do so.
- This patient needs treatment of her infection, support by blood and platelets and needs to start treatment with chemotherapeutic agents appropriate for her disease.



# Case 8

A 40 year old gentleman presents with acute onset of symptoms that started one week ago:

1. Fatigue
2. Palpitations
3. Shortness of breath
4. Fever
5. Gum bleeding (**Mucocutaneous form of bleeding**)
6. Skin bruising

No previous episodes and no family history of similar conditions

In this case we can see it's very similar to case 7 except that here the gentleman has no hypercellularity in the bone marrow.



# Case 8

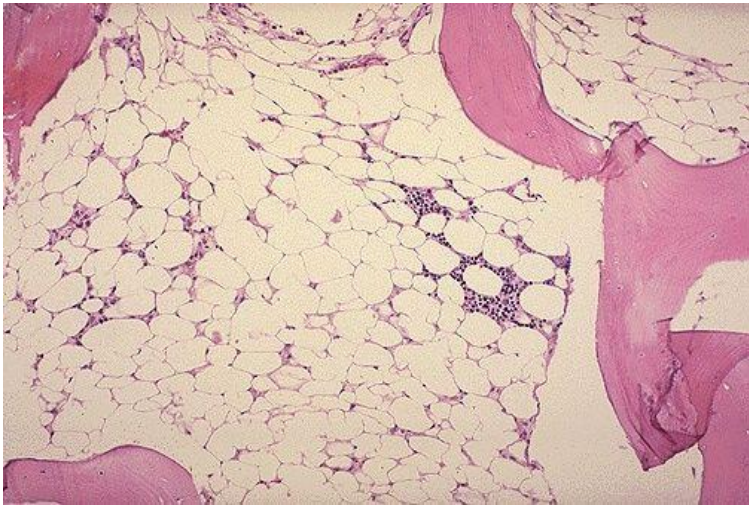
- Findings:

1. Pale
2. Documented fever
3. Skin bleeding (Ecchymosis, petechial rash)
4. Blood film showing reduced cell numbers but no abnormal cells.
5. Bone marrow is markedly hypocellular

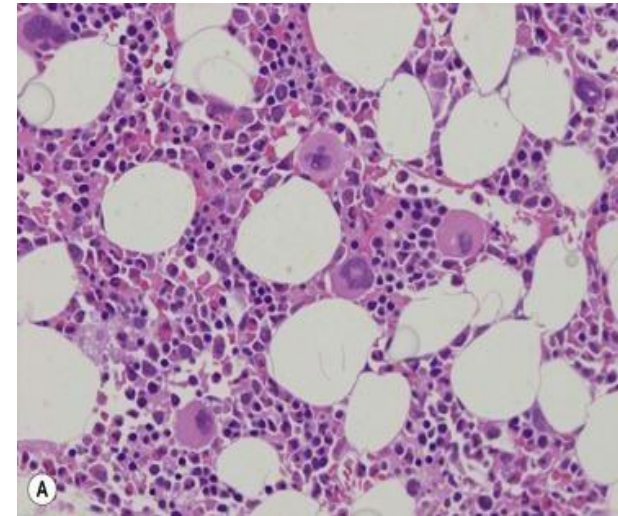


# Case 8

- Another collection of clinical symptoms suggesting pancytopenia with different findings in the bone marrow.
- **The bone marrow is hypocellular or aplastic.** This is seen in aplastic anemia which can be **inherited or acquired.**



Abnormal (Aplastic) BM with hypocellularity & filled with adipocytes.



Normal BM with normal hematopoietic & lymphopoietic processes & less adipocytes.



# Case 8

- The severity of aplastic anemia **depends on:**
  1. **The residual cellularity in the examined bone marrow**
  2. **The degree of pancytopenia present.**
- If severe disease present, this patient **treatment options** includes:
  1. **Immunosuppression**
  2. **Hematopoietic stem cell transplant.**
- Chemotherapy or steroids are not effective.



# Case 9

- A 7-year-old boy presents with swollen knee of few days' duration. This is not the first time it happens. Both knees and ankles are affected but his right knee is affected most. (one knee will be affected more because it's the weight bearing knee)
- Symptoms start by feeling of hotness in the joint followed by swelling, pain, reduced ability to move and hot skin. (Which suggest that there's bleeding inside the joint)
- His mother reports he **bled abnormally after circumcision**. He has not had any surgical procedures done. His mother thinks that **some of her family members had similar symptoms**.





# Case 9

- Findings:

1. Swollen knee (with effusion) with hotness and reduced movement.



Source:  
Williams  
Case 9

The atrophy around the joint suggest that this patient is unable to move his joint most of the times





# Case 9

## Hemophilia

- X-linked recessive disease leading to low coagulation factors (FVIII low in hemophilia A (**More common**) and FIX low in hemophilia B)
- The disease is usually inherited but **sporadic cases** (without family history, presumed due to a new mutation) **is also common**.



# Case 9

- Symptomatic patients are usually those with **severe disease (Factor level <1%)**.
- Increased bleeding episodes mainly affecting load- or strain-bearing joints (ankles, knees, and elbows).
- Recurrent bleed into particular joints lead to joint deformities and disabilities.
- Other forms of bleeding include large muscular bleed and less commonly urinary or CNS bleeding.



# Case 9

- Patient with severe disease should be treated with **replacement therapy**.
- **Factor VIII or IX should be given as prophylaxis** in order to keep level between 5-30% as this would prevent most bleeding episodes.
- This can vary according to patient life style and level of physical activity
- Additional doses may be needed to treat breakthrough bleeding or before and after surgical procedures



# **Thank you**

**(From our professor )  
&**

# **Good Luck**

**(From the Student Club academic team)**

