# Hematology

# Anemia

LEC 6

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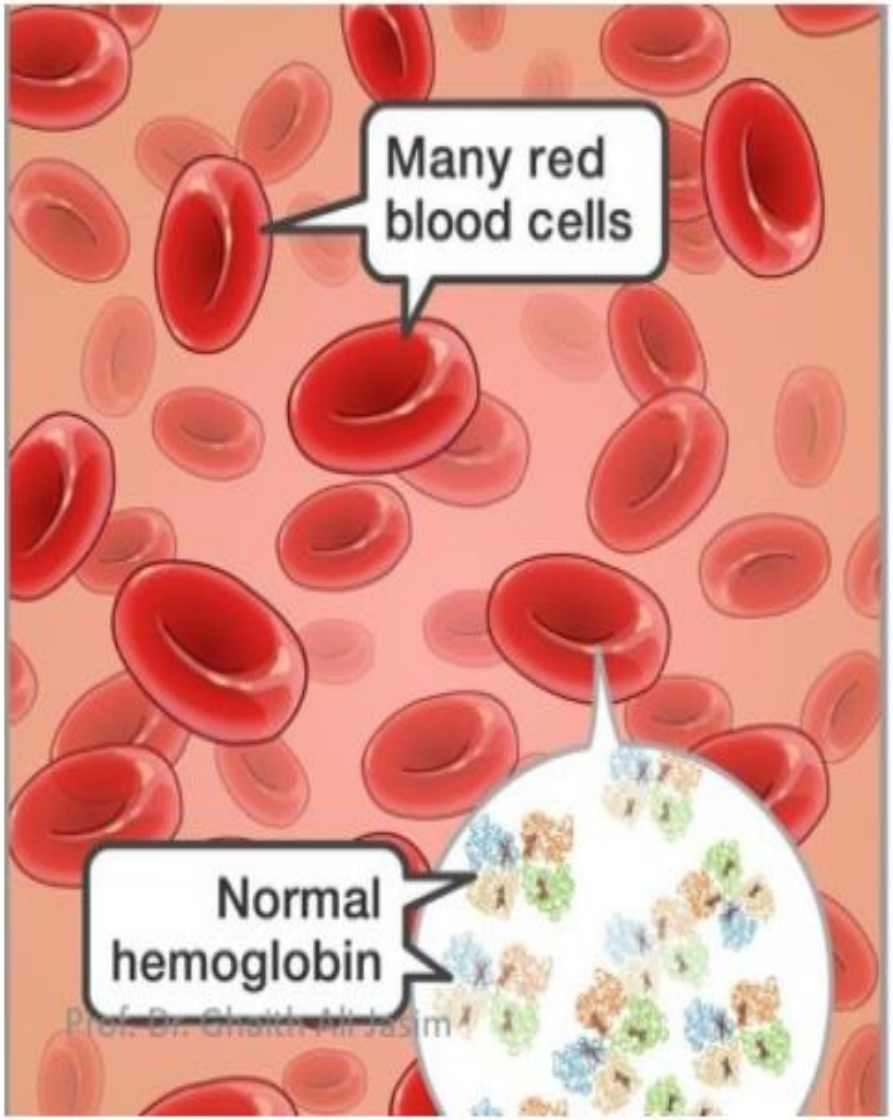
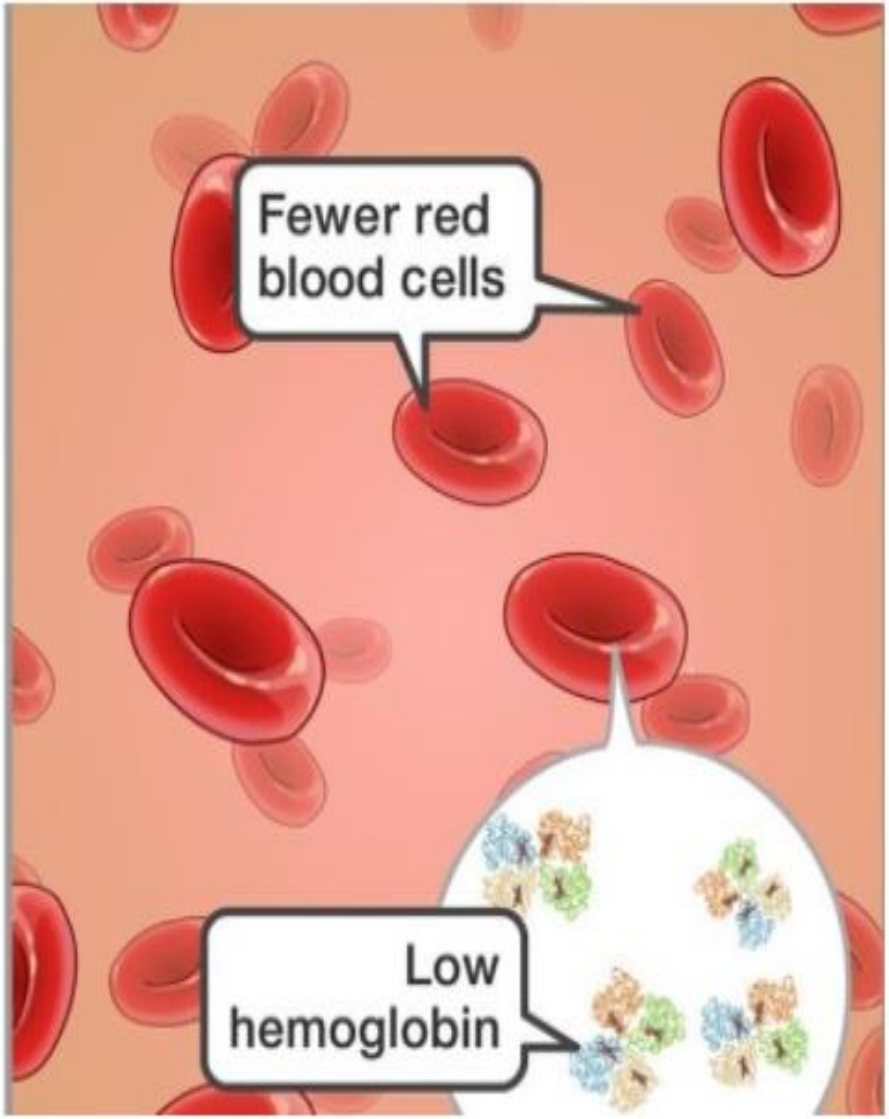
# • Anemia

- Anemia is defined as a below-normal plasma **hemoglobin concentration** resulting from a decreased number of **circulating red blood cells** or an abnormally low total **hemoglobin content** per unit of blood volume.


Many red blood cells
Normal hemoglobin


Fewer red blood cells
Low hemoglobin

- Anemia is very important subject to be studied.as there are so **many types** of it , It may occur in any age group, both sexes may be effected , some types are hereditary while other are acquired , and it may appear in any sector of the society .

- **Types of Anemia:**

- 1 - Iron deficiency anemia.
- 2 - Megaloblastic anemia.
- 3 - Pernicious anemia.
- 4 - Folate deficiency anemia.
- 5 - Hemolytic anemia.
- 6 - Thalassemia.
- 7 - Sickle cell anemia.
- 8 - Aplastic anemia.
- 9 - Sideroblastic anemia

- **Symptoms of Anemia:**

- 1 – Eyes and skin yellowing.
- 2 – Shortness of breath.
- 3 – Chest pain.
- 4 – Fainting.
- 5 – Heart attack
- 6 – Weakness.
- 7 – Changed stool color.
- 8 – Spleen enlargement

- **Additional symptoms may include:**

- **1. Hair loss.  2. Heart failure.**

- If anemia is longstanding (chronic anemia), the body may **adjust** to low oxygen levels and the individual may not feel different unless the anemia becomes severe.
- and If the anemia occurs rapidly (acute anemia), the patient may undergo **significant symptoms** relatively quickly.

- **There may be signs of specific causes of anemia:**

- **1. Koilonychia** (Spoon nails) **-** associated with Iron deficiency anemia.
- **2. Jaundice-** associated with Hemolytic or Megaloblastic anemia.
- **3. Bone deformities -** associated with Thalassemia major, and Sever congenital hemolytic anemia.
- **4. Leg ulcers-** seen in sickle-cell disease.

# Causes of Anemia

1 - Lack of iron in the body.

2 - Lack of vitamin B12 and folic acid .

3 - Not eating healthy food, which contains **vitamins**, **minerals** and **iron**.

4 - Result of some surgeries.

5 - Chronic diseases, such as diabetes.

6 - Stomach infections and liver disease.

7 - Thyroid disease.

8 - Genetic factors.

- **Classification of Anemia**

- **Classified mainly in two ways:-**
- A - According to the causes of anemia.
- B - According to the change in the shape and size of RBCs (red cell indices).

- **Classification according to the causes of anemia:**

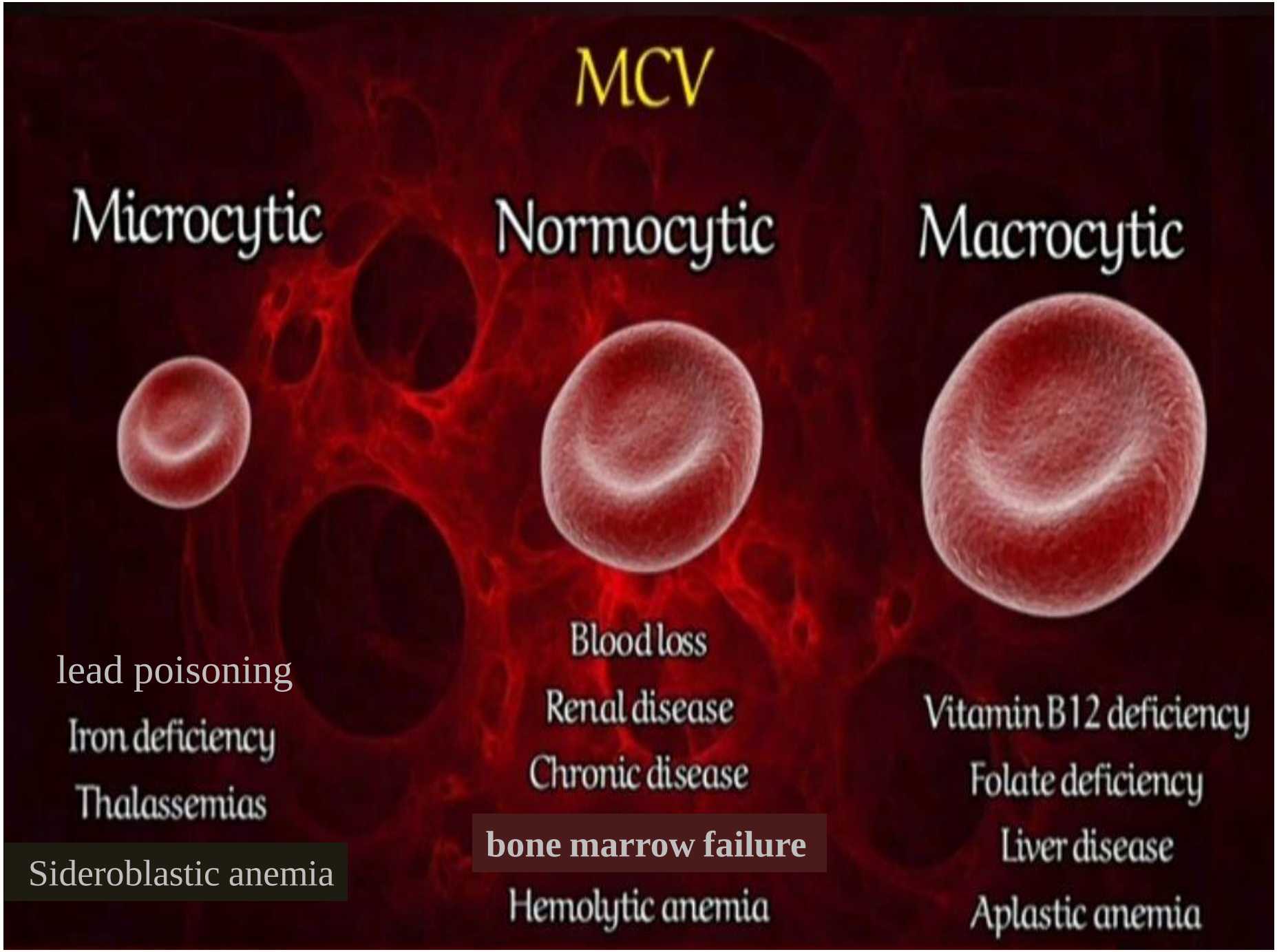
- 1 – Increase blood loss.
- 2 – Decrease of normal erythropoiesis in BM .
- 3 – Increase breakdown of RBCs.
- 4 – Age of the patient.

- **Classification According to the change in the shape and size of RBCs :**

- **1- Microcytic, hypochromic**: - MCV, MCH reduced (< 80 fl,< 27 pg.) eg. : Iron deficiency anemia, Thalassemia , lead poisoning , Sideroblastic anemia .

- **2- Normocytic, Normochromic**. :- MCV, MCH. Normal . ( MCV. 80- 100 fl. , MCH. 27-34 pg. ) .e.g. : after acute blood loss, many hemolytic anemia, bone marrow failure , Renal disease.

- **3- Macrocytic** : MCV Is raised MCV > 100 fl . eg, Megaloblastic anemia ( Vit. B12 or folate deficiency), alcohol, liver disease , Aplastic anemia .


MCV
Microcytic
Normocytic
Macrocytic
lead poisoning
Iron deficiency
Thalassemias
Sideroblastic anemia
Blood loss
Renal disease
Chronic disease
bone marrow failure
Hemolytic anemia
Vitamin B12 deficiency
Folate deficiency
Liver disease
Aplastic anemia

- **Diagnosis:**

- Diagnosing anemia usually starts with a **medical history review** and **exam by doctor**. Next, your doctor may apply for one or more of the tests below to determine the type of anemia.
- **Specialized analyses** that are not presented at all medical centers.

- **Blood tests:**

- The first test you will receive is a **complete blood count**, which measures the number of **white blood cells**, **red blood cells**, **platelets** and **Hb** in a blood sample. If test results show you have anemia, **other blood tests** may be done to identify the type and cause, including:

- 1. **Hemoglobin electrophoresis:** This test helps diagnose anemia by checking different proteins called hemoglobin in blood.

- 2. **Reticulocyte count:** A reticulocyte count shows the number of **young red blood cells** in blood to determine if your bone marrow is making them at the right rate.

- 3. **Serum iron and serum ferritin:** These tests check the amount of iron in blood and body.

- 4. **Peripheral blood smear:** A peripheral smear assesses whether the **size** and **shape** of red blood cells have changed due to anemia.

- 5. **Osmotic fragility:** This test determines if red blood cells have become more fragile than usual.

- **Tests related to underlying conditions:**

- If doctor thought that an underlying chronic disease or iron deficiency is causing anemia, one or more of the **following tests** may be **optional** to diagnose your condition.

- 1. **Stool sampling:** If doctor thinks bleeding internally, may need to provide a stool sample for testing.

- 2. **Urine analysis:** Urine analysis can reveal the presence or absence of specific substances that help identify which anemia-related condition.

- 3. **Endoscopy:** Endoscopy is a procedure used to visually examine **upper digestive system** for signs of bleeding, using a tiny camera on the end of a long, flexible tube. If necessary, cell samples can be taken for examination under a microscope (biopsy) by a pathologist.

- 4. **Colonoscopy:** This test involves passing a lighted tube through the rectum to search for **tumors** or other problems in the **large intestine** and surrounding areas.

- 5. **Bone marrow biopsy:** A bone marrow sample may be taken for examination by a **pathologist** to determine if your bone marrow, the body's blood factory, is working correctly or has abnormalities.

- 6. **Genetic tests and counseling:** If doctor suspects that your anemia is related to a **genetic condition**, a consultation with a genetic counselor may be recommended.

# Thank You For Listening