Blood pathology 2

LEUKEMIA

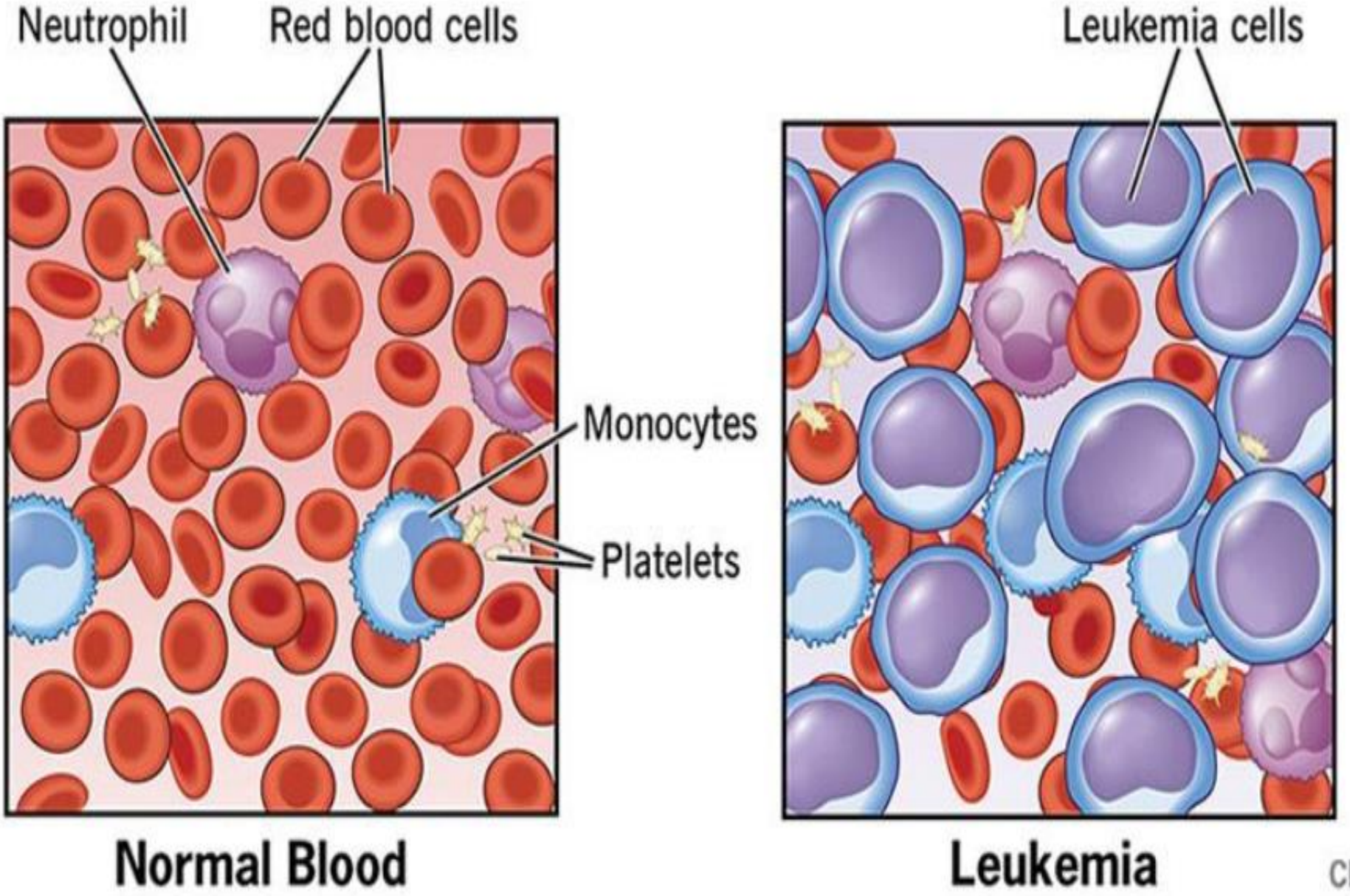
Dr. Mohamed kamel kudi

- The word Leukemia comes from the Greek **leukos** which means "white" and **aima** which means "blood" (blood cancer). It defines the production of **abnormal leukocytes** (immature and undifferentiated).
- As leukemia progresses, the bone marrow produces more abnormal blood cells and fewer normal blood cells. As the **abnormal blood cells** build up in the blood, they can spread to the lymph nodes, spleen, liver, lungs and kidneys.

Without treatment, many of the body's functions will be increasing affected.

- The **leukemias** are a group of disorders characterized by the accumulation of **malignant white cells** in the bone marrow and blood, it is occur by the rapid production of abnormal white blood cells.

These abnormal white blood cells are not able to fight infection and impair the ability of the bone marrow to produce red blood cells and platelets.


Neutrophil
Red blood cells
Monocytes
Platelets
Normal Blood
Leukemia cells
Leukemia

- Patients with untreated acute leukemia's may survive from several weeks to several months, while patients with untreated chronic leukemia may survive from several months to several years.

- Based on the rapidity of proliferation, they can be **classified** as **acute** or **chronic**, and myeloid or lymphoid based on the cell of origin.

- Subtypes are **acute myeloid leukemia** (AML) and **chronic myeloid leukemia** (CML), involving the myeloid lineage;

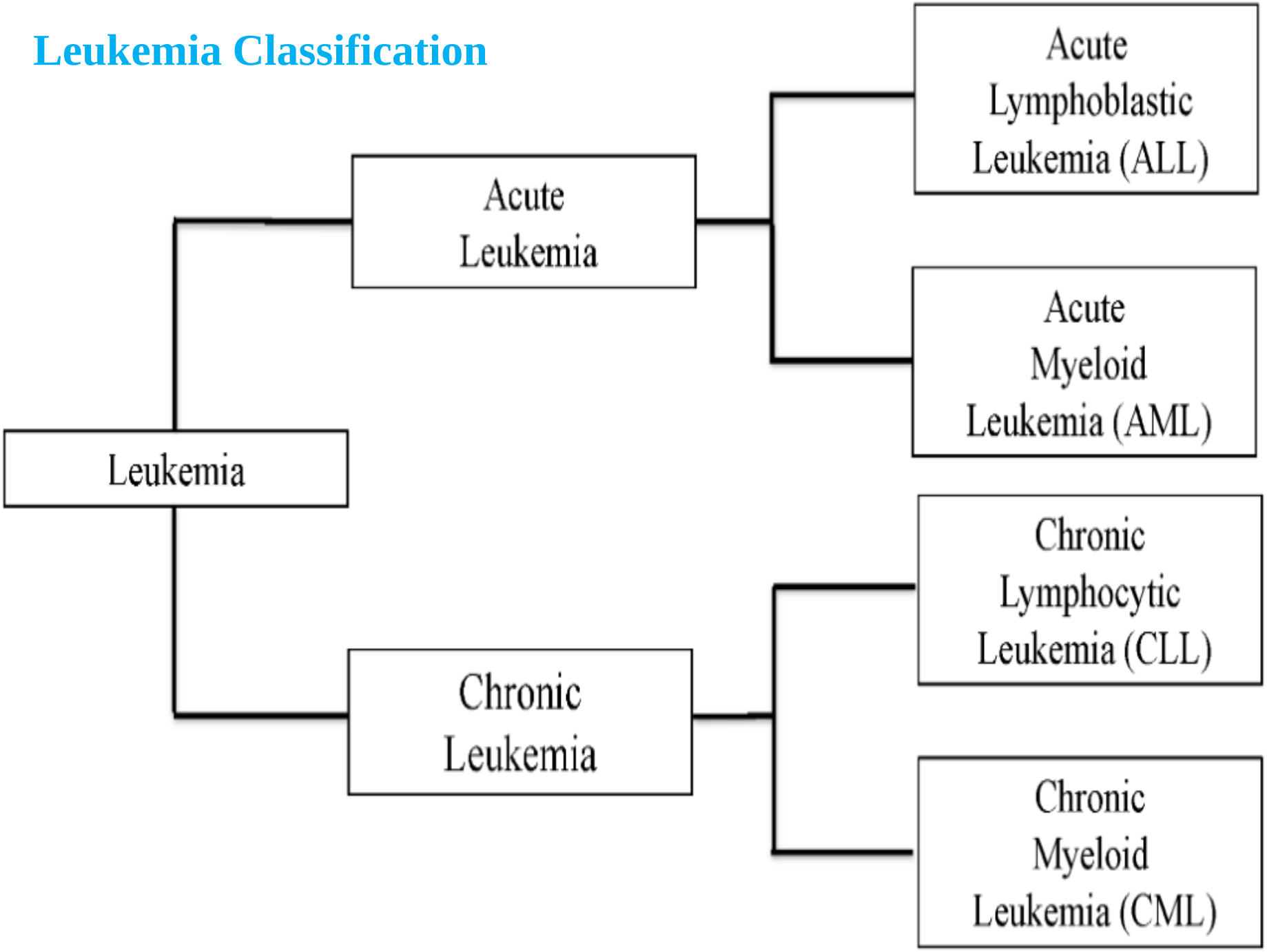
acute lymphoblastic leukemia (ALL), and **chronic lymphocytic leukemia** (CLL) involving the lymphoid chain.

- **Classification**

- ❖ **Acute**
- 1. Acute myeloid leukemia : M0-M7
- 2. Acute lymphoblastic leukemia : L1-L3

- ❖ **Chronic**
- 1. Chronic myeloid leukemia
- 2. Chronic lymphoid leukemia

Leukemia Classification



- **Pathogenesis of Leukemia:**
- The **malignant transformation** occurs in the haemopoietic stem cell or early progenitors
- **Genetic damage** is caused by**:**
- 1- increased rate of proliferation
- 2- reduced apoptosis
- 3- a block in cellular differentiation.
- Together these events cause accumulation of the early bone marrow haemopoietic cells which are known as **blast cells**.

The dominant clinical feature of Leukemia.

- 1- Bone marrow failure caused by accumulation of blast cells
- 2- organ infiltration.

- **Acute leukemia** is rapidly progressing diseases that affect cells which are not fully developed. These cells cannot carry out their normal functions.
- **Chronic leukemia** usually progresses slowly, and patients have greater numbers of mature cells. these mature cells can carry out some of their normal functions.
- With **myeloid leukemia**, a cancerous change begins in a marrow cell that forms certain blood cells-that is, red cells, some types of white cells and platelets.
- With **lymphocytic leukemia**, the cancerous change begins in a marrow cell that forms lymphocytes (another type of white cell).

- **Causes of leukemia**

- Until this time, we can't exactly say the cause, but different types of exposures and conditions lead to leukemia :

- 1 **- Ionizing radiation**: It was shown that many of the survivors from atomic bomb of Heroshima and Nagazaki developed leukemia, and patients who are exposed to radiation as therapy (e.g breast cancer patients) can develop leukemia.

- 2- **Cytotoxic drugs:** Patients with lymphoma who are treated with cytotoxic drugs were shown to develop leukemia in the late stages of the disease.

- 3- **Chemicals:** Exposure to petrochemicals such as benzene, hair dyes and pesticides can result in the development of some forms of leukemia.

- 4- **Viruses:** Some types of leukemia can be caused by certain viruses e.g infection with HIV and Epstein Barr virus was proved to cause some types of leukemia.

- 5 - **Genetic predisposition**: Leukemia in identical twins has more chance to develop than the general population. Down's syndrome was shown to be associated with acute leukemia. About 90% of patients with **chronic myeloid leukemia** have the abnormal Philadelphia chromosome, and Fanconi anemia is a risk factor for developing **acute myeloid leukemia**.

- 6- **Smoking, alcoholism and some infections**

- **Symptoms of leukemia**
- 1 - A lack in blood platelets, so patients may be easily bruised, bleeding or develop petechiae.

- 2 - leukemia causes leukocytes suppressed or become dysfunctional, therefore, the patient's immune system becomes unable to fight infections.

This mechanism makes **leukemia patients** to be exposed to various infections, such as tonsillitis, sores in the mouth, diarrhea and pneumonia.

- 3 - Red blood cell deficiency leads to anemia, which may cause dyspnea and pallor.

- 4 - Other symptoms include fever, chills , night sweats, flu-like symptoms, fatigue, nausea, headache, weight loss and enlarged lymph nodes, liver and spleen.

- **Diagnosis:**

To diagnose leukemia, doctors use **certain diagnostic tests** and procedures, such as:

• Physical examination: Doctors examine the lymph nodes, spleen and liver to check if there is any swelling.

• Blood tests: Blood tests determine the number of blood cells and platelets. They are also used to identify any abnormalities in the blood cells.

- Bone marrow biopsy to check for cancer cells.

- Genetic testing to examine the **genetic material** in the bone marrow, blood cells and lymph nodes.

- Lumbar puncture (spinal tap): to collect cerebrospinal fluid and detect any cancer cells in another fluid that surrounds the brain and spinal cord.

Thank You For Listening