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Paper WBCs and Platelets disorders

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Q.1 What is leucopoiesis, and also explain its types?

LEUCOPOIESIS is the “Formation and maturation of white blood cells” in which the process of making leukocytes, is stimulated by various colony-stimulating factors (CSFs), which are hormones produced by mature white blood cells. The development of every white blood corpuscle begins with the division of the hemopoietic stem cells into one among the subsequent “blast” cells:

Types of leucopoiesis

Leucopoiesis can be divided into two types:

1. myelopoiesis
2. lymphopoiesis.

Myelopoiesis

It is the types of leucopoiesis in which the white blood cells formed in the bone marrow area stored within the marrow until they are needed in the circulatory system. Then when the necessity arises various factors cause them to be released. Myelopoiesis is also defined as the development of non-lymphoid leukocytes.

Lymphopoiesis

Lymphopoiesis refers to the process by which the cellular components of the immune system (i.e., T cells, B cells, and natural killer cells, and certain dendritic cells) are produced during hematopoietic differentiation. This process begins with the hematopoietic stem cell and continues through progenitor stages down a series of mostly diverging lineage pathways, ultimately resulting in the remarkable diversity and flexibility of the immune system.

Q2. Compare all phases (Chronic, Accelerated, Blast) of CML?

1 Chronic phase

Approximately 85% of patients are within the chronic phase at the time of diagnosis

Asymptomatic or have only mild symptoms

Blast less than 10 %

No splenomegaly

No anemia

Thrombocytosis

Duration is variable

May progress to accelerated phase

2 Accelerated phase

10-19% blast in the blood or bone marrow

>20% basophils in the blood or bone marrow

Platelets counts less than 100,000 unrelated to therapy

Platelets count >100,000 unresponsive to therapy

In addition to the Philadelphia chromosome, other chromosomal abnormalities may be present

Marked splenomegaly and increasing white blood corpuscle count unresponsive to therapy

3 Blast crises

The final phase in the evolution of CML

Behaves like an acute leukemia

Rapid progression and short survival

Diagnosis based on the presence of

20% myeloblasts or lymphoblasts within the blood or bone marrow

Large cluster of blast in the bone marrow on biopsy

Development of chloroma solid focus of leukemia outside on the bone marrow

Q3. Explain Leukemia and its causes?

Leukemia may be a sort of cancer of the blood or bone marrow characterized by an abnormal increase of immature white blood cells called "blasts". Leukemia is a malignant progressive disease in which the bone marrow & other blood-forming organs produce increased no. of immature/abnormal leucocytes, these suppress the production of normal blood cells, leading to anemia & other symptoms, which are all known as hematological neoplasms.

Causes of leukemia

The exact explanation for leukemia isn't known, but it's thought to involve a mixture of genetic and environmental factors. Leukemia cells have acquired mutations in their DNA that cause them to grow abnormally and lose functions of typical white blood cells.

Following are the few causes of leukemia:

Working with certain chemicals

Exposure to high levels of benzene within the workplace can cause leukemia. Benzene is used widely in the chemical industry. Formaldehyde is also used by the chemical industry. Workers exposed to formaldehyde also could also be at greater risk of leukemia.

Very high levels of radiation

People exposed to very high levels of radiation are far more likely than others to develop leukemia. Medical treatment that uses radiation is often another source of high-level exposure. Radiation used for diagnosis, however, exposes people to much lower levels of radiation and isn't linked to leukemia.

Smoking

Tobacco products are the only, major avoidable explanation for cancer. Smoking is also causally associated with cancers of the pancreas, kidney, bladder, stomach, and cervix and with myeloid leukemia.

Down syndrome and certain other genetic diseases

Some diseases caused by abnormal chromosomes may increase the danger of leukemia.

Q4 .Differentiate between Acute and Chronic leukemia?

Acute Leukemia

Acute leukemia develop from early cells, called "blasts". Blasts are young cells that divide frequently. They target immature cells, causing symptoms to seem quickly. In leukemia cells, they do not stop dividing like their normal counterparts do.

- it progress rapidly
- it causes severe illness
- it heal without complication
- it is prominent
- it needed immediate treatment

Chronic Leukemia

The cells thrive for too long and accumulate. The cells grow slowly. It is not unusual in chronic cases for symptoms to take a long time to even appear.

- it progress slowly
- it can be asymptomatic
- It arises complication
- It is mild
- Treatment can be delayed

Q5. Discuss Rai Classification of chronic lymphocytic leukemia?

Rai classifies the leukemia according to whether a patient has, or does not have, any of the following: Lymphocytosis, which means there are high levels of lymphocytes in the blood.

Rai staging system:

Stage 0- lymphocytosis without clinical symptoms

Stage 1- lymphocytosis with lymphadenopathy

Stage 2 – lymphocytosis with splenomegaly

Stage 3- anemia with Hb< 100g/l whatever the oter signs

Stage 4- thrombocytopenia< 100 000/ microL whatever the other signs

Q6.Explain chronic myeloid leukemia causes and symptoms?

Chronic myeloid leukemia

Chronic myeloid leukemia (CML) is a type of cancer that affects the blood and bone marrow. In CML the bone marrow produces too many white cells, called granulocytes. These cells (sometimes called blasts or leukemic blasts) gradually crowd the bone marrow, interfering with normal blood cell production.

Causes of CML

- The initiating factor of CML is still unknown, but exposure to ionizing radiation
- Increased prevalence among survivors of the atomic bombing of Hiroshima and Nagasaki.
- Radiotherapy for a cancer in the past
- Benzene

Symptoms of CML

- Fatigue, malaise
- Weight loss
- Early satiety
- Left upper quadrant pain or mass
- Easy bruising, bleeding
- Fever