**Name: Muhammad Hussain**

**Id: 16251**

**MLT 2nd semester Section A**

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**Q: Explain the following;**

1. **Leukopenia:**

 Leuko mean white and penia meaning deficiency.

Leukopenia is decrease in the number of leukocytes. Found in the blood, they are the white blood cells, and are the body's primary defence against infection. Thus leukopenia places individuals at increased risk of infection.

Symptoms may include mouth or skin sores, sore throat, cough, trouble breathing, feeling light-headed, fever, chills, or body aches.

1. **Lymphocytosis:**

 Lymphocytosis (lim-foe-sie-TOE-sis), or a high lymphocyte count, is an increase in white blood cells called lymphocytes. Lymphocytes help fight off diseases, so it's normal to see a temporary increase after an infection.

A count significantly higher than 3,000 lymphocytes in a microliter of blood is generally considered to be lymphocytosis in adults.

Specific Causes of Lymphocytosis:

* Acute lymphocytic leukemia
* Chronic lymphocytic leukemia
* Cytomegalovirus (CMV) infection
* Hepatitis A
* Hepatitis B
* Hepatitis C
* HIV/AIDS
* Hypothyroidism (underactive thyroid)
* Lymphoma
* Mononucleosis
* Other viral infections
* Syphilis
* Tuberculosis
* Whooping cough
1. **Lymphopenia:**

 A condition in which there is a lower-than-normal number of lymphocytes (a type of white blood cell) in the blood. Also called lymphocytic leukopenia and lymphocytopenia.

Lymphopenia is a reduced amount of these cells in your blood. During an infection such as COVID-19, white blood cells attack, attach to and help induce the production and secretion of chemicals that help fight the virus.

White blood cells are an important part of the body's defense system. They fight infections and play a role in inflammation, as well as in allergic reactions. Lymphocytes exist in both the blood and the lymphatic system. They are three different types:

1) B lymphocytes (B cells) produce antibodies.

2) T lymphocytes (T cells) recognize foreign substances and process them for removal.

3) Natural killer cells (NK cells) directly attack and kill abnormal cells such as cancer cells or viruses.

1. **Basophilia:**

 Basophilia is the condition of having greater than 200 basophils/μL in the venous blood.

Basophils are a type of white blood cell. These cells are produced in your bone marrow.

White blood cells are part of your immune system. They release special enzymes to help protect your body against viruses, bacteria, and other foreign invaders.

Normally, basophils make up less than 1 percent of your circulating white blood cells. A healthy range is 0 to 3 basophils in each microliter of blood.

A low basophil level is called basopenia. It can be caused by infections, severe allergies, or an overactive thyroid gland.

An abnormally high basophil level is called basophilia. It can be a sign of chronic inflammation in your body. Or it can mean that a condition is causing too many white blood cells to be produced in your bone marrow.

1. **Neutrophilia:**

Neutrophilia is an increase in circulating neutrophils above that expected in a healthy individual of the same age, sex, race and physiological status. This represents an increase in the neutrophil count above 7.5 x 109/l and is one of the most frequently observed changes in the FBC.

Neutrophilia refers to a higher than normal number of neutrophils on a CBC with differential. Neutrophilia may result from a shift of cells from the marginal to the circulating pool (shift neutrophilia) without an increase in the total blood granulocyte pool (TBGP) or from a true increase in TBGP size (true neutrophilia).

During established infection, the neutrophil count remains elevated, with equal numbers in the marginal and the circulating pool. During the recovery phase, the flow of cells from the marrow decreases, with a resultant decrease in the number of neutrophils.

The adequate production and distribution of normally functioning neutrophils is vital to host defense. During an infection, chemotactic agents are generated that attract neutrophils to the site of

infection, which in turn play a critical role in phagocytosing and killing microorganisms.

1. **Thrombocytosis:**

 Thrombocytosis is a condition in which there are an excessive number of platelets in the blood. Platelets are blood cells in plasma that stop bleeding by sticking together to form a clot. Too many platelets can lead to certain conditions, including stroke, heart attack, or a clot in the blood vessels.

 There are two types of thrombocytosis: primary and secondary. Primary thrombocytosis,

* Primary thrombocytosis:

 also known as essential thrombocythemia

 a disease in which abnormal cells in the bone marrow cause an increase in platelets. The cause is unknown. It is not considered an inherited (family) condition despite the finding of certain gene mutations in the blood or bone marrow.

* Secondary thrombocytosis:

Secondary thrombocytosis is caused by another condition the patient may be suffering from, such as:

* Anemia due to iron deficiency
* Cancer
* Inflammation or infection
* Surgery, especially splenectomy (removal of the spleen)
1. **Thrombocytopenia:**

 Thrombocytopenia is a condition in which you have a low blood platelet count. Platelets (thrombocytes) are colourless blood cells that help blood clot. Platelets stop bleeding by clumping and forming plugs in blood vessel injuries.

Thrombocytopenia might occur as a result of a bone marrow disorder such as leukemia or an immune system problem. Or it can be a side effect of taking certain medications. It affects both children and adults.

Thrombocytopenia can be mild and cause few signs or symptoms. In rare cases, the number of platelets can be so low that dangerous internal bleeding occurs. Treatment options are available.

Symptoms;

thrombocytopenia signs and symptoms may include:

* Easy or excessive bruising (purpura)
* Superficial bleeding into the skin that appears as a rash of pinpoint-sized reddish-purple spots (petechiae), usually on the lower legs
* Prolonged bleeding from cuts
* Bleeding from your gums or nose
* Blood in urine or stools
* Unusually heavy menstrual flows
* Fatigue
* Enlarged spleen
1. **Polycythemia:**

 Polycythemia refers to an increase in the number of red blood cells in the body. The extra cells cause the blood to be thicker, and this, in turn, increases the risk of other health issues, such as blood clots.

Polycythemia can have different causes, each of which has its own treatment options. The treatment of polycythemia involves treating any underlying conditions, if possible, and finding ways to bring blood cell levels down.

• There are two types of polycythemia, which have different causes.

* Primary polycythemia:

 Primary polycythemia is also called polycythemia vera (PV).

PV is a rare, slow growing blood cancer that is a type of condition known as a myeloproliferative neoplasm. PV causes the bone marrow to create excess precursor blood cells that develop and function abnormally, leading to the production of too many red blood cells.

A person with PV may also have increased numbers of other blood cells, such as white blood cells or platelets.

* Secondary polycythemia:

 Secondary polycythemia can occur if the increase in red blood cells is not due to the myeloproliferative disease of PV.

The overproduction of blood cells in secondary polycythemia is limited to the red blood cells.

Causes of secondary polycythemia include:

Being at a very high altitude.

Obstructive sleep apnea.

Certain types of tumor.

Heart or lung disease that causes a low oxygen level in the body.

1. **Anemia:**

 Anemia is a condition in which you lack enough healthy red blood cells to carry adequate oxygen to your body's tissues. Having anemia can make you feel tired and weak.

There are many forms of anemia, each with its own cause. Anemia can be temporary or long term, and it can range from mild to severe. See your doctor if you suspect that you have anemia. It can be a warning sign of serious illness.

* Types;

Aplastic anemia

Iron deficiency anemia

Sickle cell anemia

Thalassemia

Vitamin deficiency anemia

* Symptom:

Anemia signs and symptoms vary depending on the cause. If the anemia is caused by a chronic disease, the disease can mask them, so that the anemia might be detected by tests for another condition.

Depending on the causes of your anemia, you might have no symptoms. Signs and symptoms, if they do occur, might include:

•Fatigue

•Weakness

•Pale or yellowish skin

•Irregular heartbeats

•Shortness of breath

•Dizziness or lightheadedness

•Chest pain

•Cold hands and feet

•Headaches

1. **Leukemia:**

 Leukemia is cancer of the body's blood-forming tissues, including the bone marrow and the lymphatic system.

Many types of leukemia exist. Some forms of leukemia are more common in children. Other forms of leukemia occur mostly in adults.

Leukemia usually involves the white blood cells. Your white blood cells are potent infection fighters — they normally grow and divide in an orderly way, as your body needs them. But in people with leukemia, the bone marrow produces abnormal white blood cells, which don't function properly.

* Symptoms:

Leukemia symptoms vary, depending on the type of leukemia. Common leukemia signs and symptoms include:

•Fever or chills

•Persistent fatigue, weakness

•Frequent or severe infections

•Losing weight without trying

•Swollen lymph nodes, enlarged liver or spleen

•Easy bleeding or bruising

•Recurrent nosebleeds

•Tiny red spots in your skin (petechiae)

•Excessive sweating, especially at night

•Bone pain or tenderness.

1. **Reticulocytosis:**

Reticulocytosis is a condition where there is an increase in reticulocytes, immature red blood cells. It is commonly seen in anemia. They are seen on blood films when the bone marrow is highly active in an attempt to replace red blood cell loss such as in haemolytic anaemia, haemorrhage.

Reticulocytosis may be due to posthemorrhagic blood loss or hemolysis. Reticulocytes are immature red cells released in response to decreased hematocrit levels.

Long-term alcohol intake directly affects bone marrow. This effect is not related to the presence of liver disease or vitamin deficiency and resolves only after months of abstinence from alcohol.

Reticulocytosis encountered in patients recovering from impaired erythropoiesis (e.g., an individual with pernicious anemia who received an injection of cobalamin 1 week earlier).

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