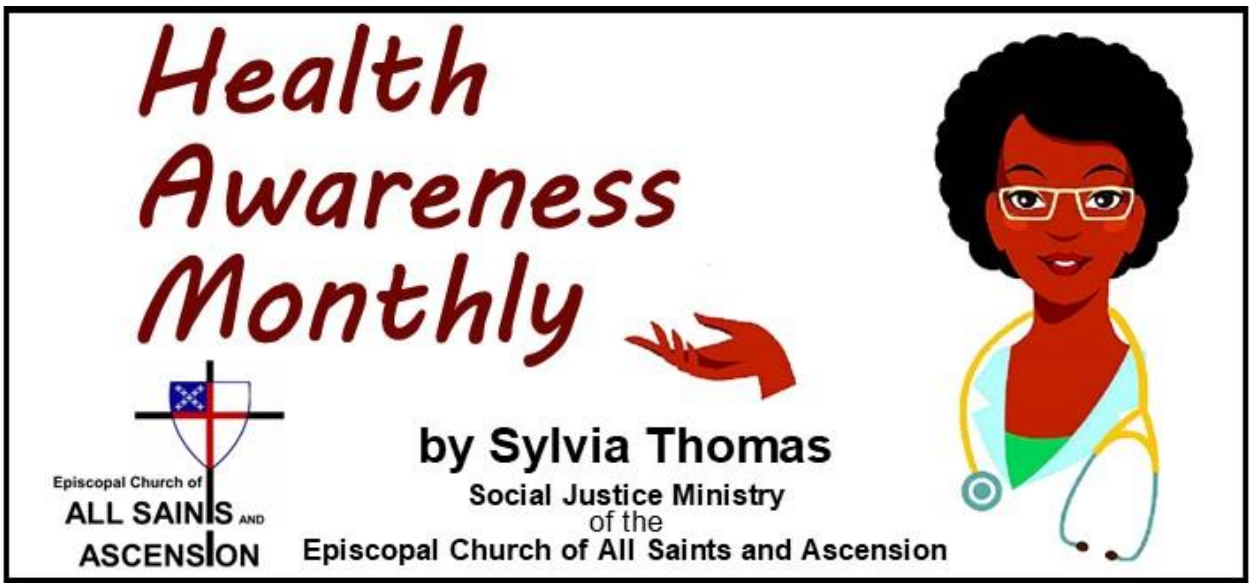
September 2021 Edition



Blood and Blood Cancer Awareness

Blood is a constantly circulating fluid in the body, providing the cells with nutrition, oxygen and waste removal. Blood is mostly liquid, with numerous cells and proteins suspended in it, making blood, “thicker“ than pure water.

The average person has about 5 liters (more than a gallon) of blood.

The liquid part of blood, called plasma makes up about half of the content of blood. Plasma contains proteins, glucose and other nutrients that help blood to clot, transport substances through the blood and perform other functions.

The other half of the volume of blood is composed of blood cells, the most common of which are:

- Red blood cells carry oxygen to the tissues
- White blood cells (there are different types) fight infections
- Platelets help blood to clot.

Blood is conducted through the blood vessels (arteries and veins) and is prevented from clotting in the blood vessels by their smoothness and the finely tuned balance of the clotting factors.

What are blood and Bone marrow cancers

Blood cancers are also called hematologic cancers. They occur when abnormal blood cells start growing out of control, interrupting the function of normal blood cells which is to fight off infection and produce new blood cells.

Bone Marrow:

Bone marrow is the spongy tissue inside the bones. This tissue contains stem cells which produce the blood cells. Stems cells are the raw materials from which all other cells with specialized functions are generated.

Types of blood and bone marrow cancers:

There are three main types of blood and bone marrow cancers and their sub-groups.

1. **Leukemia:** is a blood disorder that originates in the blood and bone marrow and usually affects the white blood cells. This occurs due to damage to the DNA of the immature white blood cells. The cells then grow and divide rapidly, and do not die like they would normally, therefore they accumulate and eventually overtake the normal cells.

   There are several sub types of Leukemia:

   - **AML** -Acute Myelogenous Lymphoma: Occurs when the cancer is in the type of bone marrow that produces red blood cells, other types of white blood cells and platelets.
   - **ALL**- Acute Lymphocytic Leukemia; occurs when the type of marrow that makes lymphocyte is affected.
   - **CLL**- Chronic Lymphocytic Leukemia; Develops from a type of white blood cell called the B-cells. It progresses slowly, usually affecting older adults. It may not cause any symptoms for years.
   - **CML-** Chronic Myeloid Leukemia. It is caused by a chromosome mutation that occurs spontaneously. This change forms an abnormal gene which turns the cell into a CML cell. The CML cell grows and

divides, building up in the bone marrow, and spilling over into the blood. In time, the cells can also settle into other parts of the body including the spleen. It is a slow growing leukemia, but it can change into a fast growing, acute leukemia that can be hard to treat. CML occurs mostly in older adults.

2. **Lymphoma:** is a blood cancer that develops in the lymphatic system from cells called lymphocytes, a type of blood cell that helps the body fight infection. White blood cells multiply abnormally inside lymph nodes and other tissues. The enlarging tissues and disruption of the blood's function can eventually cause organ failure.

   Subtypes include:

   -Hodgkin's lymphoma

   -Non-Hodgkin's Lymphoma

   -Burkitt lymphoma

   -Mantle cell lymphoma

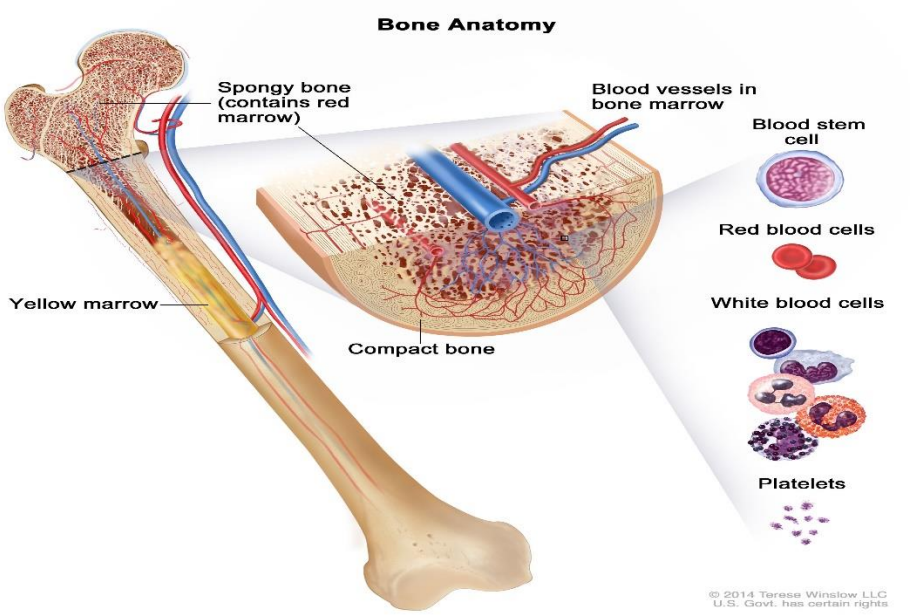
   -Follicular lymphoma

   -Diffused Large B-Cell Lymphoma (DLBCL)

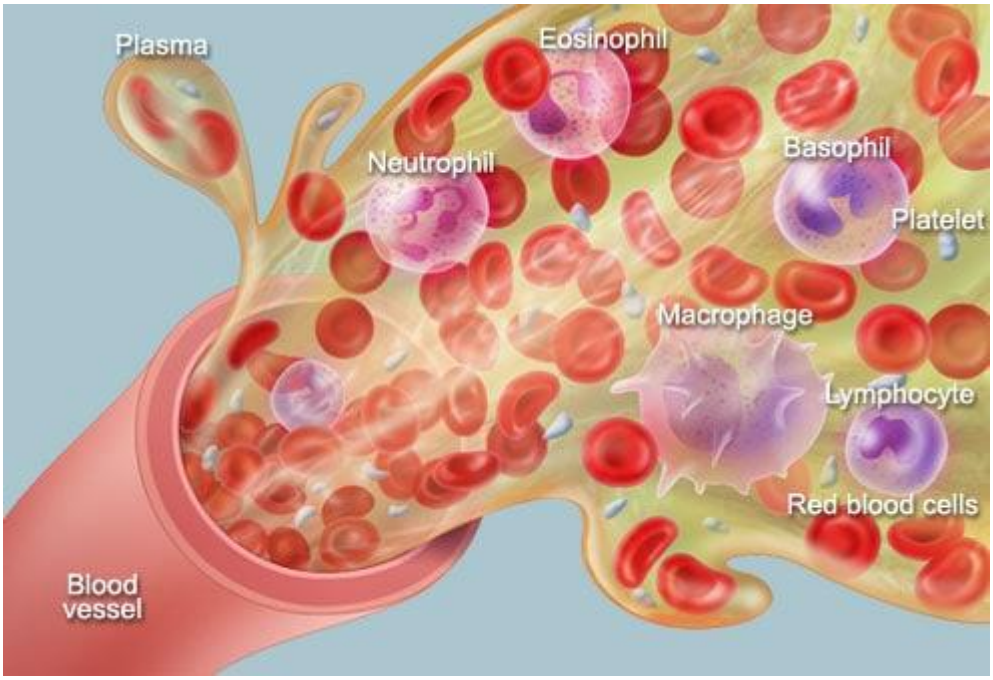
   -Small Lymphocytic Lymphoma

   -Waldenstrom Macroglobulinemia (Lymphoplasmacytic Lymphoma)

3. **Multiple Myeloma:** is a blood cancer that begins in the plasma cells of the blood. Plasma cell is a type of white blood cell made in the bone marrow. It is similar to leukemia. Anemia, kidney failure and a high blood calcium are common in Multiple Myeloma.



Picture of blood



Other common Blood conditions include:

-Anemia: An abnormally low number of Red blood cells in the blood. People usually have fatigue, shortness of breath and dizziness, but sometimes there are no noticeable symptoms.

-Hemolytic Anemia: Anemia caused by the rapid rupturing of large numbers of blood cells (hemolysis). This can be caused by an immune system malfunction.

-Hemochromatosis: A disorder that causes excessive levels of iron in the blood. The iron deposits are usually in the liver, pancreas and other organs, and cause organ damage as well as diabetes in some cases.

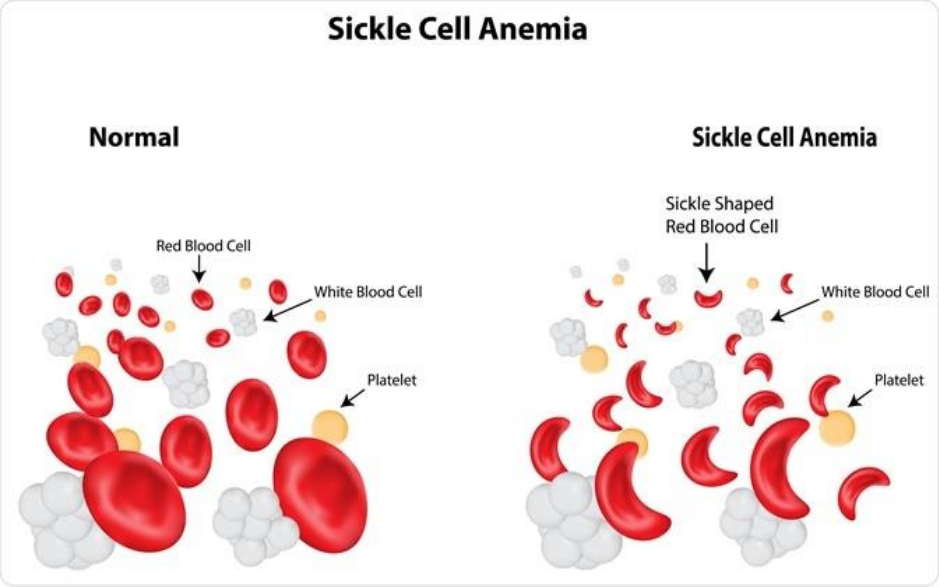
-Bacteremia: Bacterial infection of the blood, which can be very serious if not treated immediately, and may require hospitalization with continuous infusion of antibiotics.

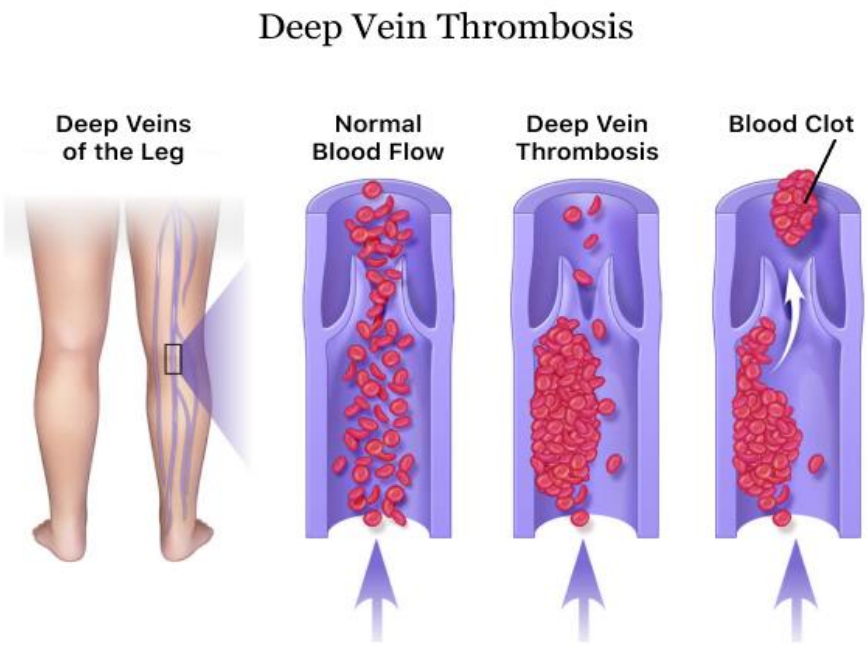
-Thrombocytopenia: An abnormally low number of platelets in the blood. This causes blood not to form clots and may lead to severe bleeding.

-Leukopenia: An abnormally low number of white blood cells in the blood. This can result in difficulty in the body's mechanism for fighting infections.

Polycythemia: an abnormally high number of red blood cells in the blood. This can result from low oxygen levels in the blood or as a result of some form of cancer.

- Sickle Cell Disease: A genetic condition in which red blood cells periodically lose their proper shape (appearing like sickles, instead of discs). The deformed blood cells are deposited in the tissues and joints, causing pain and organ damage.





Deep Vein Thrombosis (DVT): This is a blood clot in the deep veins, usually in the legs, but can occur in the arms and neck as well. DVT's are dangerous because they may become dislodged and travel to the lungs causing pulmonary embolism, or to the vessels of the heart, causing a myocardial Infarction (heart attack), or to the blood vessels of the brain, causing a stroke.

Signs and Symptoms of blood and bone marrow cancer:

Fever, chills, persistent fatigue /weakness, loss of appetite, nausea/vomiting, unexplained weight loss, night sweats, bone or joint pain, abdominal discomfort, headaches, shortness of breath, frequent infections, itchy skin, skin rash, swollen lymph nodes in the neck, armpits or groin, enlarged liver or spleen, tiny red spots on the skin, easy bruising, cuts that bleed a lot, bleeding gums, blood in urine, stool or sputum.

Treatment:

These symptoms may be quite generic, however, having one or other of these may need to be checked out by your physician who may initially order routine

testing, but further work-up will be warranted if the initial test results are abnormal.

Depending on the diagnosis, treatment can be initiated. Treatment may include a single protocol such as chemotherapy (which can be a single or multiple drugs), Immunotherapy, radiation therapy or stem cell transplant as the case may be. Newer therapies include CAR-T therapy. There are also several clinical trial studies that patient who meet the criteria can be enrolled in.

Blood and platelet transfusion may also be needed as part of the treatment.

Fun fact:

Octopuses and horseshoe crabs have blue blood. This is because the protein transporting oxygen in their blood, **HEMOCYANIN**, is actually blue.

Human blood is red because **HEMOGLOBIN** which functions to transport oxygen in the blood is rich in iron and therefore red in color.

References:

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