

Leukopenia Explained: Causes, Symptoms, and Treatment

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DESCRIPTION

Leukopenia is a medical condition characterized by a reduced number of white blood cells (leukocytes) in the bloodstream. White blood cells are an essential part of the immune system, responsible for defending the body against infections, bacteria, viruses, and other harmful pathogens. When their number drops below normal levels, the body becomes more vulnerable to infections and may struggle to fight even minor illnesses. Leukopenia is not a disease on its own but rather a sign of an underlying health problem, medication effect, or physiological condition.

White blood cells include several types, such as neutrophils, lymphocytes, monocytes, eosinophils, and basophils. Among these, neutrophils are the most important in fighting bacterial infections. A specific type of leukopenia called neutropenia refers to a low neutrophil count and is one of the most clinically significant forms because it greatly increases the risk of serious infections.

Causes of leukopenia

Leukopenia can occur due to a wide range of causes, including infections, bone marrow disorders, medications, autoimmune diseases, nutritional deficiencies, and certain cancers.

One of the most common causes is viral infections. Conditions such as influenza, hepatitis, and other viral illnesses can temporarily suppress bone marrow function, leading to reduced white blood cell production. In many cases, leukopenia caused by viral infections is temporary and resolves once the infection clears.

Bone marrow disorders are another major cause. The bone marrow is responsible for producing blood cells, including white blood cells. Diseases such as aplastic anemia, leukemia, and myelodysplastic syndromes can directly damage or suppress bone marrow function, leading to decreased production of leukocytes.

Certain medications can also cause leukopenia as a side effect. Chemotherapy drugs are well known for suppressing bone marrow activity because they target rapidly dividing cells, including cancer cells and healthy blood-forming cells. Other

medications, such as some antibiotics, antipsychotics, and immunosuppressive drugs, may also reduce white blood cell counts.

Autoimmune diseases, including Systemic Lupus Erythematosus (SLE), can lead to leukopenia because the immune system mistakenly attacks white blood cells or the bone marrow. In these cases, the body's defense system becomes overactive and destroys the very cells meant to protect it.

Nutritional deficiencies, particularly deficiencies in vitamin B12, folate, and copper, can impair white blood cell production. Without these essential nutrients, the bone marrow cannot function properly, resulting in lower cell counts.

Certain cancers, especially those affecting the blood and bone marrow, such as leukemia and lymphoma, can interfere with normal white blood cell production and lead to leukopenia.

Radiation exposure, severe stress on the body, and chronic illnesses may also contribute to reduced white blood cell levels.

Symptoms

Leukopenia itself does not always cause direct symptoms. Instead, symptoms usually appear due to the infections that develop because of a weakened immune system. When white blood cell counts are low, even minor infections can become severe or persistent.

Common symptoms include frequent infections, fever, chills, sore throat, mouth ulcers, and slow wound healing. Some individuals may experience recurring respiratory infections, skin infections, or urinary tract infections.

In more severe cases, infections may become life-threatening if not treated promptly. For example, a mild bacterial infection that would normally resolve quickly may progress rapidly in someone with severe leukopenia.

Other signs may include general fatigue, weakness, and feeling unwell, although these are non-specific and can be associated with many other conditions.

Leukopenia is usually detected through a Complete Blood Count (CBC) test, which measures the levels of different blood

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cells in the body. A low white blood cell count confirms the condition, and further tests are often needed to determine the underlying cause.

Doctors may also order a differential white blood cell count to determine which specific type of white blood cell is reduced. In some cases, bone marrow examination may be required to assess whether the marrow is functioning properly. Additional tests such as viral screening, autoimmune markers, vitamin level tests, and imaging studies may be used depending on the suspected cause.

Treatment of leukopenia depends entirely on the underlying cause rather than the condition itself. If a medication is responsible, doctors may reduce the dose or switch to an alternative drug. In cases of chemotherapy-induced leukopenia, treatment may include temporary pauses in chemotherapy or the use of medications that stimulate white blood cell production. One commonly used group of drugs is colony-stimulating factors (such as G-CSF), which help the bone marrow produce more white blood cells. These are often used in patients undergoing cancer treatment.

If leukopenia is caused by infections, treating the underlying infection usually helps restore normal white blood cell levels. Antiviral or antibacterial medications may be prescribed

depending on the cause. In cases related to nutritional deficiencies, supplementation with vitamin B12, folate, or copper can help improve blood cell production. For autoimmune-related leukopenia, such as in SLE, treatment may involve immunosuppressive medications to reduce immune system activity and prevent destruction of white blood cells. In bone marrow disorders, treatment may be more complex and can include medications, blood transfusions, stem cell therapy, or bone marrow transplantation in severe cases.

CONCLUSION

Leukopenia is a condition marked by a decrease in white blood cells, weakening the body's immune defense system. It can result from infections, bone marrow disorders, medications, autoimmune diseases, nutritional deficiencies, or cancer. While leukopenia itself may not always cause symptoms, it significantly increases the risk of infections, which can sometimes be severe. Diagnosis is made through blood tests, and treatment depends on addressing the underlying cause. With proper medical care, monitoring, and preventive strategies, many individuals with leukopenia can effectively manage the condition and reduce the risk of complications.