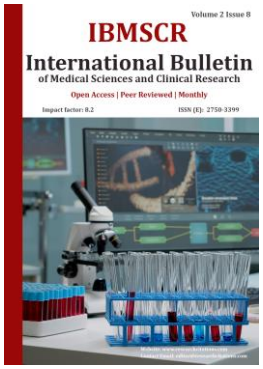

LEUKEMIA. ETIOLOGY, PATHOGENESIS, TYPES OF LEUKEMIA. SEE SYMPTOMS OF DISEASE. THE MOST INNOVATIVE METHODS OF LEUKEMIA PREVENTION AND TREATMENT.

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Abstract: In this article, the definition of Leukemia, the factors that cause it, the conditions observed in an organism affected by the disease, and the diagnosis of the disease. Research aimed at preventing this disease in modern medicine is their result. Information and opinions about drugs and treatment methods prepared using an innovative method are given.
Key words: leukemia, leukocytes, metastases, blood cells, bone marrow, immunity, blast cell, leukemia, acute and chronic leukemia

The organs that perform the most important functions in our body are undoubtedly the blood-forming tissues and organs. They create blood cells necessary for the body and carry out the function of releasing them into the blood vessels. Leukocytes are one of the most important blood cells for our body's immune system. They protect our body from any foreign substances that enter our body and act to break down substances that are considered harmful. So, it can be seen that leukocytes are of special importance among blood cells. It is these leukocytes that are produced by many organs and tissues in the body, and swelling of the tissues that produce these leukocytes significantly affects their function. As a result, various forms of leukocyte cells, which are not normally formed, appear. One of the important organs that produce blood cells, including leukocytes, is the bone marrow. Leukemia is a blood cell tumor that starts with bone marrow damage. Leukemia is a tumor disease of blood cells (leukocytes), which is mainly caused by damage to the bone marrow. Hyperplasia, metaplasia, and aplasia occur in the bone marrow, which is an irreversible process and is manifested by the presence of immature leukocytes (young tumor-specific cells) in the peripheral blood. Immature leukocytes do not perform the function that should be performed normally.

Factors that cause leukemias have not been determined until now. Several factors play a role in their appearance. These are the following:

- Oncogenic viruses
- Ionizing radiation
- Chemical carcinogen
- Genetic anomalies
- Various damage to the immune system

The role of oncogenic viruses was established by inducing leukemia by injecting a cell-free filtrate of leukemic cells from a leukemic animal into healthy animals. Viruses belong to the group of C-type RNA viruses. In humans, the viral origin of lymphoid tissue tumors has been identified in Burkitt's lymphoma (a DNA-capturing virus), and direct human-to-human transmission of leukemia has not been demonstrated. Leukemia has not been observed in breast-fed infants with leukemia or when blood from donors with leukemia is transfused into healthy individuals.

The importance of ionizing radiation in the development of leukemia in animals has been proven experimentally. It also has a great place in humans. It is known that among the population of the cities of Hiroshima and Nagasaki, which experienced the atomic bomb explosion in 1945, the number of leukemia patients is the majority. There is enough data to show that leukemia appears in children before birth in patients infected with X-ray radioactive isotopes.

It can also appear during leukemia under the influence of carcinogens. For example, contact with related compounds (benzene) with mutagenic agents (cytostatic chloramphenicol) can be indicated.

Genetic characteristics of blood formation play an important role in leukemia. It is known that leukemia and polycythemia are common, it is passed from generation to generation, and in 1/3 of twins born from each cell, the form, clinic and hematological appearance of leukemia are similar.

As a result of a certain mutagenic effect, mutation occurs and tumor (leukemia) cells appear. These cells, in turn, give rise to a large number of similar cells, that is, a clone of leukemic cells is formed. The longer the duration of the mutagenic effect, the longer the formation of these cloned cells. Formation of clone cells with relatively little differentiation (relatively benign, monoclonal period) in the bone marrow is called the monoclonal period. The polyclonal period is the beginning of the spread of cloned cells in the body through the bloodstream.

Progression (development) is observed in leukemia, as in other tumors, and it goes through several periods based on certain laws.

1. 1. Violation of normal hemopoiesis. One of the main characteristics of leukemia is that tumor (leukemia) cells suppress normal hematopoiesis in blood-forming tissues, as a result of which the formation of other normal types of leukocytes decreases. Erythropoiesis decreases, severe anemia occurs in the patient, thrombocytes decrease, blood clotting slows down, bleeding occurs, anemia worsens.
2. 2. As a result of the transformation of blast (core) cells, enzymes lost their specificity, their shape changed dramatically, and various, mainly blast, cells proliferated.
3. 3. Metastases. In other types of hemoblastosis and in the tumor process in general, metastases (the spread of tumors) are usually observed in the late stages of the disease. Leukemia, especially in its acute forms, metastases appear at the beginning of the disease. Because their tumor cells are composed of blood cells (stem or stem cells) and their close descendants, they easily spread into the blood. Leukemia cells that have entered the blood are located in various organs, first of all in tissues that are blood-forming organs, liver, spleen, lymph nodes, and later in others (kidneys, meninges, digestive organs, even the oral cavity tissues). and skin) settle and form a leukemic infiltrate (leukemic proliferation), that is, form tumors. These seriously harm the activities of the above-mentioned members.
4. Disruption of granulo-, monocyte- and lymphopoiesis - due to depression (depression), immune reactions decrease (phagocytosis, formation of antibodies, etc.). as a result, the body's susceptibility to infections increases and autoinfections are activated. In leukemia, immunological differentiation ability decreases and "forbidden" aggressive clones appear. These have the ability to create autoantigens that cause an autoimmune process, and as a result, cells and molecules of the body's normal structure accept foreign antigens as their own, and autoaggressive immune reactions develop.

First of all, the leukemia disease was called leukemia, and this is connected with two meanings (leukemia and leukemia). First, it is called by this name because of the large number of white blood cells (leukemia) and secondly, because of the transfer of leukemia cells to the blood. Considering that acute leukocytosis is not necessary in leukemia, it is more correct to call the disease leukemia. Acute forms of leukemia are life-threatening, develop quickly and are known to cause death within a month or two or even a few weeks. Causes of death: severe anemia, the spread of leukemic infiltrates and organ damage, tumor cachexia, and often the development of secondary infections as a result of weakened immunity. Chronic leukemia is milder, and the patient can live for several years, but it can turn into an acute type and quickly lead to death. Acute leukemia does not usually develop into chronic leukemia. This is a special feature of leukemia, which differs from other diseases.

There are four main and common types of leukemia:

- Acute lymphocytic leukemia;
- Chronic lymphocytic leukemia;
- Acute myeloid leukemia;
- Chronic myeloid leukemia.

Less common types of leukemia:

- Hairy cell leukemia is a type of chronic form
- Chronic myelomonocytic leukemia - a type that develops from myeloid cells;
- Young myelomonocytic leukemia is a common type of myeloid leukemia in children under 6 years of age;
- Large granular lymphocytic leukemia.

Changes in the body affected by leukemia:

- Fever
- Evening sweats
- Enlarged lymph nodes, usually painless
- Feeling tired
- Light bleeding
- Blue or purple spots on the skin
- Recurrent nosebleeds
- Frequent infections
- Pain in bones and joints
- Loss of body weight and loss of appetite
- Enlargement of the spleen or liver, which may cause abdominal pain or swelling
- Red spots on the skin

If leukemia cells also enter the brain, symptoms such as headache, seizures, right-sided confusion, loss of muscle control, and vomiting may occur.

Leukemia diagnosis. Hematologists are medical professionals who specialize in the diagnosis and treatment of blood disorders, including leukemia. Hematologists and oncologists deal with the treatment of this disease. Diagnosis of the disease requires a history (questions about symptoms and risk factors) and physical examination, as well as laboratory testing of a blood sample. An abnormal number of blood cells can indicate a white blood cell disease when the blood is examined more closely under a microscope. A bone marrow sample may be taken for diagnosis. A bone marrow biopsy is performed by inserting a thick tubular needle into the bone marrow under local anesthesia. If leukemia cells are detected, a blood and bone marrow

sample will be further tested. These additional tests look for genetic changes and the expression of certain cell surface markers by cancer cells. The results of these tests are used to classify the disease and choose the optimal treatment. MRT and CT scans can be used to determine the extent of the disease in some patients.

Treatment of the disease. There are many different medical approaches to treating leukemia. It usually depends on the type of leukemia, the age and health of the patient, as well as whether pathological cells have migrated to the spinal fluid or not. Genetic changes or characteristics of leukemia cells detected in the laboratory can also determine the most appropriate type of treatment. For some people with chronic leukemia, mindfulness can be a treatment option. The essence of this is to carefully monitor health, so therapy can begin in the early stages of the disease. Vigilance allows the patient to get rid of the side effects of treatment and prevent complications. Treatment for white blood cell disease includes chemotherapy (the main method), radiation, biologics, stem cell transplants, and targeted therapy. contains z. These methods can be used in combination. If the spleen is enlarged, part of it can be surgically removed. The goal of treating acute leukemia is to induce remission (the absence of leukemia cells in the body). Post-remission therapy is prescribed to prevent recurrence of white blood cell disease. This includes consolidation or maintenance. Acute leukemia can often be completely cured. Chronic leukemia cannot be cured, but therapeutic measures often control the cancer and manage symptoms. Some people with chronic leukemia may be candidates for a stem cell transplant, which offers a chance of recovery. In most cases, there is time to review and discuss treatment options, which does not affect the effectiveness of treatment. But in very rare cases, in extremely aggressive leukemias, therapy is started immediately.

Common treatments include:

- Chemotherapy
- Biological therapy
- Targeted therapy
- Radiation therapy
- Stem cell transplantation

Leukemia is an active area of biomedical research. Current research investigates the risk factors and causes of the disease and discovers new and improved treatments. Clinical trials are conducted to study new drugs or new combinations of drugs and existing treatments. Trials are currently underway to test new targeted, biologic, and chemotherapy regimens.

As a result of modern medical advances, hematopoietic stem cell transplantation is used in the fight against leukemia. A hematopoietic stem cell transplant is a treatment used to replace diseased cells destroyed by high-dose chemotherapy or radiation therapy with healthy cells from a matched donor. Often the donor is a sibling or family member, but it can also be someone else who matches the patient's cells. Another treatment option is chemotherapy and immunotherapy with CAR-T cells. In addition to transplants, other treatments available today are chemotherapy combined with other approaches to stimulate the immune system to recognize and destroy leukemia cells, such as interferon alpha or monoclonal antibodies, to slow the growth of tumor cells. used for antibodies. targets leukemia cells, helping them to be destroyed by the immune system. In recent years, an innovative therapeutic approach is immunotherapy with CAR-T cells, which is available for some leukemias that do not respond to conventional treatments. CAR-T cells are genetically modified patient T lymphocytes

equipped with a CAR molecule (chimeric antigen receptor). Thanks to this molecule, after reintroduction into the patient, CAR-T cells can precisely recognize tumor cells and effectively attack and destroy them. Leukemia is the first cancer treated in Italy with this therapeutic agent, which has been available since 2019.

In the United States, sequestration, that is, federal budget cuts, has a negative impact on biological and medical research. There is no doubt that testing new drugs against incurable diseases requires a lot of money. The money is distributed mainly by the National Institutes of Health, which are funded by the government. But the private sector also plays a big role. Support from a private foundation played a major role in the treatment of leukemia, a white blood disease. Jim Davis was cured of leukemia. When he was diagnosed 10 years ago, he thought he was dead. But medical treatment saved Davis' life. "A new drug called Gleevec has made a big difference. In the past, only 15 percent of people with gonorrhea survived. Although there is no cure for leukemia now, patients who take the drug every day live longer." Davis Leukemia and chairman of the Lymphoma Society. Every year in March they hold a big fundraiser. "Our largest non-profit organization in Washington. Every year we spend three million dollars on a lot of research."

Research is definitely paying off. Research supported by the Leukemia Society has led to a cure for acute lymphoblastic leukemia, Davis said. Six-year-old Emma has this disease. Oscar-winning director Ross Kauffman made a documentary about the girl. The drug, created by scientists from the University of Pennsylvania, was given to Emma and 10 other patients as an experiment. "We changed the virus. It no longer causes disease. However, this pain persists as long as the human immune system is able to change and destroy the cancer cells," said Dr. Carl June, a scientist at the University of Pennsylvania.

This is great news for some patients. But there are many types of leukemia. Dr. Donald Small of Johns Hopkins University explains that the discharge is actually an overproduction of blood cells. Leukemia types are determined by different cell mutations. - The difference between chronic myeloid leukemia and acute myeloid leukemia is that one mutation is observed in the chronic form of the disease. On average, 8-10 mutations are observed in acute myeloid leukemia. Dr. Small was the first scientist to identify a mutation in the FLT3 gene. This was achieved 20 years ago. The FLT3 gene is altered in acute myelogenous leukemia. "I took leukemia cells that had a mutation in the FLT3 gene and added a lot of tyrosine kinase inhibitor to them." Research by scientists like Dr. Small takes a long time and costs hundreds of thousands of dollars. "In the United States, all biomedical research is funded by the National Institutes of Health. In recent years, it has become more difficult to get money from them. "Now they are responding positively to 9 percent of the National Cancer Institute. apps, meaning they're paying," says Small. The rest is provided by the private sector. For example, the Leukemia and Lymphoma Society. Davies says that pharmaceutical companies will invest heavily after seeing the first breakthrough in research. "If the research goes on for a long time and If it succeeds, the pharmaceutical companies will not hesitate to invest. Several of the studies we started were continued by such companies, and then the drug went on sale. The University of Pennsylvania did it. Emma's disease, which was treated there, is currently in remission. Some of the other patients in the trial did not improve. However, , the pharmaceutical company Novartis decided to allocate 20 million dollars for research. Research will continue until the exact causes, treatment methods and prevention of the disease are completed. Thanks to modern medicine, various innovative drugs and methods of

treatment of diseases are being created. In this future, white blood cells will be sick. serves to reduce the disease.

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