

THE MAIN FACTORS IN THE ORIGIN OF LEUKEMIA DISEASE

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Annotation: Leukemia is a cancer of the blood and bone marrow. In this disease, the bone marrow produces excess blood cells – leukocytes. They are necessary for the body to protect and fight against various infections (viruses, bacteria, fungi). In leukemia, white blood cells have an abnormal structure and do not fully function. Leukocytes gradually displace other blood cells, which leads to the development of severe bleeding, the spread of infection and death.

Key words: Leukemia, treatment, DNA, symptoms.

It is important to start treating leukemia as soon as possible. This will help avoid serious complications such as severe bacterial infection or internal bleeding. A correctly selected first chemotherapy protocol determines the prognosis of all subsequent treatments

Leukemia (leucosis) develops against the background of changes in genes. DNA stores all information about a cell: its functioning, division and death. Dysfunction of DNA can lead to abnormal division of hematopoietic cells. Leukemia cells travel from the bone marrow to the bloodstream and then spread to other organs. One of the most severe manifestations of acute forms of leukemia is neuroleukemia. In this case, atypical blood cells affect the brain and some nerves.

Scientists have not yet identified the exact cause of the development of leukemia and damage to genetic information.

Risk factors that increase your chances of getting one of the types of leukemia:

Treatment of other forms of oncology. People who have received chemotherapy and radiation for another cancer diagnosis are more likely to develop leukemia.

- Radiation. Single or prolonged exposure to radiation sources leads to the formation of abnormal blood cells.
- Genetic abnormalities. Disruption of some genes and abnormal chromosomes can cause leukemia. Leukemia is common in patients with Down syndrome.
- Exposure to chemicals. Certain chemicals, such as benzene, increase the chances of developing leukemia.
- Smoking. The combustion products of tobacco products can cause the development of acute myeloid leukemia.
- Family history. Leukemia rarely develops in several family members or close relatives. But the chances of getting sick are higher if there is confirmed leukemia in relatives.

The manifestations of the disease depend on the age of the patient and the type of leukemia. In the initial stages, the disease may be asymptomatic and not disturb the patient.

Common symptoms of leukemia:

- Frequent headaches and dizziness;
- Increased bleeding of the gums, frequent nosebleeds and bruising after minor physical impact;
- Painful joints and bones;
- Swollen lymph nodes and spleen;
- Vomiting and nausea;
- Seizures;
- Regular infections that are difficult to treat and often return after a short period of remission;
- Sudden weight loss without changes in nutrition;
- Profuse sweating at night;
- Feeling hot or chilly.

Chronic forms of leukemia are detected by chance during regular examinations of the whole organism. Cancer cells are detected in laboratory blood tests, even if the patient is not worried about anything. In acute forms of leukemia, the doctor prescribes a more extensive diagnosis – specific tests.

Consultation and examination by a doctor

A hematologist is involved in the diagnosis and treatment of blood diseases. Oncological diseases of the hematopoietic system are treated in specialized oncohematological departments. The patient may be referred to a hematologist by a general practitioner if a blood disorder is suspected.

The hematologist will collect anamnesis, get acquainted with the patient's medical history and clarify the complaints. After the conversation, the doctor will conduct an examination. Examine the color of the skin and mucous membranes, since with anemia (a decrease in red blood cells), pallor of the skin is observed. Also, the doctor can feel the liver, spleen, and lymph nodes. They may be inflamed or enlarged.

Laboratory blood tests

A venous blood test provides the doctor with information about how the bone marrow works. Pay attention to the number of erythrocytes, platelets and leukocytes. Cell maturity is assessed. With leukemia, an increased content of leukocytes is often observed with a decrease in the absolute number of other blood elements.

In some forms of leukemia, immature forms of cells – blasts – are found in the blood. Their number directly reflects the severity of the patient's condition. Blast cells do not perform their functions and displace healthy bone marrow tissues.

Bone marrow biopsy

A biopsy is the taking of tissue samples from a patient using a special needle. With leukemia, the bone marrow is examined, in which the processes of hematopoiesis take place. The collection of bone marrow cells is done through a puncture of the pelvic or femur.

The doctor prescribes a biopsy when a large number of immature blood cells are found in the tests, or some cells predominate over others.

Multidisciplinary medical centers abroad have their own pathology laboratory, where biopsy samples are examined. New equipment and qualifications of specialists ensure that the diagnosis has been made correctly and the prescribed treatment will be the most effective.

If the doctor suspects the development of complications, additional studies are prescribed:

- X-ray;
- MRI;
- CT;
- Lumbar puncture.

When dividing leukemia into groups, experts assess the rate of development of pathological changes and the microscopic structure of blood cells.

Doctors distinguish four main types of leukemia:

- Acute lymphoblastic leukemia. The main method of treatment is chemotherapy. To achieve remission, the patient goes through three consecutive stages of treatment – induction, consolidation and supportive treatment. Each stage has its own combination of chemotherapy drugs.
- Chronic lymphoblastic leukemia. Often, this subtype of leukemia requires a wait-and-see approach and doctors recommend treatment if any symptoms appear. Treatment protocols include chemotherapy and radiotherapy, monoclonal antibodies, and immunotherapy.
- Acute myeloid leukemia. As with acute lymphoblastic leukemia, the main treatment includes combination chemotherapy. In all variants of acute leukemia, treatment should be started as soon as possible.
- Chronic myeloid leukemia. The only treatment for this form of leukemia is bone marrow transplantation (BMT). This is especially true for young patients in whom the new bone marrow engrafts better. Some chemotherapy drugs can improve blood counts and reduce symptoms.

Immunotherapy

Immunotherapy drugs affect a person's own immune system and stimulate the body to fight on its own against atypical cancer cells.

Blast cells, which are produced in excess by the bone marrow in leukemia, can create special proteins on their surface to suppress the immune system. In this situation, the body perceives the tumor as normal tissue and does not fight it. Immunotherapy drugs can interfere with this process and help the immune system recognize leukemia cells.

Targeted therapy

Modern anti-cancer drugs are capable of inhibiting the growth and multiplication of tumor cells. This type of treatment is called targeted therapy or targeted therapy.

This type of treatment is also available for patients with leukemia. Samples of leukemic bone marrow are examined in a laboratory and tested for possible treatment with targeted drugs.

CAR-T cell therapy

This is a new method of treating certain types of tumors using immune engineering. Blood is taken from the patient, from which a population of T-cells is isolated. Normally, T-cells are responsible for the acquired immune response and the destruction of harmful cells. In a special high-tech laboratory, T cells are modernized and “tuned” against tumor cells. CAR-T can be done for some subtypes of leukemia.

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