

Cancer Facts

ADULT LEUKEMIA

Leukemia occurs when abnormal white blood cells accumulate in the blood and bone marrow.

There are two main types of leukemia: **Lymphocytic leukemia** is marked by an increased number of white blood cells called **lymphocytes**. These cells are made chiefly in the lymph nodes (lymph glands). In leukemia, most lymphocytes produced are abnormal or immature.

Granulocytic leukemia is marked by an increase in white blood cells called **granulocytes**. These are made in the **bone marrow**. Normal granulocytes are essential to the body's defense against infection, but abnormal leukemic cells lack this capability.

Both types of leukemia occur as **acute** (fast-growing) or **chronic** (slow-growing) diseases.

Acute leukemia can occur at any age, but it is most often seen in children. It accounts for about half of all leukemia cases.

Chronic leukemia occurs most often in adults, but can occur at any age. It accounts for about half of all leukemia cases.

What happens in leukemia?

Leukemia, like other cancers, is a disease of the body's cells. Cells of different shapes and functions make up various parts of the body: the skin, heart, lungs, bones and so forth. All cells reproduce themselves by dividing. Normal growth and repair of body tissues take place in this orderly manner. When cell division is not orderly, abnormal growth takes place.

Both acute and chronic leukemia affect three types of blood cells: **red blood cells, white blood cells** and **platelets**.

Red blood cells carry oxygen to all parts of the body. Made in the bone marrow, they number several million in each drop of blood. In leukemia, the red cell count drops, robbing the body of necessary oxygen. This results in anemia, causing paleness, weakness and fatigue.

White blood cells fight infections by destroying bacteria, viruses and foreign matter in the blood and help build immunity to disease. In leukemia, white blood cells don't function normally. This results in infections occurring repeatedly because the leukemic white cells are unable to fight off bacteria or viruses. An extremely high number of abnormal white blood cells accumulate, flooding the bone marrow and preventing normal blood formation.

Platelets are tiny blood components formed in the bone marrow. They are essential for clotting. They collect around a wound and form a "plug" (clot) to stop bleeding. In leukemia, platelet production goes down. This results in excessive bleeding, bruising and hemorrhaging because the blood won't clot.

Both acute and chronic leukemia cause the same effects, except those of chronic leukemia are less dramatic and typically occur later in the disease course.

In **chronic lymphocytic leukemia**, the main effect may be simply an increase in lymphocytes circulating in the blood and bone marrow. Multiple lymph node tumors may also develop. The condition may go for many years with few or no ill effects, but infections and bleeding or bruising eventually develop.

In **chronic granulocytic leukemia**, overgrowth and overproduction of abnormal bone marrow often causes an increase in platelets as well as white cells. The condition can be controlled for several years, but many cases eventually convert to an acute phase.

What causes leukemia?

It is believed that a change in **gene structure** causes the abnormalities and uncontrolled multiplication of white cells in leukemia. Genes are the "blueprints" for cell growth. They are located on the **chromosomes**, inside the nucleus of every

cell. Scientists at Jefferson's Kimmel Cancer Center have been world leaders in describing the genes associated with many leukemia types, and new treatment approaches are being designed based upon this new information.

The cause of the change in gene structure is unknown, but several factors are suspected, such as certain birth defects, X-rays, other forms of radiation, viruses and chemical irritants from the workplace or environment.

What are the symptoms of leukemia?

Symptoms of acute leukemia are varied and can progress rapidly. Therefore it is important to consult a doctor promptly. The **lymph nodes, spleen and liver** may be enlarged because they are infiltrated with white blood cells. Other common symptoms are bone pain, paleness, tendency to bleed or bruise easily and frequent infections.

With chronic leukemia, a patient most often seeks medical treatment because of increasing fatigue or weight loss. There may be a sense of fullness or heaviness under the left ribs, and the doctor may discover a mass in the abdomen. Less frequently, the complaints result from anemia, abnormal perspiration, fever, bleeding, pain in the spleen or an attack of gout. Sometimes the discovery of the disease may be accidental, in the course of routine clinical or laboratory examinations.

Chronic lymphocytic leukemia usually occurs in older people and develops slowly. In fact, symptoms are entirely absent in some cases, and the disease discovered accidentally when a patient is examined for another complaint. When symptoms do occur, they may be a general feeling of ill health, fatigue, lack of energy, fever, loss of appetite and weight, or night sweats. Enlarged lymph nodes in the neck or groin may be noticed in some patients. Some may show signs of anemia or infections.

How is leukemia diagnosed?

Leukemia can be diagnosed only by microscopic examination of the blood and the bone marrow. If leukemia cells are present in these tissues, they can be identified and the diagnosis made.

Blood tests may show low hemoglobin, low white cell levels and a low platelet level. **Blast cells** (immature cells) may also be present in the blood.

Because these findings suggest a diagnosis of leukemia, a bone marrow **biopsy** may be done. A sample of bone marrow is obtained by inserting a needle into the bone and withdrawing a tiny amount of tissue. The bone marrow is examined under the microscope by a pathologist. A pathologist is a physician who interprets and diagnoses the changes caused by disease in body tissues. The bone marrow biopsy establishes the specific type of leukemia, which is essential in determining the best form of treatment. It also is used as a way of checking on the progress of therapy.

When a diagnosis of leukemia is confirmed, it is best that a patient begin treatment in a hospital that has an expert staff and resources to apply all forms of effective treatment right from the beginning.

Do I need a second opinion?

Since treatment decisions are complex, a patient might want a second doctor to review the diagnosis and treatment plan before actually starting treatment.

- Patients can call the Jefferson Cancer Network at **1-800-JEFF-NOW**.
- The patient's doctor may be able to suggest a doctor who has a special interest in leukemia.
- Patients can obtain the names of doctors from their local medical society, a nearby hospital or a medical school.

How is leukemia treated?

While treatment must be tailored to individual needs, leukemia can respond well to a program combining **chemotherapy** and a team approach for **total care**.

Chemotherapy uses powerful drugs in various combinations to kill abnormal cells and/or slow their growth, giving normal cells a chance. The goal of the therapy is remission, or the apparent disappearance of symptoms and evidence of leukemia. This enables a patient to return to apparently normal health and remain so for weeks, months or years. Repeated chemotherapy can bring repeated remissions. Some patients have been in remission long enough to be considered cured. Since anti-leukemic drugs also affect normal cells, side effects are common. Therapy must be carefully administered and constantly monitored.

The best chance for a long-term remission is **total care treatment** in specially equipped medical facilities by a team of specially trained doctors, nurses and paramedics. Total care includes:

- Initial treatment, with drugs given daily to induce remission. Usually within four weeks, a patient is free from any signs of disease.
- Maintenance therapy is employed, sometimes for several months, with selected drugs used to extend and maintain remission.
- Sometimes a bone marrow or peripheral stem cell transplant is performed to maintain remission.
- Supportive therapy is required when disease is active. It may include blood transfusions, platelet transfusions or antibiotics.

The result of successful treatment means a longer life expectancy than ever for leukemia patients, with a significant number achieving a normal lifespan. Though recovery from leukemia was once considered hopeless, major treatment advances mean that acute leukemia is now considered a potentially curable disease.

What are clinical trials?

When laboratory research shows that a new treatment method has promise, patients with cancer have the opportunity to receive the treatment in clinical trials or protocols.

By participating in a clinical trial, you may have the first chance to benefit from improved treatment methods and the opportunity to make an important contribution to medical science. Many clinical trials take the best-known therapy and modify it a little in an effort to improve on it further.

To find out more about current clinical trials that you may be able to participate in, ask your doctor or call either the Kimmel Cancer Center at Jefferson's Research Management Office at **215-955-1661** or **1-800-JEFF-NOW**.

*Jefferson also offers a number of cancer support and education programs as well as a Buddy Program in which survivors of cancer provide support and encouragement to patients who are newly diagnosed and an active cancer advocacy group. You'll find information about these programs online at **www.jeffersonhospital.org** or by calling **1-800-JEFF-NOW**.*

*For an appointment with a Jefferson physician, please call **1-800-JEFF-NOW** (1-800-533-3669) or visit our web site at **www.JeffersonHospital.org**.*

*Speech- or hearing-impaired callers can access JEFF NOW® by calling **1-800-654-5984**.*

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