

National Cancer Institute

What You Need
To Know About™

Leukemia

U.S. DEPARTMENT OF
HEALTH AND HUMAN SERVICES
National Institutes of Health

How Can We Help?

You may want information about cancer for yourself, your family, and your friends.

- **Call** NCI's Cancer Information Service at **1-800-4-CANCER (1-800-422-6237)**
- **Visit** us at **<http://www.cancer.gov>** or **<http://m.cancer.gov/>** (mobile)
- **Chat** using **LiveHelp**, NCI's instant messaging service, at **<https://livehelp.cancer.gov>**
- **Email** us at **cancergovstaff@mail.nih.gov**
- **Order** publications at **<http://www.cancer.gov/publications>** or by calling **1-800-4-CANCER (1-800-422-6237)**
- **Get help** with quitting smoking at **1-877-44U-QUIT (1-877-448-7848)**
- **Follow** us on **Facebook**  **Twitter** 
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About This Booklet

This National Cancer Institute (NCI) booklet is for you—someone who has just been diagnosed with **leukemia**. Leukemia is **cancer** of the blood and bone marrow (the soft material in the center of most bones). In 2013, more than 43,000 adults and 5,000 children and teens will be diagnosed with this disease in the United States.

Words that may be new to you are shown in **bold**. See the **Words To Know** section on page 25 to learn what a new word means and how to pronounce it.

This booklet is about medical care for people with leukemia. Learning about medical care for this disease can help you take an active part in making choices about your care.

You can read this booklet from front to back. Or, you can read only the sections you need right now.

This booklet has lists of questions that you may want to ask your doctor. Many people find it helpful to take a list of questions to a doctor visit. To help remember what your doctor says, you can take notes. You may also want to have a family member or friend go with you when you talk with the doctor—to take notes, ask questions, or just listen.

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Normal Blood Cells

To understand how leukemia affects blood cells, it helps to know about normal blood cells.

All blood cells come from blood **stem cells**. Although some blood stem cells are in the blood, most are in the bone marrow. Blood stem cells produce three kinds of blood cells:

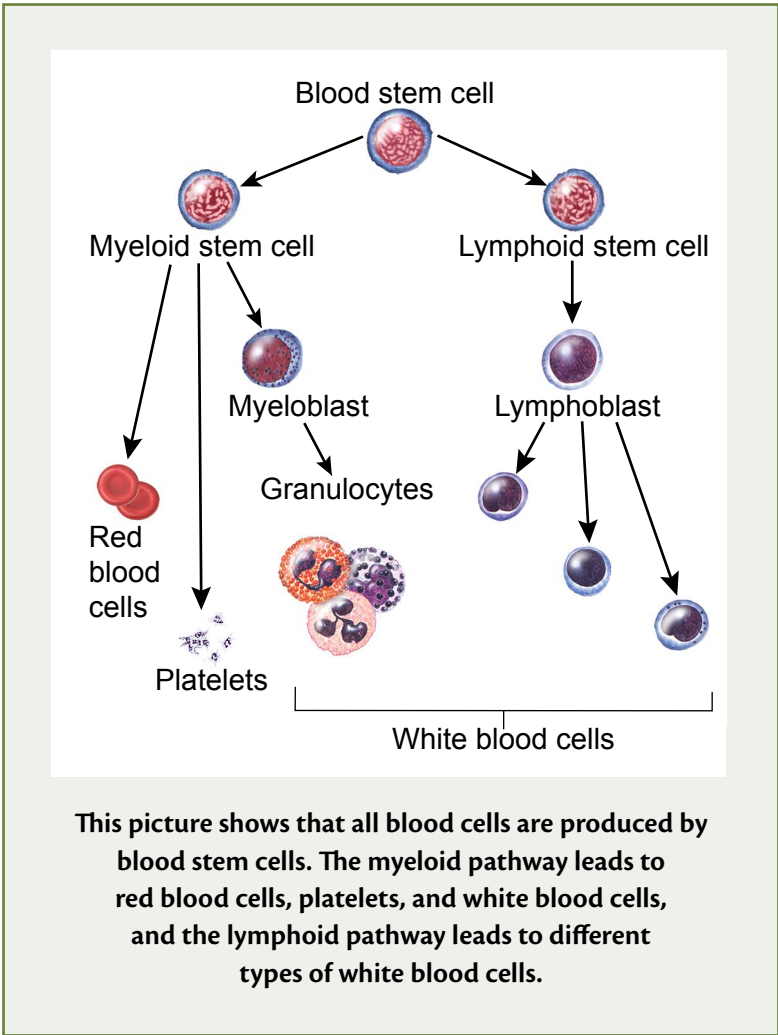
- **Red blood cells:** Red blood cells carry **oxygen** all over the body.
- **Platelets** (PLAYT-lets): Platelets help form blood clots to slow or stop bleeding.
- **White blood cells:** White blood cells help fight infection.

When blood cells become old or damaged, they die, and the blood stem cells produce new blood cells to take their place.

Normal Myeloid and Lymphoid Cells

The picture on page 2 shows that all blood cells are produced by blood stem cells. The picture shows two pathways. A blood stem cell can produce both **myeloid** stem cells and **lymphoid** stem cells:

- **Myeloid cells:** A myeloid stem cell can produce red blood cells and platelets. Or, it can produce **myeloblasts**. (A blast is a type of immature cell.) Myeloblasts can produce several types of white blood cells known as **granulocytes**.
- **Lymphoid cells:** A lymphoid stem cell can produce **lymphoblasts**, which can produce several types of white blood cells that are different from granulocytes.



Leukemia Cells

In a person with leukemia, the bone marrow produces abnormal white blood cells that are called leukemia cells and leukemic blast cells. The abnormal cells can't produce normal white blood cells.

Leukemia cells divide to produce copies of themselves. The copies divide again and again, producing more and more leukemia cells.

Unlike normal blood cells, leukemia cells don't die when they become old or damaged. Because they don't die, leukemia cells can build up and crowd out normal blood cells. The low level of normal blood cells can make it harder for the body to get oxygen to the tissues, control bleeding, or fight infections.

Also, leukemia cells can spread to other organs, such as the **lymph nodes, spleen**, and brain.

Types of Leukemia

Lab tests help the doctor find out the type of leukemia that you have. For each type of leukemia, the treatment plan is different.

Acute and Chronic Leukemias

Leukemias are named for how quickly the disease develops and gets worse:

- **Acute:** **Acute leukemia** usually develops quickly. The number of leukemia cells increases rapidly, and these abnormal cells don't do the work of normal white blood cells. A bone marrow test may show a high level of leukemia cells and low levels of normal blood cells. People with acute leukemia may feel very tired, bruise easily, and get infections often.

- **Chronic:** **Chronic leukemia** usually develops slowly. People may not feel sick at first, and the first sign of illness may be abnormal results on a routine blood test. For example, a blood test may show a high level of leukemia cells. If not treated, the leukemia cells may later crowd out normal blood cells.

Myeloid and Lymphoid Leukemias

Leukemias are also named for the type of white blood cell that is affected:

- **Myeloid:** Leukemia that starts in myeloid cells is called myeloid, **myelogenous**, or **myeloblastic** leukemia.
- **Lymphoid:** Leukemia that starts in lymphoid cells is called lymphoid, **lymphoblastic**, or **lymphocytic** leukemia. Lymphoid leukemia cells may collect in the lymph nodes, which become swollen.

Four Most Common Types of Leukemia

Acute myeloid leukemia

Acute myeloid leukemia (AML) affects myeloid cells and grows quickly. Leukemic blast cells collect in the bone marrow and blood.

About 15,000 Americans will be diagnosed with AML in 2013. Most (about 8,000) will be 65 or older, and about 870 children and teens will get this disease.

Acute lymphoblastic leukemia

Acute lymphoblastic leukemia (ALL) affects lymphoid cells and grows quickly. Leukemic blast cells usually collect in the bone marrow and blood.

More than 6,000 Americans will be diagnosed with ALL in 2013. Most (more than 3,600) will be children and teens.

Chronic myeloid leukemia

Chronic myeloid leukemia (CML) affects myeloid cells and usually grows slowly at first. Blood tests show an increase in the number of white blood cells. The abnormal blood cells work okay. There may be a small number of leukemic blast cells in the bone marrow.

About 6,000 Americans will be diagnosed with CML in 2013. Almost half (about 2,900) will be 65 or older, and only about 170 children and teens will get this disease.

Chronic lymphocytic leukemia

Chronic lymphocytic leukemia (CLL) affects lymphoid cells and usually grows slowly. Blood tests show an increase in the number of white blood cells. The abnormal cells work almost as well as the normal white blood cells.

About 16,000 Americans will be diagnosed with CLL in 2013. Most (about 10,700) will be 65 or older. This disease almost never affects children or teens.

Other types of leukemia

Other, less common types of leukemia will account for more than 6,000 new cases in 2013.



You and your doctor will develop a treatment plan.

Treatment

The treatment that's right for you depends mainly on the type of leukemia, your age, and your general health. People with leukemia have many treatment options, and you may receive more than one type of treatment.

Treatment options may include:

- **Watchful waiting**
- **Chemotherapy**
- **Targeted therapy**
- **Radiation therapy**
- **Stem cell transplant**

If you have chronic leukemia without symptoms, you may not need treatment right away. This option is called **watchful waiting**. When the disease worsens, treatment can often control the disease and its symptoms. After treatment controls leukemia, people may receive therapy known as maintenance therapy, which helps keep the leukemia from coming back.

However, people with acute leukemia need to be treated right away. The goal of treatment is to destroy signs of leukemia in the body and to make symptoms go away. Maintenance therapy may be given after signs of leukemia are gone.

At any time, care is available to relieve the **side effects** of treatment and to control pain and other symptoms. For example, antibiotics are given for infections, and transfusions of blood, platelets, or granulocytes are given for bleeding and other blood problems. You can get information about coping on NCI's website at <http://www.cancer.gov/cancertopics/coping>.

Also, you can get information about coping from NCI's Cancer Information Service at **1-800-4-CANCER (1-800-422-6237)**. Or, chat using NCI's instant messaging service, **LiveHelp (<https://livehelp.cancer.gov>)**.

Doctors Who Treat Leukemia

Whenever possible, people should be treated at a medical center that has doctors experienced in treating leukemia. If this isn't possible, your doctor may discuss the treatment plan with a specialist at such a center.

Resources are available to help you find doctors who treat leukemia:

- Your doctor may be able to refer you to specialists.
- You can ask a local or state medical society, or a nearby hospital or medical school for names of specialists.
- NCI's Cancer Information Service can give you information about treatment centers near you. Call **1-800-4-CANCER (1-800-422-6237)**. Or, chat using **LiveHelp (<https://livehelp.cancer.gov>)**, NCI's instant messaging service.
- Other sources can be found in the NCI fact sheet *How To Find a Doctor or Treatment Facility If You Have Cancer*.

Your health care team may include the following specialists:

- **Hematologist:** A **hematologist** is a doctor who specializes in treating blood disorders.
- **Medical oncologist:** A **medical oncologist** is a doctor who specializes in treating leukemia and other cancers. Treatments used for leukemia may include **chemotherapy**, **targeted therapy**, and **stem cell transplant**.
- **Radiation oncologist:** A **radiation oncologist** is a doctor who specializes in treating cancer with **radiation therapy**.

Your health care team may also include an **oncology nurse**, a **social worker**, and a **registered dietitian**. For a child with leukemia, the health care team may include a **pediatric oncologist**.

Your health care team can describe your treatment options, the expected results of each option, and possible side effects. Because cancer treatments often damage healthy cells and tissues, side effects are common. These side effects depend on many factors, including the type of treatment. The specific side effects may not be the same for everyone, and they may even change from one treatment session to the next.

You may want to talk with your doctor about taking part in a treatment research study (**clinical trial**). Research studies are an important option for people with leukemia. See the **Treatment Clinical Trials** section on page 12.

Questions you may want to ask your doctor about treatment options

- What are my treatment options?
Which do you recommend for me? Why?
- What are the expected benefits of each kind of treatment?
- What are the risks and possible side effects of each treatment? How can side effects be managed?
- What can I do to prepare for treatment?
- Will I need to stay in the hospital?
If so, for how long?
- What is the treatment likely to cost?
Will my insurance cover it?
- How will treatment affect my normal activities?
- Would a treatment research study be right for me?



You may want to get a second opinion before starting treatment.

Second Opinion

Before starting treatment, you might want a second opinion about your diagnosis and your treatment options. Some people worry that the doctor will be offended if they ask for a second opinion. Usually the opposite is true. Most doctors welcome a second opinion. Many health insurance companies will pay for a second opinion if you or your doctor requests it. Some insurance companies actually require a second opinion.

If you get a second opinion, the second doctor may agree with your first doctor's diagnosis and treatment recommendation. Or, the second doctor may suggest another approach. Either way, you have more information and perhaps a greater sense of control. You can feel more confident about the decisions you make, knowing that you've looked at all of your options.

It may take some time and effort to gather your medical records and see another doctor. Because some people with leukemia need treatment right away, ask your doctor whether you can delay treatment for a couple weeks.

Treatment Clinical Trials

For anyone thinking about cancer treatment, clinical trials are an option. Clinical trials are research studies that involve people. They are an option for all stages of cancer.

Cancer research has led to real progress in the treatment of leukemia. Because of research, adults and children with leukemia can look forward to a better quality of life and a better chance of living longer. Doctors continue to search for new and better ways to treat leukemia.

Like all other treatment options, clinical trials have possible benefits and risks. But, by looking closely at all options, including clinical trials, you are taking an active role in a decision that affects your life.

Even if you don't benefit directly from the treatment being studied, you may still make an important contribution by helping doctors learn more about leukemia and how to control it. If you're interested in being part of a clinical trial, talk with your doctor.

NCI's website has a section called **Learn About Clinical Trials** at <http://www.cancer.gov/clinicaltrials/learningabout>. You can learn about:

- **What clinical trials are and why they are important**
- **How your safety is protected**
- **Who pays for clinical trials**
- **What to think about if you're deciding whether to take part in a clinical trial**
- **What to ask your doctor**

In addition, NCI's Cancer Information Service can answer your questions and provide information about clinical trials. Contact CIS at **1-800-4-CANCER (1-800-422-6237)** or at **LiveHelp** (<https://livehelp.cancer.gov>).

You can search for clinical trials of leukemia at <http://www.cancer.gov/clinicaltrials/search> on NCI's website.

Watchful Waiting

Your doctor may suggest watchful waiting if you're diagnosed with chronic lymphocytic leukemia (CLL) but you don't have symptoms. Watchful waiting means delaying treatment until you have symptoms. The purpose is to avoid the side effects of treatment as long as possible.

If you and your doctor agree that watchful waiting is a good idea, you'll get exams and blood tests every 3 to 6 months. Your doctor may suggest starting treatment if you develop symptoms.

Some people worry that waiting to start treatment may reduce the chance to control leukemia before it gets worse. Having regular checkups reduces this risk.

If you choose watchful waiting but later become concerned about delaying treatment, you should talk with your doctor. You can change your mind and have treatment at any time.

Questions you may want to ask your doctor about watchful waiting

- Is it safe for me to delay treatment? Does it mean I won't live as long as if I started treatment right away?
- Can I change my mind later on?
- How often will I have checkups?
- How will we know if the leukemia is getting worse?

Chemotherapy

Most people with leukemia are treated with chemotherapy. Chemotherapy uses drugs to kill leukemia cells.

Several drugs are used for leukemia, and they may be given in different ways. The drugs used for leukemia may be given through a thin needle directly into a vein (**intravenously**) and as pills and liquids that you swallow. The drugs enter the bloodstream and can kill leukemia cells almost all over the body.

However, many drugs given directly into a vein or taken by mouth can't pass through the tightly packed blood vessel walls found in the brain and spinal cord. If leukemia affects the brain or spinal cord, the drugs may be given through a needle into the fluid that fills the spaces in and around the brain and spinal cord. This method is known as **intrathecal chemotherapy**, and it's given in two ways:

- **Into the spinal fluid:** The doctor may inject drugs into the spinal fluid. Injections into the spinal fluid can be painful.
- **Under the scalp:** The surgeon may place a device known as an **Ommaya reservoir** under the scalp during surgery. The doctor injects drugs into the device. This method usually doesn't hurt. The doctor may suggest this method when many doses of intrathecal chemotherapy are planned.

You may receive chemotherapy in a clinic, at the doctor's office, or at home. Some people need to stay in the hospital during treatment.

The side effects depend mainly on which drugs are given and how much. Chemotherapy kills fast-growing leukemia cells, but the drugs can also harm normal cells that divide rapidly:

- **Blood cells:** When drugs lower the levels of healthy blood cells, you're more likely to get infections, bruise or bleed easily, and feel very weak and tired. Your health care team will check for low levels of blood cells. If your levels are low, your health care team may stop the chemotherapy for a while, reduce the dose of the drug, or give you a blood **transfusion**. They may also give you medicines that help your body to make new blood cells.

- **Cells in hair roots:** Chemotherapy may cause hair loss. If you lose your hair, it will grow back after treatment, but the color and texture may be changed.
- **Cells that line the digestive tract:** Chemotherapy can cause a poor appetite, nausea and vomiting, diarrhea, or mouth blisters. Your health care team can give you medicines and suggest other ways to help with these problems.

Ask whether chemotherapy could make you unable to have children. Chemotherapy can cause infertility in adults, but most children treated with chemotherapy for leukemia seem to have normal fertility when they grow up. If teens or adults want to have a child someday after treatment, they may choose to store sperm or eggs before treatment starts.

The NCI booklet *Chemotherapy and You* has helpful ideas for coping with chemotherapy side effects.

Targeted Therapy

Targeted therapies are drugs that can block the growth of leukemia cells. For example, a targeted therapy may block the action of an abnormal protein that causes leukemia cells to grow.

Several targeted therapies are used for leukemia. The type of targeted therapy depends on the type of leukemia:

- **For CML and ALL:** People with the **Philadelphia chromosome** may receive a targeted therapy. Nearly everyone with CML (chronic myeloid leukemia) and some people with ALL (acute lymphocytic

leukemia) have this chromosome. The targeted therapy used for CML and ALL is a pill that you swallow. Possible side effects include nausea, diarrhea, rash, and swelling. This drug may also cause headache, hair loss, or joint pain.

- **For CLL:** People who have CLL (chronic lymphocytic leukemia) may receive a targeted therapy that is different from the one used for CML and ALL. This drug is given directly into a vein through a thin needle. It may cause nausea, vomiting, diarrhea, night sweats, or joint pain. Side effects usually go away after treatment ends.

You may want to read the NCI fact sheet *Targeted Cancer Therapies* to learn more about targeted therapies for leukemia.

Questions you may want to ask your doctor about chemotherapy or targeted therapy

- Which drug or drugs do you suggest for me? What will they do?
- What are the possible side effects? What can we do about them?
- When will treatment start? When will it end? How often will I have treatments?
- How will we know the treatment is working?
- Will there be lasting side effects?

Radiation Therapy

Some people with leukemia receive radiation therapy along with chemotherapy. You'll lie down on a treatment table, and a large machine will aim high-energy rays at your body to kill cancer cells. The machine may be aimed at the brain or other parts of the body where leukemia cells have been found. Or, the machine may be aimed at the whole body.

You'll go to a hospital or clinic for treatment. Radiation therapy for the brain or other areas is usually given 5 days a week for several weeks. Radiation therapy for the whole body is given once or twice a day for a few days, usually before a stem cell transplant.

Side effects depend mainly on how much radiation is given and the part of your body that is treated. Ask your health care team what to expect. Side effects may develop during radiation therapy or months or years later.

Radiation therapy aimed at the brain may cause you to feel tired or to lose hair from your head. Your health care team can suggest ways to manage these problems, which usually go away when treatment ends. However, some side effects, such as memory loss or other problems, may be permanent.

It's common for skin in the treated area to become red, dry, and itchy. Check with your doctor before using lotion or cream on that area. After treatment is over, the skin will slowly heal.

You're likely to become tired during radiation therapy, especially in the later weeks of treatment. Although getting enough rest is important, most people say they feel better when they exercise every day. Try to go for a short walk, do gentle stretches, or do yoga.

The NCI booklet *Radiation Therapy and You* has helpful ideas for coping with radiation therapy side effects.

Questions you may want to ask your doctor about radiation therapy

- Why do I need this treatment?
- When will treatment start? When will it end?
How often will I have treatments?
- How will we know the treatment is working?
- What side effects should I expect? What should I tell you about?
- Are there any lasting effects?

Stem Cell Transplant

Some people with leukemia receive a stem cell transplant. This treatment is done after radiation therapy aimed at the whole body, a large dose of chemotherapy, or both. Radiation therapy and chemotherapy will destroy both leukemia cells and normal blood stem cells in the bone marrow.

Stem cell transplants take place in the hospital. You may need to stay in the hospital for several weeks.

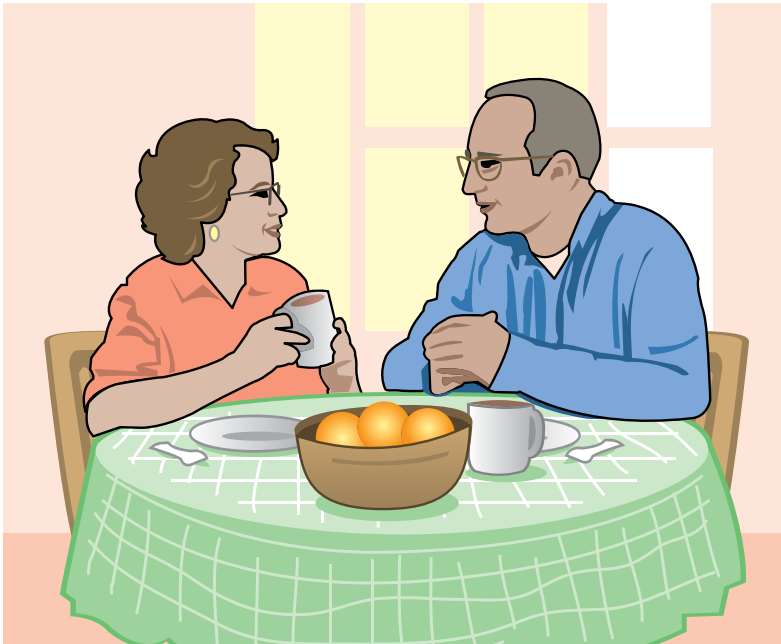
To replace the normal blood stem cells that are destroyed by radiation therapy and chemotherapy, you'll receive healthy blood stem cells through a vein. It's like getting a blood transfusion. The transplanted stem cells will move to the bone marrow and make new blood cells.

People who receive stem cells from a donor, such as a sister or brother, may get **graft-versus-host disease**. The donated white blood cells may react against your normal tissues and harm your liver, skin, or digestive tract. This disease can be mild or very severe. It can occur any time after the transplant, even years later. Steroids or other drugs may help.

You may want to read the NCI fact sheet *Bone Marrow Transplantation and Peripheral Blood Stem Cell Transplantation*. It tells about the types of transplants and their side effects.

Questions you may want to ask your doctor about stem cell transplants

- What kind of stem cell transplant do you recommend? Where will the stem cells come from?
- How long will I be in the hospital? Will I need special care? How will I be protected from germs?
- What care will I need when I leave the hospital?
- What are the risks and side effects of this treatment? What can we do about them?
- How will we know if the treatment is working?
- What is my chance of a full recovery? How long will that take?



Eating well may help you feel better.

Nutrition

Eating well is important before, during, and after treatment for leukemia. You need the right amount of calories to maintain a good weight. You also need enough protein to keep up your strength. Eating well may help you feel better and have more energy.

Sometimes, especially during or soon after treatment, you may not feel like eating. You may be uncomfortable or tired. You may find that foods don't taste as good as they used to. In addition, poor appetite, nausea, vomiting, mouth blisters, and other side effects of treatment can make it hard for you to eat.

Your doctor, a registered dietitian, or another health care provider can suggest ways to help you meet your nutrition needs. Also, the NCI booklet *Eating Hints* has many useful recipes and lists of foods that can help with side effects.

Follow-up Care

After treatment for leukemia, you'll need regular checkups. For example, someone with acute leukemia may need a checkup every month for the first year after treatment, and someone with chronic leukemia may need a checkup every six months.

Checkups help ensure that any changes in your health are noted and treated if needed. If you have any health problems between checkups, contact your doctor.

Leukemia may come back after treatment. Your doctor will check for the return of leukemia. Checkups also help detect health problems that can result from cancer treatment.

Checkups may include a physical exam, blood tests, and bone marrow tests.

You may find it helpful to read the NCI booklet *Facing Forward: Life After Cancer Treatment*. You may also want to read the NCI fact sheet *Follow-up Care After Cancer Treatment*.

Sources of Support

Learning that you have leukemia can change your life and the lives of those close to you. These changes can be hard to handle. It's normal for you, your family, and your friends to need help coping with the feelings that a diagnosis of cancer can bring.

Concerns about treatments and managing side effects, hospital stays, and medical bills are common. You may also worry about caring for your family, keeping your job, or continuing your daily activities.

Many people can help you manage these concerns:

- Doctors, nurses, and other members of your health care team can answer questions about treatment, working, or other activities.
- Social workers, counselors, or members of the clergy can be helpful if you want to talk about your feelings or concerns. Often, social workers can suggest resources for financial aid, transportation, home care, or emotional support.
- Support groups can also help. In these groups, people with leukemia or their family members meet with other patients or their families to share what they have learned about coping with the disease and the effects of treatment. Groups may offer support in person, over the telephone, or on the Internet. You may want to talk with a member of your health care team about finding a support group.

- NCI's Cancer Information Service can help you locate programs, services, and NCI publications. Call **1-800-4-CANCER (1-800-422-6237)**. Or, chat using **LiveHelp (<https://livehelp.cancer.gov>)**, NCI's instant messaging service.

For tips on coping, you may want to read the NCI booklet *Taking Time: Support for People With Cancer*.

Words To Know

Definitions of thousands of terms are on NCI's website in NCI's Dictionary of Cancer Terms. You can access it at <http://www.cancer.gov/dictionary>.

Acute leukemia (uh-KYOOT loo-KEE-mee-uh): A rapidly progressing cancer that starts in blood-forming tissue such as the bone marrow, and causes large numbers of white blood cells to be produced and enter the blood stream.

Acute lymphoblastic leukemia (uh-KYOOT LIM-foh-BLAS-tik loo-KEE-mee-uh): An aggressive (fast-growing) type of leukemia (blood cancer) in which too many lymphoblasts (immature white blood cells) are found in the blood and bone marrow. Also called acute lymphocytic leukemia and ALL.

Acute myeloid leukemia (uh-KYOOT MY-eh-loyd loo-KEE-mee-uh): An aggressive (fast-growing) disease in which too many myeloblasts (immature white blood cells that are not lymphoblasts) are found in the bone marrow and blood. Also called acute myeloblastic leukemia, acute myelogenous leukemia, acute nonlymphocytic leukemia, AML, and ANLL.

Cancer: A term for diseases in which abnormal cells divide without control and can invade nearby tissues. Cancer cells can also spread to other parts of the body through the blood and lymph systems. Also called malignancy.

Chemotherapy (KEE-moh-THAYR-uh-pee): Treatment with drugs that kill cancer cells.

Chronic leukemia (KRAH-nik loo-KEE-mee-uh): A slowly progressing cancer that starts in blood-forming tissues such as the bone marrow, and causes large numbers of white blood cells to be produced and enter the blood stream.

Chronic lymphocytic leukemia (KRAH-nik LIM-foh-SIH-tik loo-KEE-mee-uh): An indolent (slow-growing) cancer in which too many immature lymphocytes (white blood cells) are found mostly in the blood and bone marrow. Sometimes, in later stages of the disease, cancer cells are found in the lymph nodes and the disease is called small lymphocytic lymphoma. Also called CLL.

Chronic myeloid leukemia (KRAH-nik MY-eh-loyd loo-KEE-mee-uh): A slowly progressing disease in which too many white blood cells (not lymphocytes) are made in the bone marrow. Also called chronic granulocytic leukemia, chronic myelogenous leukemia, and CML.

Clinical trial: A type of research study that tests how well new medical approaches work in people. These studies test new methods of screening, prevention, diagnosis, or treatment of a disease. Also called clinical study.

Graft-versus-host disease: A disease caused when cells from a donated stem cell graft attack the normal tissue of the transplant patient. Symptoms include jaundice, skin rash or blisters, a dry mouth, or dry eyes. Also called GVHD.

Granulocyte (GRAN-yoo-loh-SITE): A type of immune cell that has granules (small particles) with enzymes that are released during infections, allergic reactions, and asthma. Neutrophils, eosinophils, and basophils are granulocytes. A granulocyte is a type of white blood cell. Also called granular leukocyte, PMN, and polymorphonuclear leukocyte.

Hematologist (HEE-muh-TAH-loh-jist): A doctor who specializes in treating blood disorders.

Intrathecal chemotherapy (IN-truh-THEE-kul KEE-moh-THAYR-uh-pee): Treatment in which anticancer drugs are injected into the fluid-filled space between the thin layers of tissue that cover the brain and spinal cord.

Intravenous (IN-truh-VEE-nus): Into or within a vein. Intravenous usually refers to a way of giving a drug or other substance through a needle or tube inserted into a vein. Also called IV.

Leukemia (loo-KEE-mee-uh): Cancer that starts in blood-forming tissue such as the bone marrow and causes large numbers of abnormal blood cells to be produced and enter the bloodstream.

Lymph node (limf): A rounded mass of lymphatic tissue that is surrounded by a capsule of connective tissue. Lymph nodes filter lymph (lymphatic fluid), and they store lymphocytes (white blood cells). They are located along lymphatic vessels. Also called lymph gland.

Lymphoblast (LIM-foh-BLAST): A lymphocyte that has gotten larger after being stimulated by an antigen. Lymphoblast also refers to an immature cell that can develop into a mature lymphocyte.

Lymphoblastic (LIM-foh-BLAS-tik): Refers to lymphoblasts (a type of immature white blood cell).

Lymphocytic (LIM-foh-SIH-tik): Refers to lymphocytes (a type of white blood cell).

Lymphoid (LIM-foyd): Referring to lymphocytes, a type of white blood cell. Also refers to tissue in which lymphocytes develop.

Medical oncologist (MEH-dih-kul on-KAH-loh-jist): A doctor who specializes in diagnosing and treating cancer using chemotherapy, hormonal therapy, biological therapy, and targeted therapy. A medical oncologist often is the main health care provider for someone who has cancer. A medical oncologist also gives supportive care and may coordinate treatment given by other specialists.

Myeloblast (MY-eh-loh-BLAST): A type of immature white blood cell that forms in the bone marrow. Myeloblasts become mature white blood cells called granulocytes (neutrophils, basophils, and eosinophils).

Myeloblastic (MY-eh-loh-BLAS-tik): Refers to myeloblasts (a type of immature cell that forms in the bone marrow).

Myelogenous (MY-eh-LAH-jeh-nus): Having to do with, produced by, or resembling the bone marrow. Sometimes used as a synonym for myeloid; for example, acute myeloid leukemia and acute myelogenous leukemia are the same disease.

Myeloid (MY-eh-loyd): Having to do with or resembling the bone marrow. May also refer to certain types of hematopoietic (blood-forming) cells found in the bone marrow. Sometimes used as a synonym for myelogenous; for example, acute myeloid leukemia and acute myelogenous leukemia are the same disease.

Ommaya reservoir (oh-MY-uh REH-zer-vwahr): A device surgically placed under the scalp and used to deliver anticancer drugs to the fluid surrounding the brain and spinal cord.

Oncology nurse (on-KAH-loh-jee): A nurse who specializes in treating and caring for people who have cancer.

Oxygen (OK-sih-jen): A colorless, odorless gas. It is needed for animal and plant life. Oxygen that is breathed in enters the blood from the lungs and travels to the tissues.

Pediatric oncologist (pee-dee-A-trik on-KAH-loh-jist): A doctor who specializes in treating children with cancer.

Philadelphia chromosome (FIH-luh-DEL-fee-uh KROH-muh-some): An abnormality of chromosome 22 in which part of chromosome 9 is transferred to it. Bone marrow cells that contain the Philadelphia chromosome are often found in chronic myelogenous leukemia and sometimes found in acute lymphocytic leukemia.

Radiation oncologist (RAY-dee-AY-shun on-KAH-loh-jist):
A doctor who specializes in using radiation to treat cancer.

Radiation therapy (RAY-dee-AY-shun THAYR-uh-pee):
The use of high-energy radiation from x-rays, gamma rays, neutrons, protons, and other sources to kill cancer cells and shrink tumors. Radiation may come from a machine outside the body (external-beam radiation therapy), or it may come from radioactive material placed in the body near cancer cells (internal radiation therapy). Systemic radiation therapy uses a radioactive substance, such as a radiolabeled monoclonal antibody, that travels in the blood to tissues throughout the body. Also called irradiation and radiotherapy.

Registered dietitian (dy-eh-TIH-shun): A health professional with special training in the use of diet and nutrition to keep the body healthy. A registered dietitian may help the medical team improve the nutritional health of a patient.

Side effect: A problem that occurs when treatment affects healthy tissues or organs. Some common side effects of cancer treatment are fatigue, pain, nausea, vomiting, decreased blood cell counts, hair loss, and mouth sores.

Social worker: A professional trained to talk with people and their families about emotional or physical needs, and to find them support services.

Spleen: An organ that is part of the lymphatic system. The spleen makes lymphocytes, filters the blood, stores blood cells, and destroys old blood cells. It is located on the left side of the abdomen near the stomach.

Stem cell: A cell from which other types of cells develop. For example, blood cells develop from blood-forming stem cells.

Stem cell transplant: A method of replacing immature blood-forming cells in the bone marrow that have been destroyed by drugs, radiation, or disease. Stem cells are injected into the patient and make healthy blood cells. A stem cell transplant may be autologous (using a patient's own stem cells that were saved before treatment), allogeneic (using stem cells donated by someone who is not an identical twin), or syngeneic (using stem cells donated by an identical twin).

Targeted therapy (TAR-geh-ted THAYR-uh-pee): A type of treatment that uses drugs or other substances, such as monoclonal antibodies, to identify and attack specific cancer cells.

Transfusion (tranz-FYOO-zhun): A procedure in which a person is given an infusion of whole blood or parts of blood. The blood may be donated by another person, or it may have been taken from the patient earlier and stored until needed. Also called blood transfusion.

Watchful waiting: Closely watching a patient's condition but not giving treatment unless symptoms appear or change. Watchful waiting is sometimes used in conditions that progress slowly. It is also used when the risks of treatment are greater than the possible benefits. During watchful waiting, patients may be given certain tests and exams.

For the Latest Information About Leukemia

Visit NCI's website at <http://www.cancer.gov/cancertopics/types/leukemia>

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