



**The Leukemia &
Lymphoma Society**[®]
Fighting Blood Cancers

Acute Myelogenous Leukemia: A Guide for Patients and Families

LEUKEMIA

LYMPHOMA

MYELOMA



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About 12,000 Americans learn they have acute myelogenous leukemia (AML) each year.

People can get AML at any age. The chance of getting AML increases with age.

About 1 in 5 children with acute leukemia has AML.

This booklet is for patients with AML and their families.

It will help patients and families learn about AML and how it is treated.



1 **Questions? Contact an Information Specialist at The Leukemia & Lymphoma Society at www.LLS.org or (800) 955-4572.**

Part 1 answers the questions

- What is AML?
- Who gets AML?
- How does the doctor find AML?

Part 2 answers the questions

- What is the treatment for AML?
- What are the side effects of the treatment?
- How do I get more information?

Some words in the booklet may be new to you. Check “Medical Terms” at the back of this booklet. Or call The Leukemia & Lymphoma Society at (800) 955-4572.



The Leukemia & Lymphoma Society's free booklet, *Acute Myelogenous Leukemia*, gives more details on this disease and its treatment.

This booklet about AML is from The Leukemia & Lymphoma Society. It is for information only. The Society does not give medical advice or medical services.

To order free booklets, contact **The Leukemia & Lymphoma Society** at **www.LLS.org** or **(800) 955-4572**.

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Part 1 – Understanding Acute Myelogenous Leukemia

Leukemia is a type of cancer. There are 4 main types of leukemia. Acute myelogenous leukemia (AML) is 1 of the 4 types. With AML, the leukemic cells are often referred to as **blast cells**.

AML starts with a change to a single cell in the bone marrow. Marrow is the spongy center inside the bones.

In most cases doctors do not know what causes a healthy cell to change to an AML cell.

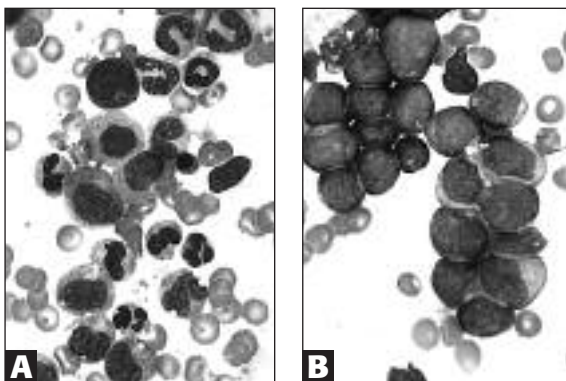
Some things that may increase the risk of getting AML are:

- Some types of chemotherapy
- Radiation used to treat cancer
- Tobacco smoke

- Down syndrome
- Being exposed to large amounts of the chemical benzene, found in some workplaces. (Benzene is used to make plastics, detergents, pesticides and other chemicals.)

You cannot catch AML from someone else.

There are different types of AML. These are called subtypes. Doctors look at the AML cells in a patient's marrow or blood to identify the patient's subtype of AML. Treatment for AML depends on the patient's subtype of AML.



Panel A shows normal marrow cells seen through a microscope. These normal cells are in various stages of development.

Panel B shows AML **blast cells** seen through a microscope. These cells have stopped developing. The marrow is filled with blast cells, immature cells that do not function properly.

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Some changes that a person with AML may have are

- Tiredness or no energy
- Shortness of breath during physical activity
- Pale skin
- Swollen gums
- Slow healing of cuts
- Pinhead-size red spots under the skin
- Prolonged bleeding from minor cuts
- Mild fever
- Black-and-blue marks (bruises) with no clear cause
- Aches in bones or knees, hips or shoulder.

These signs and symptoms for AML are common to many illnesses.

A symptom is a change in the body that a patient can see or feel. A sign is a change in the body that the doctor sees in an exam or a lab test.

About Marrow, Blood and Blood Cells

Marrow is the spongy center inside of bones.

Blood cells are made in the marrow. Blood cells begin as stem cells. Stem cells become red cells, white cells and platelets in the marrow. Then the red cells, white cells and platelets enter the blood.

The blood is also made up of **plasma**. Plasma is mostly water. It also has some vitamins, minerals, proteins, hormones and other natural chemicals.

Platelets prevent bleeding and form plugs that help stop bleeding after an injury.

Red cells carry oxygen around the body. When the number of red cells is below normal this is called anemia. Anemia can make you tired, pale or short of breath.

White cells fight infection in the body. A neutrophil is one type of white cell that fights infection.

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Blood and Bone Marrow Tests

Blood and **bone marrow** tests are done to look for leukemia cells to find out if a person has AML.

A **bone marrow aspiration** and a **bone marrow biopsy** are two of the tests that are done. An aspiration is done so that doctors can take a close look at the cells in the marrow. They can see what types of cells are in the marrow and what abnormalities the cells may have. The biopsy gives information about how much disease is in the marrow.

A **bone marrow aspiration** is examined by removing a sample of fluid and cells (the aspirate) from the marrow through a special needle. First, medication is given to numb the part of the body that will be used for the sample. The sample is usually taken from the patient's hip bone. The marrow cells are looked at under a microscope.

The bone marrow aspirate is examined to look for abnormal cells such as leukemic blast cells. It can also be used for **cytogenetic analysis** and other tests.

Cytogenetic analysis is a lab test to examine the **chromosomes** of the leukemic blast cells. Some changes to chromosomes give doctors information about how to treat their AML patients.

A **bone marrow biopsy** is done by removing a very small amount of bone filled with marrow cells. This is done with a special needle. First, medication is given to numb the part of the body that will be used for the biopsy – this is usually the patient’s hip bone. The bone marrow sample is looked at under a microscope.

Bone marrow aspiration and biopsy may be done in the doctor’s office or in a hospital. The two tests are almost always done together. Both tests are also done to see if treatment is destroying leukemic blast cells.

The doctor uses information from these tests to decide

- If leukemia is present
- The type of treatment the patient needs.

To decide the best treatment for the patient, the doctor may also consider

- The patient’s age
- The general health of the patient
- The presence and type of changes to chromosomes.

Each cell in the body has **chromosomes** that carry genes. Genes give instructions that tell each cell what to do.

Part 2 – Treatment

The goal of treatment for AML is to cure the disease.

There are two parts of treatment for AML, called **induction therapy** and **consolidation therapy**. Induction therapy is explained below. Consolidation therapy is explained on page 12 of this booklet.

Induction Therapy

Induction therapy is the term for the first part of treatment with chemotherapy.

Patients with AML need to start chemotherapy right away.

The aim of induction therapy is to

- Kill as many AML cells as possible and
- Get blood cell counts back to normal over time.

When the aim of induction therapy is achieved it is called a **remission**.

When a patient is in remission

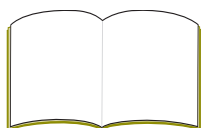
- He or she feels better over time
- Leukemia cells can't be seen in blood or marrow.

Induction therapy is done in the hospital. Patients are often in the hospital for 3 to 4 weeks. Some patients may need to be in the hospital longer.

Some patients with AML can be cured. Children with AML and patients with a type of AML called acute promyelocytic leukemia (APL) are among those most often cured.

Chemotherapy is treatment with drugs that kill or damage cancer cells. For treatment of AML, two or more drugs are usually used together. Some drugs are given by mouth. Most drugs are given through a **catheter** placed into a vein – usually in the patient's upper chest.

The catheter is sometimes called a central line, an indwelling catheter, or a Hickman® catheter. It is used to give chemotherapy, fluids, red cells and platelets, and to obtain blood samples.



The Society's free booklet, *Understanding Drug Therapy and Managing Side Effects*, has more information about managing side effects.

Many different drugs are used to kill leukemic cells. Each drug type works in a different way to kill the cells. Combining drug types can strengthen the effects of the drugs. New drug combinations are being studied. Information about side effects begins on page 21.

The first round of chemotherapy usually does not get rid of all the AML cells. Most patients will need more treatment. Usually the same drugs are used for more rounds of treatment to complete induction therapy.

It is important to get medical care in a center where doctors are experienced in treating patients with AML. You can ask your doctor how much experience he or she has treating AML patients.

Consolidation Therapy

More treatment is usually needed even after a patient with AML is in remission. This second part of treatment is called **consolidation therapy**. It is needed because some AML cells remain that are not found by common blood or marrow tests.

Consolidation therapy is done in the hospital. Patients are often in the hospital for 3 to 4 weeks. Some patients may need to be in the hospital longer.

Consolidation therapy may include chemotherapy with or without a stem cell transplant (sometimes called a bone marrow transplant). Stem cell transplants are explained on pages 14-16 of this booklet.

The doctor considers many things to decide the kind of consolidation therapy a patient needs, such as the

- Age of the patient
- Patient's physical ability to handle strong chemotherapy drugs
- Results of blood and marrow tests
- Availability of a stem cell donor.

Follow-Up Visits

Patients who are in remission still need to see the doctor regularly for exams and blood tests. Bone marrow tests may be needed too. The doctor may recommend longer waits between follow-up visits if a patient continues to be disease-free.

Refractory Leukemia and Relapsed Leukemia

Some patients still have AML cells in their marrow even after treatment. This is called **refractory leukemia**.

With refractory leukemia, drugs that were not used to treat the patient's AML in the first part of treatment may be given. Stem cell transplantation also may be used.

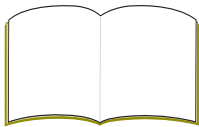
A **relapse** is when AML returns after the patient has had a remission.

For patients who relapse, the same or different drugs may be given, or stem cell transplantation may be used.

A drug called gemtuzumab ozogamicin (Mylotarg®) is being used to treat some older patients who have relapsed AML. More information about Mylotarg® is on page 27.

Stem Cell Transplant

A **stem cell transplant** (sometimes called a bone marrow transplant) is a treatment used for some patients who have AML. With a stem cell transplant, donated stem cells (allogeneic transplant) or the patient's own stem cells (autologous transplant) are injected into the patient's blood after chemotherapy. The injected stem cells go into the patient's marrow and help start a new supply of red cells, white cells and platelets. More information about allogeneic stem cell transplant follows. Information about autologous stem cell transplant begins on page 16.



The Society's free booklet, *Blood and Marrow Stem Cell Transplantation*, has more details on this topic.

Allogeneic Stem Cell Transplant

Chemotherapy also kills the healthy stem cells in the marrow. With an allogeneic stem cell transplant, stem cells are taken from a donor and transfused into the patient's blood after chemotherapy ends. Sometimes the donor can be a brother or a sister. About 1 out of 4 brothers or sisters has stem cells that "match" the patient's. The donor can be an unrelated person with stem cells that "match" the patient's if there is no related donor.

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There are 2 reasons for doing an allogeneic stem cell transplant:

- 1) To give strong doses of chemotherapy to kill more AML cells.
- 2) To give the patient the donor immune cells to attack any AML cells that remain.

When the donor cells attack the AML cells it is called “graft versus leukemia” or GVL.

The transplanted stem cells go from the patient’s blood to the marrow and help start a new supply of red cells, white cells (including immune cells) and platelets.

Allogeneic stem cell transplant can be a high-risk procedure. For this reason, it may not be a good treatment for some AML patients. The decision to do a transplant depends on the patient’s

- Age
- Overall health
- Chances that chemotherapy alone will cure his or her AML
- Understanding of the benefits and risks of the transplant. Doctors will discuss these with patients and parents of young children with AML.

AML patients who get an allogeneic stem cell transplant

- Are usually between the ages of 1 and 50
- Are in remission
- Have a matched donor.

Doctors are studying a type of stem cell transplant called a nonmyeloablative stem cell transplant. It may be helpful for older patients. More information about nonmyeloablative stem cell transplant is on page 26.

Autologous Stem Cell Transplant

Patients who do not have a matched donor for a stem cell transplant may get very high doses of chemotherapy and an **autologous stem cell transplant** instead.

Autologous means the patient's own cells are used for the transplant. Stem cells are taken from the patient's blood or marrow and stored before chemotherapy begins. They are infused back into the patient's blood after treatment with chemotherapy ends.

The goal of an **autologous stem cell transplant** is to restore the body's ability to make normal blood cells after high-dose chemotherapy.

AML Treatment in Children

There are about 3,500 new cases of childhood leukemia each year in the United States. About 1 in 5 children with acute childhood leukemia has AML. Induction therapy for children with AML starts with 2 or 3 drugs.

Stronger treatment is needed after a child with AML is in remission. This is called **intensive consolidation therapy**. It is given because usually some AML cells remain after induction therapy. These AML cells do not show up in standard blood or marrow tests. Consolidation therapy in children includes a number of chemotherapy drugs.

About 4 out of 5 children with AML go into remission. About half of children with AML have no signs of disease after 5 years. Most of these children are considered cured.

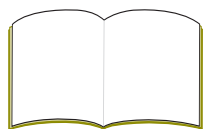
AML treatment is less likely to bring about a remission or cure when children

- Have acute myelogenous leukemia with very high white cell counts.
- Are younger than 1 year of age
- Have certain chromosomes in their AML cells that are not normal.

Allogeneic stem cell transplants may be used in children who are not doing well or whose AML returns (called a **relapse**) after high-dose chemotherapy. Doctors will discuss the benefits and risks with parents and older children.

Long-Term and Late Effects of Treatment on Children

Transplant and other treatment can cause problems with a child's growth, hormones, heart and other parts of the body. Treatment for leukemia can also cause problems with learning skills. But special education classes can help these children learn. It is important to identify problems early. Talk to the doctor about when your child's learning skills should be checked.



The Society's free fact sheet, *Long-Term and Late Effects of Treatment for Blood Cancers* and free booklet, *Learning & Living with Cancer*, has more information on this topic.

To order free booklets, contact **The Leukemia & Lymphoma Society** at www.LLS.org or **(800) 955-4572**.

AML Treatment in Older Patients

AML is more common in older patients. At least half of patients are over 65 years old when their disease is diagnosed.

Some healthy older patients can be treated with the same doses of chemotherapy as younger adults. Sometimes older patients have other medical problems, such as heart disease, kidney or lung disease, or diabetes. The doctor takes these other medical problems into account to decide which drugs to use and in what dose.

The doctor will also consider

- The type of AML
- The patient's physical ability to handle the treatment
- The patient's feelings about the treatment approach.

Healthy older patients can be treated with chemotherapy. The type and dose of drugs may be changed for older patients with other health problems.

Special AML Subtypes

Acute promyelocytic leukemia (APL) and acute monocytic leukemia are subtypes of AML that need different treatment than other subtypes of AML.

Acute Promyelocytic Leukemia Treatment

People with a type of AML called **acute promyelocytic leukemia** are treated with a substance that comes from vitamin A called all-trans retinoic acid (ATRA). This treatment is given along with chemotherapy. It is often successful in bringing this type of leukemia into remission.

Another treatment for acute promyelocytic leukemia is arsenic trioxide (ATO). It may be given to patients whose leukemia has returned or cannot be brought under control with chemotherapy and ATRA. Acute promyelocytic leukemia is the most curable form of AML.

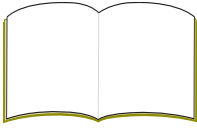
Acute Monocytic Leukemia Treatment

In one type of AML, called **acute monocytic leukemia**, the leukemia cells are more likely to invade the lining of the spinal canal or brain.

The patient gets chemotherapy directly into the spinal canal to treat these hard-to-reach cells. A needle is placed into the spinal canal during a procedure called a **spinal tap**. Spinal fluid is removed and chemotherapy is injected into the spinal canal.

Sometimes **radiation therapy** may be used to treat a large mass of leukemia cells in the spine or brain.

Disease and Treatment Side Effects for AML



The Society's free booklet, *Understanding Drug Therapy and Managing Side Effects*, has more information about managing side effects.

The term **side effect** is used to describe how treatment affects healthy cells.

Some common side effects of treatment for AML are listed below. Not all patients have these side effects.

- The number of red cells may decrease (called anemia). Transfusions of red cells (blood cells that are donated and given to the patient) are usually needed to increase the red cell count.
- Patients usually have a drop in the number of platelets. If a patient's platelet count is very low he or she usually needs a platelet transfusion to prevent or treat bleeding.
- A long-lasting and big drop in white cells may lead to an infection. Such infections are usually treated with **antibiotics**, until the normal white cell count goes up and the infection clears up.

Fever or chills may be the only signs or symptoms of infection.

Patients with an infection may also have

- Coughing
- Sore throat
- Pain when urinating
- Frequent loose bowel movements.

T**o lower the risk of bacterial, viral and fungal infections**

- The patient, visitors and medical staff need to wash their hands well.
- The patient's central line must be kept clean.
- Patients should follow all medical advice for taking care of their teeth and gums.

These are some other side effects:

- Mouth sores
- Rashes
- Dry mouth
- Diarrhea
- Nausea
- Constipation
- Hair loss
- Vomiting
- Food tastes different

Drugs can be given to prevent or treat nausea or vomiting.

To order free booklets, contact **The Leukemia & Lymphoma Society** at www.LLS.org or **(800) 955-4572**.

Chemotherapy may cause the amount of uric acid to increase in the blood of some AML patients. (Some patients also have a buildup of uric acid from the disease itself.) Uric acid is a chemical made in the body. A high level of uric acid can cause kidney stones.

Patients with high uric acid levels may be given a drug called allopurinol (Aloprim®, Zyloprim®) by mouth. Another drug used to treat high uric acid levels is called rasburicase, which is given by vein (Elitek®).

Blood Counts

Chemotherapy and radiation therapy often affect a person's blood counts. Complete blood counts are usually done throughout treatment. The doctor can see if treatment needs to be changed by checking your blood counts. If the red cell counts or platelet counts are too low transfusions may be necessary.

Growth factors are sometimes given to increase white cells. **G-CSF** (Neupogen®) and **GM-CSF** (Leukine®) are drugs that increase white cell counts. Your doctor may talk about **neutropenia** (a lower than normal neutrophil count) and **absolute neutrophil count** or ANC, which is the number of white cells that are neutrophils. Neutrophils fight infection in the body.

What is a normal blood cell count?

There is a range for normal blood counts. The ranges of blood cell counts below are for adults. They may vary a little from lab to lab and for children and teens.

Red blood cell (RBC) count

Men: 4.5 to 6 million red cells per microliter of blood

Women: 4 to 5 million red cells per microliter of blood

Hematocrit (the percent of the blood made up of red cells)

Men: 42% to 50%

Women: 36% to 45%

Hemoglobin (the part of the red blood cell that carries oxygen)

Men: 14 to 17 grams per 100 milliliters of blood

Women: 12 to 15 grams per 100 milliliters of blood

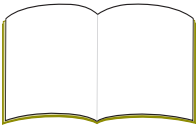
Platelet count

150 to 450 thousand platelets per microliter of blood

White blood cell (WBC) count

4.5 to 11 thousand white cells per microliter of blood

Differential count (sometimes referred to as a “diff”) is a breakdown of the different types of white cells. The five types of white cells that are counted are neutrophils, lymphocytes, monocytes, eosinophils, and basophils. Blood has about 60% neutrophils, 30% lymphocytes, 5% monocytes, 4% eosinophils and less than 1% basophils.



The Society's free fact sheet, *Understanding Blood Cell Counts*, has more information on this topic.

To order free booklets, contact **The Leukemia & Lymphoma Society** at www.LLS.org or (800) 955-4572.

Outlook for AML Patients

AML is a hard blood cancer to cure. The good news is that there has been improvement in treatment results in recent years.

A patient's age will affect the chance for a cure. Children have the best chance for a cure. Almost half of children with AML are cured. In general, the chance for a cure goes down the older a person gets.

Patients with certain subtypes of AML, such as acute promyelocytic leukemia (APL) have a higher chance of cure.

Patients who have an allogeneic stem cell transplant may be cured.

Getting More Information

Clinical Trials

Clinical trials are used to study new drugs, new treatments or new uses for approved drugs or treatments. Research has contributed to the growing number of patients with AML who enter remission, stay in remission for years or are cured.



The Society's free booklet, *Understanding Clinical Trials for Blood Cancers* has more information about clinical trials.

These are some of the types of trials underway:

Scientists are trying to create new drugs or find them from natural sources. They are also studying new combinations of drugs already being used.

Scientists are studying ways to boost the body's natural defenses, called immunotherapy. The goal is to kill or prevent the growth of AML cells.

Doctors are studying a type of stem cell transplant, called a **nonmyeloablative stem cell transplant** (or “mini” transplant). A mini transplant begins with less harsh therapy than a myeloablative transplant. The patient takes special drugs so that his or her immune system does not reject the transplanted immune cells. Over a long time, the donated stem cells replace the patient's blood and immune system cells. The donated cells also attack the AML cells.

Doctors are studying **cytokines**, natural substances made by cells. Cytokines can also be made in the lab. They can be used to help restore normal blood cell counts during treatment or boost the immune system to better attack the leukemia cells.

Leukemia-specific therapy, based on a patient's specific subtype of leukemia – such as the type of chromosome changes – is being studied.

Clinical Trials (continued)

The AML cells of some patients are not as easily killed by drugs as those of other patients. This is called drug resistance. Scientists are trying to understand why some AML cells are resistant to the effects of chemotherapy. This will help them develop better treatments.

Scientists are studying the exact genetic changes that cause a normal cell to become an AML cell. This research is leading to the development of new treatments. These treatments could block the effects of cancer-causing genes called oncogenes.

Gemtuzumab ozogamicin (Mylotarg[®]), a drug that is used to treat older patients who have relapsed AML, is being studied in combination with other drugs to treat relapsed AML. The drug is also being studied in combination with two drugs used to treat a type of AML called acute promyelocytic leukemia – all-trans retinoic acid (ATRA) and arsenic trioxide (ATO) – as a treatment for that type of leukemia.

Call The Leukemia & Lymphoma Society's Information Resource Center at (800) 955-4572 to learn how you and your doctor can find out if participating in a clinical trial is right for you.

Talking to the Doctor

Talk with the doctor about AML and how the doctor plans to treat the disease. This will help you to know more about the disease and treatment. It will help you to be involved and make decisions.

Some questions to ask your doctor are:

- What do the blood and marrow tests show? How do these results compare to “normal”?
- What kind of treatment do you think is needed?
- How much experience does this hospital have treating AML patients?
- Will the treatment be paid for by my health plan?
- How often and how long will I (or my child) need treatment/follow-up visits?
- Will you send updates to my family doctor?
- Will I (or my child) be treated using an **oncology group protocol**? An oncology group protocol is a National Institutes of Health clinical trial for cancer research.
- What side effects should be expected from treatment?
- What can be done to help deal with side effects?
- Will I (or my child) need to change our daily routine or avoid any activities?

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Talking to the Doctor (continued)

It may be helpful to write down the answers to your questions and review them later. You may want to bring a family member or friend with you to the doctor. The person can listen, take notes and offer support. Some patients find it easier to tape-record information from the doctor and listen to the tape at home.

Patients with AML should talk with their family and friends about how they feel. They can share what they know about the disease. When family and friends know about AML it will help them to cope.



It is important for patients or parents of children with AML to:

- Keep all appointments with the doctor
- Take all medicines as instructed by the doctor
- Follow the doctor's advice for preventing infection, such as avoiding crowds and washing hands
- Eat healthy foods each day; it is okay for patients to eat 4 or 5 smaller meals instead of 3 larger meals
- Ask your treatment team for helpful tips for patients who don't feel like eating
- See the family doctor to keep up with other health care needs.

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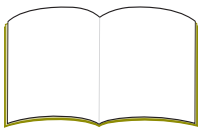
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Coping with AML

The news that you, your spouse, your child or another loved one has leukemia brings up many feelings. People dealing with AML face many unknowns. You and your family can talk about your concerns with the health care team. First you may want to focus on learning about AML and its treatment. You can then look ahead to taking care of yourself, remission and recovery.

Making treatment choices can cause a lot of stress. The time and money for medical care may place extra burdens on the family. It is important to ask the health care team for help and guidance. The team can also give emotional support and refer you to other sources of help.

Family and friends can often help you cope with what lies ahead. A friend or family member can go with you to treatments. Also, patients with AML may get to know one another and these friendships help too.



The Society's free booklets, *Each New Day* and *Coping: Support for People Living with Leukemia, Lymphoma or Myeloma* and *Financial Health Matters*, have more details on this topic.

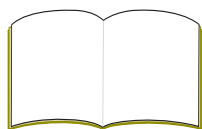
Helping Children Cope

Children with cancer may feel scared and helpless. But they may be too young to understand their illness and treatment.

Children with AML may have to deal with missing school, friends and favorite activities. They may feel angry at doctors and nurses for “hurting them.” They may be angry at their parents – they may believe their parents let them get sick. Or they may be angry at their parents for making them have tests and treatment.

The best way to help children accept the changes in their lives is to have them take part in everyday activities as soon as their doctors say it is okay.

Children with a family member who has AML also need special attention. They may be afraid of getting the disease. They may feel bad that their brother or sister is sick. They may be sad or angry that their parents are not around as much.



The Society’s free booklet, *Emotional Aspects of Childhood Blood Cancers*, has more information about helping children cope.

To order free booklets, contact **The Leukemia & Lymphoma Society** at www.LLS.org or **(800) 955-4572**.

The Leukemia & Lymphoma Society is Here to Help

The Leukemia & Lymphoma Society has chapters around the nation. The Society's chapters offer support groups and also can arrange for an AML patient to talk with another person who has been treated for AML. **To find the Society's chapter in your area, call (800) 955-4572.** Or go to www.LLS.org, the Society's Web site.



The Leukemia & Lymphoma Society has free booklets.

Acute Myelogenous Leukemia gives more detailed information about AML for patients and their families.

Blood and Marrow Stem Cell Transplantation is about stem cell transplantation.

Blood Transfusion provides information for patients with leukemia, lymphoma or myeloma and their families.

Each New Day and *Coping: Support for People Living with Leukemia, Lymphoma or Myeloma* are two support booklets for patients and families dealing with blood cancers.

Emotional Aspects of Childhood Blood Cancers is for parents of young children and adolescents with leukemia or lymphoma.

Financial Health Matters is about financial aid, insurance and ways to manage money.

Immunotherapy is a fact sheet that provides information about the different types of immunotherapies and their roles in the treatment of blood cancers.

Integrative Medicine & Complementary and Alternative Therapies as Part of Blood Cancer Care provides information about these topics.

To order free booklets, contact **The Leukemia & Lymphoma Society** at www.LLS.org or **(800) 955-4572**.

Learning & Living With Cancer: Advocating for Your Child's Educational Needs is a booklet to help parents deal with the education challenge that a child with cancer may have.

Long-Term and Late Effects of Treatment for Blood Cancers is a fact sheet that gives guidance about dealing with some of the effects of chemotherapy and radiation therapy.

The Stem Cell Transplant Coloring Book helps children to express themselves throughout this treatment.

Understanding Blood Cell Counts, Choosing and Communicating with a Cancer Specialist and *Choosing a Treatment Facility* are fact sheets that may help you to take a more active role in managing your health care.

Understanding Clinical Trials for Blood Cancers has more details to help you understand and decide about clinical trials.

Understanding Drug Therapy and Managing Side Effects is about many cancer drugs and common side effects.

Medical Terms

Acute leukemia

A rapidly progressing disease that affects mostly cells that are unformed or immature (not yet fully developed).

Antibiotics

Drugs that are used to treat infections. Penicillin is one type of antibiotic.

Antibodies

Proteins that help to fight infection in the body.

Central line

Special tubing the doctor puts into a large vein in the upper chest to prepare a patient for chemotherapy treatment. The central line is used to give the patient chemotherapy drugs and blood cells, and to remove blood samples. Also called an indwelling catheter.

Chemotherapy

Treatment with drugs or medicines to kill leukemia cells.

Clinical trials

Studies that use volunteers to test new drugs, treatments or new uses for approved drugs or treatments.

Consolidation therapy

Added treatment given to a patient even after the cancer is in remission. It usually includes chemotherapy drugs not used during induction treatment.

Cytokines

Natural substances made by cells. They can also be made in the lab. Today, growth factor cytokines can be used to help restore normal blood cells during treatment. In the future, immune cell cytokines may be used to treat **AML**.

Donor immune cells

The donated stem cells that a patient receives from a stem cell transplant. These can help him or her make new blood cells and new immune cells. Often, other immune cells called “lymphocytes” are mixed in with the donor stem cells. In time, the patient begins to make “donor” type blood and immune cells.

Both the infused immune cells and the patient-made donor-type immune cells (lymphocytes) lead to 2 results: “graft versus host” and “graft versus leukemia.” A strong “graft versus leukemia” and a weak “graft versus host” result usually means a better outcome for the patient.

Immune system

Cells and proteins that defend the body against infection.

Leukemia

A cancer of the marrow and blood.

Radiation therapy

Treatment with X-rays or other high-energy rays.

Relapse or recurrence

When disease comes back after it has been successfully treated.

Remission

No sign of the disease and/or a long time span when the disease is not causing any health problems for the patient.

Spinal tap

This is a medical procedure in which a small amount of the fluid that surrounds the brain and spinal cord is removed and examined. Also called a lumbar puncture.

Stem cell

A type of cell found in marrow that makes red cells, white cells and platelets.

Notes

Questions? Contact an Information Specialist at The Leukemia & Lymphoma Society at www.LLS.org or (800) 955-4572.

Call Our Information Resource Center

The Society's Information Resource Center (IRC) provides patients, families and healthcare professionals with the latest information on leukemia, lymphoma and myeloma. Our information specialists – master's level oncology professionals – are available by phone (800.955.4572) Monday through Friday, 9 am to 6 pm (ET); via email (infocenter@LLS.org); or chat online at www.LLS.org (click on "Live Help").

Call 800.955.4572 for a complete directory of our patient services programs.



**The Leukemia &
Lymphoma Society**
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LEUKEMIA

LYMPHOMA

MYELOMA