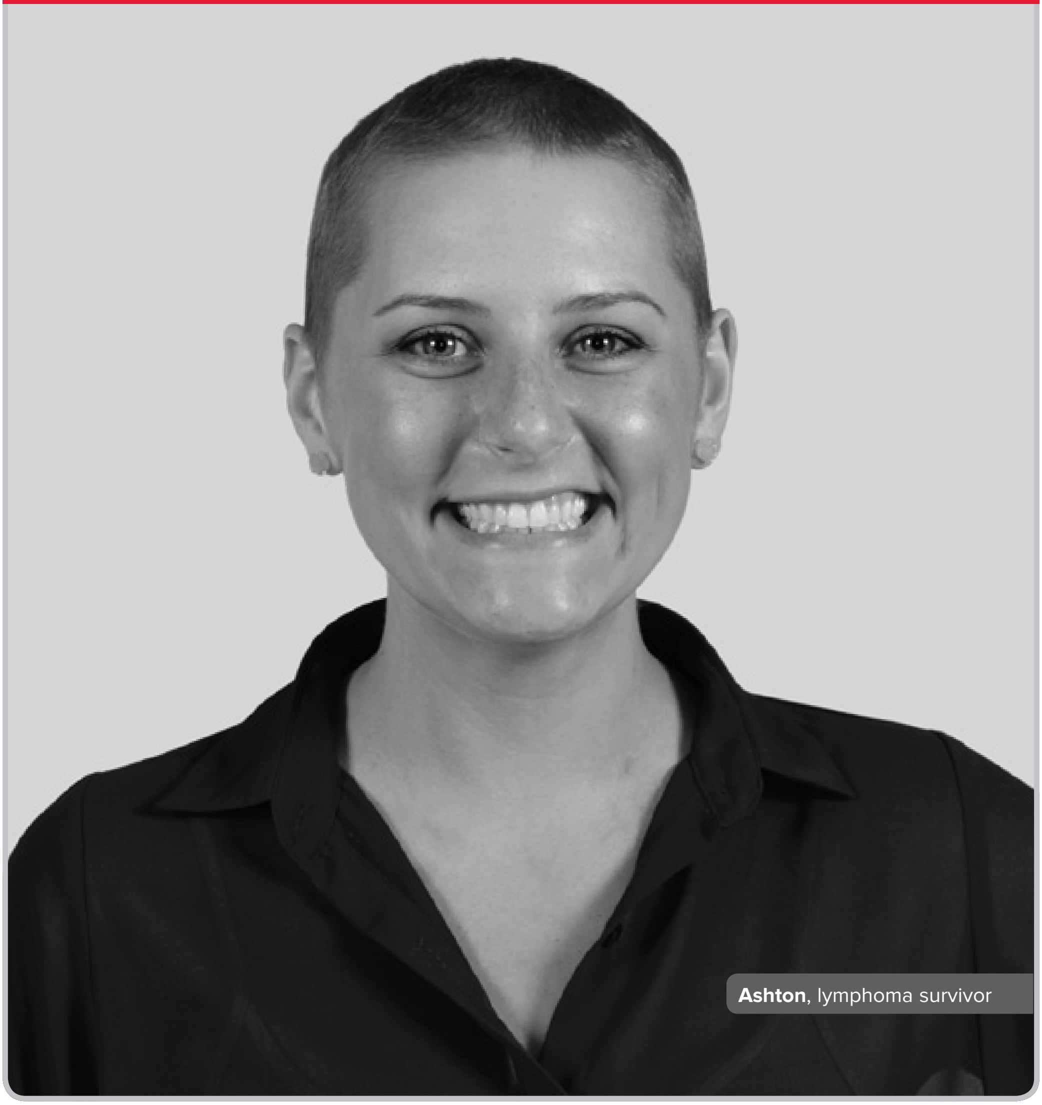
someday is today | LEUKEMIA & LYMPHOMA SOCIETY®
fighting blood cancers

The Lymphoma Guide

Information for Patients and Caregivers


Ashton, lymphoma survivor

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Revised **2013**

A Message From John Walter

President and CEO of The Leukemia & Lymphoma Society

The Leukemia & Lymphoma Society (LLS) wants to bring you the most up-to-date blood cancer information. We know how important it is for you to understand your treatment and support options. With this knowledge, you can work with members of your healthcare team to move forward with the hope of remission and recovery.

Our vision is that one day most people who have been diagnosed with lymphoma will be cured or they will be able to manage their disease with good quality of life. We hope that the information in this *Guide* will help you along your journey.

LLS is the world's largest voluntary health organization dedicated to funding blood cancer research, advocacy and patient services. Since its first funding in 1954, LLS has invested almost $1 billion in research specifically targeting blood cancers. We will continue to invest in research for cures and in programs and services that improve the quality of life of people who have lymphoma and their families.

We wish you well.

John Walter
President and CEO

Inside This Guide

This LLS Guide about lymphoma is for information only. LLS does not give medical advice or provide medical services.

Introduction

Lymphoma is the name for a group of blood cancers that develop in the lymphatic system. Hodgkin lymphoma and non-Hodgkin lymphoma are the two main types.

About 90 percent of people with lymphoma have non-Hodgkin lymphoma (NHL). The rest have Hodgkin lymphoma. Some types of lymphoma are curable. For other types, many patients are able to keep their disease under control and have a good quality of life with medical treatment. Progress in treating lymphoma gives patients more hope than ever before.

In 2013, about 731,277 people were either living with, or in remission from, lymphoma. This number includes

- ○ About 172,937 people with Hodgkin lymphoma
- ○ About 558,340 people with non-Hodgkin lymphoma

The Lymphoma Guide has sections with information for all types of lymphoma, for Hodgkin lymphoma and for non-Hodgkin lymphoma. A key at the bottom of each page shows you whether the section has

L	**Lymphoma information**
HL	**Hodgkin lymphoma information**
NHL	**Non-Hodgkin lymphoma information.**

Some words in the *Guide* may be new to you. Check *Medical Terms* beginning on page 40. Or, call our Information Specialists at (800) 955-4572.

Here to Help

The information in this *Guide* will help you when you talk to your doctor about tests and treatment. Members of your healthcare team will answer your questions and give support and any needed referrals. Let your doctor know if you want a professional healthcare interpreter who speaks your native language or uses sign language. Many times, this is a free service.

The news that you have lymphoma may be a shock to you and your loved ones. You may feel sad, depressed or afraid. Keep in mind that

- The number of patients who have gone into remission or have been cured is increasing each year.
- New treatments are being studied in clinical trials for patients of all ages and in all stages of treatment.

LLS Has Ways to Help. Treatment for lymphoma will affect your daily life for a period of time. You may want to ask friends or family members to help you

- Get information
- Take care of chores.

We want you to know that LLS offers free information and patient services for individuals and families touched by blood cancers.

Information Specialists. Our Information Specialists are master's level oncology social workers, nurses and health educators. They provide up-to-date blood cancer information. You can call to speak with an Information Specialist Monday through Friday, 9 a.m. to 6 p.m. ET at (800) 955-4572. You can also email infocenter@LLS.org or chat online at www.LLS.org.

Clinical Trials. Our Information Specialists help patients work with their doctors to find out about specific clinical trials. You can also use our online clinical-trial search service supported by LLS. It offers patients and caregivers immediate access to listings of blood cancer clinical trials. You can reach this online service by visiting www.LLS.org/clinicaltrials.

Advocacy and Public Policy. The LLS Office of Public Policy (OPP) enlists volunteers to help advocate for policies and laws to speed the development of new treatments and improve access to quality medical care. Visit www.LLS.org/advocacy to find out more or get involved.

Co-pay Assistance Program. This program offers assistance for financially eligible patients with certain blood cancer diagnoses to help pay for private or public health insurance premiums and/or co-pay costs for prescription medications. Check www.LLS.org/copay or call (877) 557-2672 to speak to a *Co-Pay Assistance Program* specialist for eligibility information.

Language Services. Free language services are available for calls with our Information Specialists.

Free Materials and Información en Español. LLS has free patient education and support booklets in English and Spanish. You can order these materials by phone at (800) 955-4572. You can also read or print the booklets, or order free print versions, at www.LLS.org/resourcecenter.

Chapter Programs and Services. LLS chapter offices around the United States and Canada offer support and education. Your chapter can arrange for you to speak to another person living with lymphoma through the *Patti Robinson Kaufmann First Connection Program*. The *Patient Financial Aid* program offers a limited amount of financial aid for qualified patients. Find your chapter by calling (800) 955-4572 or by visiting www.LLS.org.

Telephone/Web Education Programs. LLS provides free telephone and web education programs presented by experts for patients and caregivers. For more information contact our Information Specialists. Visit www.LLS.org/programs.

Children's Concerns. Children with lymphoma may feel scared and helpless and may be too young to understand their illness and treatment. One way to help children feel better about the changes in their lives is to have them take part in "normal" activities as soon as the doctor says it is okay. Parents of a child with lymphoma may want to talk to members of their child's healthcare team about how to find enough time for everything, pay for treatment and best help their children. For more information, see the free LLS publication *Coping With Childhood Leukemia and Lymphoma*.

The Trish Greene Back to School Program for Children With Cancer. This program helps doctors, nurses, parents and school personnel work together for a smooth return to school for children with cancer. For more information, contact your LLS chapter or call (800) 955-4572.

Reach Out. You and your loved ones can reach out to others for support. For example

- LLS offers online Blood Cancer Discussion Boards and live online chats at www.LLS.org/getinfo.
- Local or Internet support groups and blogs can give support.
- You may get to know other people living with cancer. These friendships provide support.

Suggestions From Other People Living With Cancer

- Get information about choosing a cancer specialist or treatment center.
- Talk with family and friends about how you feel and how they can help you.
- Find out what your insurance covers.
- Find out if financial assistance is available.
- Learn about the most current tests and treatments for lymphoma.
- Talk openly with your doctor about your fears or concerns.
- Tell your doctor if you have any side effects of treatment.
- Contact your doctor if you have fatigue, fever, pain or sleep problems.
- Get medical advice if you have changes in mood or feelings of sadness or depression.

Information for Veterans. Veterans with lymphoma who were exposed to Agent Orange while serving in Vietnam may be able to get help from the United States Department of Veterans Affairs. For more information call the Department of Veterans Affairs at (800) 749-8387 or visit www.publichealth.va.gov/exposures/agentorange.

Information for World Trade Center Responders. People who were involved in the aftermath of the attacks of September 11, 2001, may be eligible for help from the World Trade Center Health Program. These include: responders, workers and volunteers who helped with rescue, recovery and cleanup at the World Trade Center and related sites in New York City; survivors who were in the New York City disaster area, lived, worked, or were in school in the area; and responders to the Pentagon and the Shanksville, PA crash who have been diagnosed with a blood cancer. For more information, call the World Trade Center Health Program at (888) 982-4748 or visit www.cdc.gov/wtc/faq.html.

We'd Like to Hear From You. We hope this *Guide* helps you. Please tell us what you think at www.LLS.org/publicationfeedback. Click on **LLS Disease & Treatment Publications—Survey for Patients, Family and Friends**.

Want more information?

You can view, print or order the free LLS publications *Hodgkin Lymphoma* and *Non-Hodgkin Lymphoma* at www.LLS.org/resourcecenter or contact our Information Specialists for copies.

Part 1

Understanding Lymphoma

Lymphoma is the general term for many different types of blood cancer. Non-Hodgkin lymphoma and Hodgkin lymphoma are the two main types.

About Marrow, Blood and Blood Cells

The information in this section about normal blood and marrow may help you understand the lymphoma information in the rest of this *Guide*.

Marrow is the spongy center inside of bones where blood cells are made.

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

Platelets form plugs that help stop bleeding at the site of an injury.

Red blood cells carry oxygen around the body. When the number of red blood cells is below normal, the condition is called **anemia**. Anemia may make you feel tired or short of breath. It may make the skin look pale.

White blood cells fight infection in the body. There are two major types of white blood cells: germ-eating cells (neutrophils and monocytes) and infection-fighting **lymphocytes** (B cells, T cells and natural killer [NK] cells).

Plasma is the liquid part of the blood. It is mostly water. It also has some vitamins, minerals, proteins, hormones and other natural chemicals in it.

Normal Blood Cell Count Fast Facts

The ranges of blood cell counts below are for adults. They may be a little different 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 part of the blood made up of red cells)

- ○ Men: 42% to 50%
- ○ Women: 36% to 45%

Hemoglobin (amount of the red cell pigment 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

- ○ 150,000 to 450,000 platelets per microliter of blood

White blood cell (WBC) count

- ○ 4,500 to 11,000 white cells per microliter of blood

Differential (also called **diff**)

- ○ Shows the part of the blood made up of different types of white cells
- ○ The types of white cells counted are neutrophils, lymphocytes, monocytes, eosinophils and basophils.
- ○ Adults usually have about 60% neutrophils, 30% lymphocytes, 5% monocytes, 4% eosinophils and less than 1% basophils in the blood.

The Immune System

The immune system is the body's defense against infection.

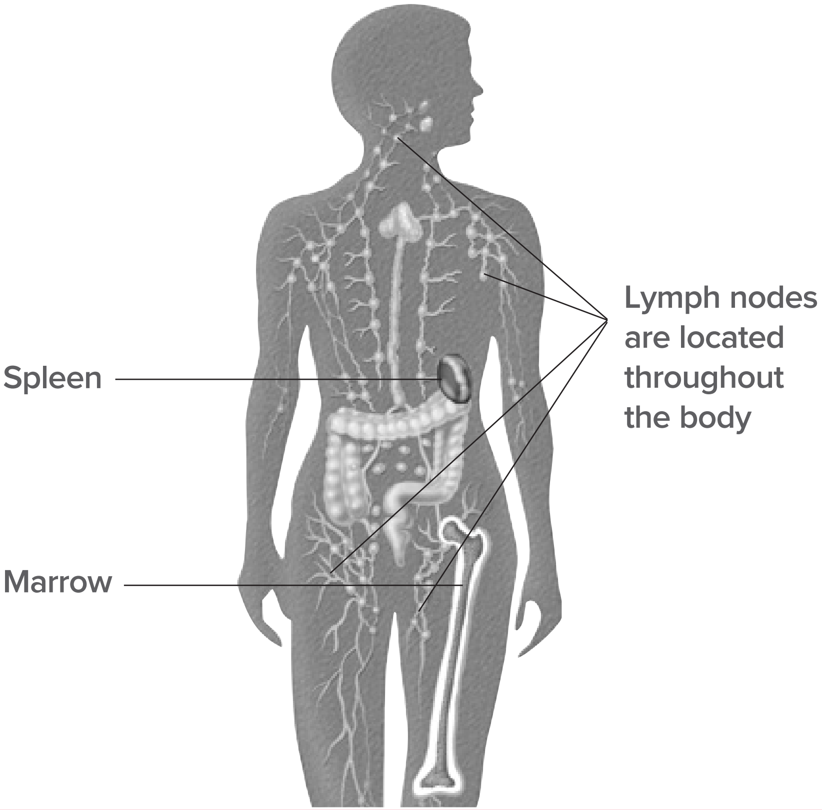
The marrow and the lymphocytes are part of the immune system.

Here are some other parts of the immune system.

Lymph nodes are bean-sized collections of lymphocytes. There are about 600 lymph nodes found throughout the body – in the neck, armpits, chest, abdomen, groin and some other parts of the body. Lymphatic vessels connect the lymph nodes. They contain lymph, a fluid that carries lymphocytes.

The spleen is an organ found on the left side of the body, near the stomach. It contains lymphocytes and removes worn-out cells from the blood.

Some Parts of the Immune System



The normal immune system helps to protect the body from infection.

About Lymphoma

Lymphoma starts with a change to a lymphocyte (a type of white blood cell).

The change to the lymphocyte causes it to become a lymphoma cell. The lymphoma cells pile up and form lymphoma cell masses. These masses gather in the lymph nodes or other parts of the body.

Choosing a Specialist

Choose a doctor who specializes in treating lymphoma and knows about the most up-to-date treatments. This type of specialist is usually called a **hematologist-oncologist**. Or your local cancer specialist can work with a lymphoma specialist.

Ways to Find a Lymphoma Specialist

- Ask your primary care doctor.
- Contact your community cancer center.
- Call your local medical society.
- Reach out to doctor and/or health plan referral services.
- Call our Information Specialists.
- Use online doctor-finder resources, such as
  - The American Medical Association's (AMA) "DoctorFinder."
  - The American Society of Hematology's (ASH) "Find a Hematologist."

Want more information?

www.LLS.org

You can view, print or order the free LLS publication *Choosing a Blood Cancer Specialist or Treatment Center* at www.LLS.org/resourcecenter or contact our Information Specialists for a copy.

Ask Your Doctor

Talk with the doctor and ask questions about how he or she plans to treat your lymphoma. This will help you to be actively involved in your care and to make decisions. This *Guide* includes questions to ask your doctor about lymphoma treatment (see the inside back cover).

It may be helpful to write down the answers to your questions and review them later. You may want to have a caregiver, family member or friend with you when you talk to your doctor. This person can listen, take notes and offer support. Some people like to record information from the doctor and then listen to the recording later on.

People with lymphoma who are unsure about their treatment options are encouraged to get a second opinion.

Pretreatment Considerations

Adults of childbearing age and parents of children diagnosed with lymphoma should ask their doctors for information that may lessen the risk for infertility.

Want more information?

For a list of Healthcare Question Guides about second opinions and other topics that you can print, go to www.LLS.org/whattoask. You can view, print or order the free LLS publication *Fertility* at www.LLS.org/resourcecenter or contact our Information Specialists for a copy.

Part 2

Hodgkin Lymphoma

Want more information?

www.LLS.org

You can view, print or order the free LLS publication *Hodgkin Lymphoma* at www.LLS.org/resourcecenter or contact our Information Specialists for a copy.

Hodgkin lymphoma (HL) is one of the most curable forms of cancer.

Doctors do not know what causes most cases of Hodgkin lymphoma. There is no way to prevent lymphoma and you can not catch lymphoma from someone else. It is commonly diagnosed when a person is in his or her 20s or 30s. It is less common in middle age and becomes more common again after age 60.

Signs and Symptoms

The most common sign of Hodgkin lymphoma is one or more enlarged (swollen) lymph nodes. The enlarged lymph node may be in the neck, upper chest, armpit, abdomen or groin. It is usually painless.

A **sign** is a change in the body that the doctor sees in an exam or a test result.

A **symptom** is a change in the body that a patient can see or feel.

Signs and symptoms of Hodgkin lymphoma may include

- Swollen lymph nodes
- Cough and shortness of breath
- Fever
- Night sweats
- Tiredness
- Weight loss
- Itchy skin.

Diagnosis and Staging

Having the correct diagnosis is important for getting the right treatment. Some patients may need to get a second medical opinion about the diagnosis before they begin treatment. Talk to the doctor about the tests used to make the diagnosis.

Doctors do a test called a "lymph node biopsy" to find out if a patient has Hodgkin lymphoma.

How is a Lymph Node Biopsy Done?

- A surgeon removes all or part of an enlarged lymph node.
- The lymph node is examined under a microscope by a pathologist (a doctor who identifies diseases by studying cells and tissues under a microscope).

It may be important to get another opinion about the biopsy results from a second pathologist.

The doctor will do other tests to **stage** the disease (to see how far the disease has spread). See *Lymphoma Stages* on page 15 for descriptions of the stages.

The tests for staging include

- Blood tests – to check red blood cell, white blood cell and platelet counts; blood tests are also done to check for other signs of disease
- Bone marrow tests – to look for Hodgkin lymphoma cells in the marrow
- Imaging tests – to create pictures of the chest and abdomen to see if there are lymphoma masses in the lymph nodes, liver, spleen or lungs. Examples of imaging tests include a
    - Chest x-ray
    - CT (computed tomography) scan
    - MRI (magnetic resonance imaging)
    - PET (positron emission tomography) scan.

How are the Blood and Bone Marrow Tests Done?

Blood tests. Usually a small amount of blood is taken from the patient's arm with a needle. The blood is collected in tubes and sent to a lab.

Bone marrow aspiration. A liquid sample of cells is taken from the marrow.

Bone marrow biopsy. A very small amount of bone filled with marrow cells is taken from the body.

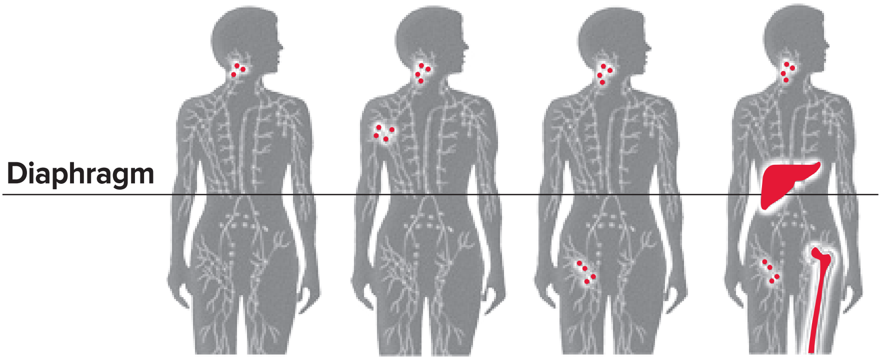
Blood and marrow tests may be done in the doctor's office or in a hospital. A bone marrow aspiration and a bone marrow biopsy are almost always done together. Both tests are done with a special needle. Some patients are awake for the procedure. They get medication first to numb the skin where the procedure will take place. This is usually the area near the patient's hip bone. The hip bone holds the cells needed to be examined. Some patients are sedated (asleep) for the procedure.

Blood and marrow tests may also be done both during and after treatment. The tests are repeated to see if treatment is destroying lymphoma cells.

Want more information?

You can view, print or order the free LLS publication *Understanding Lab and Imaging Tests* to learn more about lab tests and what to expect at www.LLS.org/resourcecenter or contact our Information Specialists for a copy.

Lymphoma Stages



Stage I
One lymph node region or a single organ.

Stage II
Two or more lymph node regions on the same side of the diaphragm.

Stage III
Two or more lymph node regions above and below the diaphragm.

Stage IV
Widespread disease; multiple organs, with or without lymph node involvement.

Patients are also divided into "A" or "B" categories. "B" category patients have fever, a lot of sweating and/or weight loss. "A" category patients do not.

All stages of lymphoma can be treated.

Hodgkin Lymphoma Subtypes

Knowing your subtype helps the doctor make treatment decisions. Below are the names of the different Hodgkin lymphoma subtypes.

- Classical Hodgkin Lymphoma – about 95 percent of patients have this type, which has been further subdivided into
  - Nodular sclerosis
  - Mixed cellularity
  - Lymphocyte-depleted
  - Lymphocyte-rich classical.
- Nodular Lymphocyte-Predominant Hodgkin Lymphoma

Treatment for these subtypes may vary. For more information, see the *Treatment* section on page 16 and our free LLS publication *Hodgkin Lymphoma*.

Treatment

Hodgkin lymphoma can be cured in about 75 percent of all patients. The cure rate in younger patients is over 90 percent.

There are different types of HL. Talk to your doctor about the type of Hodgkin lymphoma that you have and your treatment choices.

Factors that may affect treatment include

- The type of Hodgkin lymphoma
- The stage and category of the disease
- Disease that has not responded to treatment
- Disease that has come back after treatment
- Other medical problems, such as a very low red blood cell count (anemia), diabetes mellitus, heart or kidney disease.

Combination chemotherapy along with "involved field radiation therapy" is the most common treatment. Involved field radiation therapy uses high-energy rays to target the HL cells. Other parts of the body are protected to reduce harm to healthy cells.

Chemotherapy without radiation therapy may be the treatment for patients with widespread Hodgkin lymphoma, fever, night sweats or weight loss.

Chemotherapy is given in "cycles," usually several weeks apart. A number of cycles are needed. The treatment may last from six to 10 months. It is outpatient treatment for most patients. Some patients may have to stay in the hospital for a short time if they develop a fever or have other signs of infection. Some patients who need antibiotics may stay in the hospital until the infection is gone.

Nodular Lymphocyte-Predominant Hodgkin Lymphoma. Patients with nodular lymphocyte-predominant Hodgkin lymphoma (NLPHL) need different treatment than patients with other HL subtypes. NLPHL is slow-growing (indolent) and close to 100 percent of patients see long-term survival. The treatment for patients with NLPHL is involved field radiation. Patients do respond to chemotherapy, but the disease tends to come back more often after chemotherapy. For more information, see the free LLS publication *Hodgkin Lymphoma*.

Examples of Some Treatment Approaches Used for Hodgkin Lymphoma

ABVD – Adriamycin® (doxorubicin), bleomycin, vinblastine and dacarbazine

BEACOPP – bleomycin, etoposide, Adriamycin (doxorubicin), cyclophosphamide, Oncovin® (vincristine), procarbazine and prednisone

Stanford V – mechlorethamine, doxorubicin, vinblastine, vincristine, bleomycin, etoposide and prednisone

Brentuximab vedotin (Adcetris®)

High-dose chemotherapy may also kill normal blood-forming cells in the marrow. Chemotherapy may cause very low counts of red blood cells, white blood cells or platelets.

Some patients may need a blood transfusion or drugs called **blood cell growth factors** until the side effects of chemotherapy wear off. Examples of red blood cell growth factors are Aranesp® (darbepoetin alfa) and Procrit® (epoetin alfa). These can increase red blood cell counts.

Want more information?

You can view, print or order the free LLS publication *Blood Transfusion* at www.LLS.org/resourcecenter or you can contact our Information Specialists for a copy.

Hodgkin lymphoma affects the body's ability to fight infection. Chemotherapy and radiation can add to the problem. Good treatment and following the doctor's advice will help lower the risk of infection. White blood cell growth factors may be part of treatment.

Neupogen® or Neulasta® (also called **granulocyte-colony stimulating factor** or **G-CSF**) and Leukine® (also called **granulocyte-macrophage colony stimulating factor** or **GM-CSF**) can increase the number of neutrophils (white blood cells).

See *Side Effects of Lymphoma Treatment* on page 35 for more information.

Relapsed Hodgkin Lymphoma. In some patients, Hodgkin lymphoma may come back (called a "recurrence" or "relapse").

The doctor will treat these patients again with chemotherapy. The treatment often gives patients very long disease-free periods. Another treatment option for relapsed HL is brentuximab vedotin (Adcetris®). This drug has been FDA approved for the treatment of HL after failure of autologous stem cell transplant and in HL patients who are not autologous stem cell transplant candidates after failure of at least two multiagent chemotherapy regimens.

Stem Cell Transplantation

When doctors are planning treatment, they use a number of factors to determine a patient's need for a stem cell transplant. These factors may include the patient's disease, subtype, stage, other treatment received and the patient's physical ability to have the transplant. While a stem cell transplant is not an option for every patient, it can be an important addition to the treatment plan for some patients.

Additional information about the different kinds of transplants that are available for some HL patients start on the next page. Talk to your doctor about whether a stem cell transplant is a treatment option for you.

Want more information?

www.LLS.org

You can view, print or order the free LLS publication *Blood and Marrow Stem Cell Transplantation* at www.LLS.org/resourcecenter or contact our Information Specialists for a copy.

Autologous Stem Cell Transplantation. Autologous transplantation is more frequently used than allogeneic transplantation for Hodgkin lymphoma patients.

The goal of autologous stem cell transplantation is to help the body start a new supply of blood cells after high-dose chemotherapy.

With an autologous transplant

- The patient's own stem cells are collected from the patient's blood or marrow and stored after the first cycles of drug therapy are completed.
- The patient is then given high-dose chemotherapy to kill the lymphoma cells. This treatment also kills normal stem cells in the marrow.
- The last step is to infuse the stem cells back into the patient through a central line.

Allogeneic Stem Cell Transplantation. An allogeneic transplant is a treatment that uses stem cells from a donor. The donor may be a brother or sister. Or, the donor can be an unrelated person with stem cells that "match" the patient's. Stem cells may also come from a cord blood unit (the blood in the umbilical cord after a baby's birth). Allogeneic transplants may be done in the hospital. First, the patient is given high-dose chemotherapy and/or radiation therapy to kill the lymphoma cells in the body. Stem cells are collected from a donor. The donor stem cells are given to the patient through an intravenous (IV) line or central line. The donor stem cells go from the patient's blood to the marrow and help start a new supply of red blood cells, white blood cells and platelets.

Reduced-intensity allogeneic stem cell transplantation (also called a **nonmyeloablative transplant**) uses lower doses of chemotherapy than a standard allogeneic transplant. Some older and sicker patients may be helped by this treatment. Talk to your doctor about whether stem cell transplantation is a treatment option for you.

Childhood Hodgkin Lymphoma

Children and teens with Hodgkin lymphoma should be treated at medical centers that have a pediatric oncology team.

It is important for young adults and parents of children to talk to members of the oncology team about the

- Stage of the disease
- Type of Hodgkin lymphoma
- Lab test results.

Doctors use this information about the patient's disease in order to determine the most effective therapy. Children and young adults with Hodgkin lymphoma are usually treated with combination chemotherapy, sometimes with the addition of radiation therapy to increase local control of the disease.

See *Pretreatment Considerations* on page 11 and *About Clinical Trials* on page 34 for more information.

Part 3

Non-Hodgkin Lymphoma

Want more information?

www.LLS.org

You can view, print or order the free LLS publication *Non-Hodgkin Lymphoma* at www.LLS.org/resourcecenter or contact our Information Specialists for a copy.

There are many types of non-Hodgkin lymphoma (NHL). Most people with NHL have a B-cell type of NHL (about 85 percent). The others have a T-cell type or an NK-cell type of lymphoma.

NHL that is

- Slow-growing is called **indolent** or **low-grade**
- Fast-growing is called **aggressive** or **high-grade**.

Talk to your doctor about the type of NHL that you have and your treatment choices.

There are treatments for every type of NHL. Some patients with fast-growing NHL can be cured. For patients with slow-growing NHL, treatment may keep the disease in check for many years. This can be true even when tests show that disease remains in some parts of the body.

Some Types of Non-Hodgkin Lymphoma

Slow-Growing or Indolent NHL

Follicular lymphoma – the most common slow-growing NHL

Cutaneous T-cell lymphoma

Lymphoplasmacytic lymphoma

Marginal zone lymphoma

Mucosa-associated lymphoid tissue (MALT) lymphoma

Small cell lymphocytic lymphoma (SLL)/Chronic lymphocytic leukemia (CLL)

Waldenström macroglobulinemia

Fast-Growing or Aggressive NHL

Diffuse large B-cell lymphoma – the most common fast-growing NHL

AIDS-associated lymphoma

Anaplastic large cell lymphoma

Burkitt lymphoma

Central nervous system (CNS) lymphoma

Follicular lymphoma (transformed)

Lymphoblastic lymphoma

MALT lymphoma (transformed)

Mantle cell lymphoma (most types)

Peripheral T-cell lymphoma (most types)

Want more information?

www.LLS.org

You can view, print or order the free LLS publications *Mantle Cell Lymphoma Facts; Cutaneous T-Cell Lymphoma Facts*; *Waldenström Macroglobulinemia Facts; Peripheral T-Cell Lymphoma Facts* and *Chronic Lymphocytic Leukemia* at www.LLS.org/resourcecenter or contact our Information Specialists for copies.

Signs and Symptoms

The most common sign of NHL is one or more enlarged lymph nodes in the neck, armpit or groin. Enlarged lymph nodes also can be near the ears or elbow.

A **sign** is a change in the body that the doctor sees in an exam or a test result.

A **symptom** is a change in the body that a patient can see or feel.

Signs and symptoms of NHL may include

- Swollen lymph nodes
- Fever
- Night sweats
- Tiredness
- Loss of appetite
- Weight loss
- Rash.

Diagnosis and Staging

Having the correct diagnosis is important for getting the right treatment. Some patients may need to get a second medical opinion about the diagnosis before they begin treatment. Talk to the doctor about the tests used to make the diagnosis.

Doctors do a test called a **lymph node** biopsy to find out if a patient has NHL. Sometimes a biopsy is done to examine cells from other parts of the body, such as the lungs.

How is a Lymph Node Biopsy Done?

- A surgeon removes all or part of an enlarged lymph node.
- The lymph node is examined under a microscope by a pathologist (a doctor who identifies diseases by studying cells and tissues under a microscope).
- The doctor may look at the cells from the biopsy to see if there are changes in the chromosomes of the NHL cells. (Each cell in the body has chromosomes that carry genes. Genes give the instructions that tell each cell what to do.)

It may be important to get another opinion about the biopsy results from a second pathologist.

Immunophenotyping is done to find out if the patient's NHL cells are B cells or T cells. This is a lab test that can be done using the sample of cells from the lymph node biopsy or with blood or bone marrow biopsy samples.

The doctor will do other tests to stage the disease. See *Lymphoma Stages* on page 15 for descriptions of the stages.

A physical exam, lab and imaging tests help the doctor to see how widespread the disease is. The doctor will check

- The number of lymph nodes that are affected
- Where the affected lymph nodes are located (for example, in the abdomen or the chest or in both parts of the body)
- Whether any cancer cells are in other parts of the body besides the lymph nodes or lymphatic system, such as the lungs or liver.

The tests for staging include

- Blood tests – to check red blood cell, white blood cell and platelet counts. Blood tests are also used to look for other signs of disease.
- Bone marrow tests – to look for NHL cells in the marrow.
- Imaging tests – to create pictures of the chest and abdomen to see if there are lymphoma masses in the lymph nodes, liver, spleen or lungs. Examples of imaging tests include a
    - Chest x-ray
    - CT (computed tomography) scan
    - MRI (magnetic resonance imaging)
    - PET (positron emission tomography) scan.

Other staging tests may be done for some types of NHL.

Treatment

The doctor has to take into account many factors to make a treatment plan for a patient with NHL, including

- The type of NHL
- The stage and category of the disease
- The patient's overall health.

Types of treatment are

- Watch and wait – an approach for some types of NHL
- Chemotherapy – the main type of treatment for NHL
- Drug therapy – Rituxan® (rituximab) and certain other drugs are used to treat some types of NHL
- Radiation therapy – an important added treatment given along with chemotherapy for some types of NHL
- Stem cell transplantation – a procedure used for some types of NHL
- New types of treatment – now under study in clinical trials.

Chemotherapy is given in "cycles," usually several weeks apart. Patients need a number of cycles of treatment. The treatment may last from six to 10 months.

High-dose chemotherapy may also kill normal blood-forming cells in the marrow. Chemotherapy may cause very low counts of red blood cells, white blood cells or platelets. A red blood cell transfusion or drugs called **blood cell growth factors** may be needed until the side effects of chemotherapy wear off.

Examples of these growth-factor drugs are

- Aranesp® (darbepoetin alfa) and Procrit® (epoetin alfa) – these can increase the red blood cell count
- Neupogen® or Neulasta® (also called **granulocyte-colony stimulating factor** or **G-CSF**) and Leukine® (also called **granulocyte-macrophage colony stimulating factor** or **GM-CSF**) – these can increase the number of neutrophils (white blood cells).

Want more information?

You can view, print or order the free LLS publication *Blood Transfusion* at www.LLS.org/resourcecenter or you can contact our Information Specialists for a copy.

Most treatment for NHL usually takes place in an outpatient setting. Some patients may need to stay in the hospital for a short time – for example, if they develop a fever or have other signs of infection. Some patients who need antibiotics may stay in the hospital until the infection is gone.

Some Drug Combinations Used to Treat NHL

Many drug combinations are used to treat NHL. The drug choice depends on the type of NHL and the stage of treatment.

A number of drug combinations include Rituxan® – a "monoclonal antibody therapy." Monoclonal antibody therapies kill certain types of cancer cells. They can cause side effects but do not cause many of the side effects caused by chemotherapy.

R-CHOP: Rituxan, cyclophosphamide, hydroxydoxorubicin (doxorubicin), Oncovin® (vincristine) and prednisone

R-CVP or **F-CVP:** Rituxan or fludarabine, plus cyclophosphamide, vincristine and prednisone

R-HCVAD: Rituxan, cyclophosphamide, vincristine, Adriamycin® (doxorubicin) and dexamethasone alternating with R-MTXAraC: Rituxan, methotrexate, cytarabine (ara-C)

B-R: Bendamustine (Treanda®) and Rituxan

Rituxan for NHL Treatment – Types and Stages

Disease-Type	Treatment-Stage	Treatment
Follicular, CD20-positive, B-cell	Newly diagnosed (initial treatment)	R-CVP (Rituxan + cyclophosphamide, vincristine and prednisone)
Low-grade, or follicular, CD20-positive, B-cell	Maintenance of stable disease or either a partial or a complete response after initial treatment with CVP	Rituxan
	Relapsed or refractory	
	Relapsed or refractory after initial Rituxan treatment	
	Maintenance of advanced disease after response to initial treatment with Rituxan plus chemotherapy	
CD20-positive, Diffuse large B-cell	Newly diagnosed (initial treatment)	R-CHOP (Rituxan + cyclophosphamide, doxorubicin, Oncovin® and prednisone) or certain other anthracycline-based chemotherapies

Watch and Wait. In most cases, a patient begins treatment for NHL right away. But when a patient has NHL that is not growing or is growing slowly, the doctor may recommend a watch-and-wait approach.

The watch-and-wait approach means that a doctor watches a patient's condition but does not treat with drugs or radiation therapy. Patients may think that they should have treatment right away. But for patients with slow-growing disease and no symptoms, it is common not to start treatment. This allows the patient to avoid side effects of therapy until treatment is needed.

Patients in a watch-and-wait protocol need follow-up visits with the doctor. At each office visit the doctor will check for any health changes. The results of exams and lab tests over time will help the doctor advise the patient about when to start treatment with drugs or radiation.

Treatment will begin if a patient develops symptoms or there are signs that the NHL is starting to grow.

Patients may be treated with one to five drugs. The goal of treatment is a series of remissions – each lasting a number of years. This can be true even when tests show that disease remains in some parts of the body. Many patients lead active, good-quality lives.

Maintenance for Slow-Growing NHL. People with some types of slow-growing lymphoma may continue treatment to stay in remission. This is called **maintenance therapy**. Rituxan is a drug that is approved for maintenance therapy for patients with follicular lymphoma.

Radiation Therapy. Radiation uses high-energy rays to kill lymphoma cells in one area. Radiation can be used along with chemotherapy when there are very large masses of lymphoma cells in a small area of the body. Radiation can also be used when large lymph nodes are pressing on an organ (such as the bowel) and chemotherapy cannot control the problem. Radiation usually is not the only treatment for NHL because the lymphoma cells are likely to be in many areas of the body.

Some Other Drugs Used to Treat NHL

Adcetris® (brentuximab vedotin) – a drug that is FDA-approved for the treatment of patients with systemic anaplastic large cell lymphoma after at least one previous multi-drug chemotherapy regimen did not work.

Folotyn® (pralatrexate) – a drug that is FDA-approved for patients with relapsed or refractory pheripheral T-cell lymphoma (PTCL).

Istodax® (romidepsin) – a drug that is FDA-approved for the treatment of PTCL patients who have received at least one previous therapy.

Treanda® (bendamustine) – a drug that is FDA-approved to treat patients with relapsed, slow-growing, B-cell NHL that has progressed during or within six months of treatment with Rituxan® or a Rituxan-containing regimen. Treanda is also approved to treat patients with chronic lymphocytic leukemia (CLL).

Velcade® (bortezomib) – a drug that is FDA-approved to treat mantle cell lymphoma and is also being studied in clinical trials for some other types of NHL.

Zevalin® (ibritumomab) – a monoclonal antibody that is FDA-approved to treat NHL. It is called **radioimmunotherapy**. This means that this drug carries a radioactive substance that targets the lymphoma cells, reducing radiation side effects to normal cells. Zevalin is approved for relapsed or refractory CD20-positive, low-grade, follicular or transformed B-cell lymphomas and for previously untreated follicular non-Hodgkin lymphoma patients who achieve a partial or complete response to initial chemotherapy.

Relapsed or Refractory NHL. Disease can come back months or years after treatment ends. This condition is called **relapsed** NHL. Some patients may not respond to treatment. This condition is called **refractory** NHL.

Doctors can either change the patient's treatment or give added treatment. There are many drug choices and approaches to treatment. If relapse occurs long after treatment, the same drugs that were used for the patient before may work. In other cases, new drugs or treatment options are used. Patients with refractory NHL should talk with the doctor about the risks and benefits of participating in a clinical trial.

Stem Cell Transplantation

When doctors are planning treatment, they use a number of factors to determine a patient's need for a stem cell transplant. These factors may include the patient's disease, subtype, stage, other treatment received and the patient's physical ability to have the transplant. While a stem cell transplant is not an option for every patient, it can be an important addition to the treatment plan for some patients.

Additional information about the different kinds of transplants that are available for some NHL patients start on the next page. Some of these transplants are for patients with slow-growing lymphomas, some are more appropriate for patients with fast-growing lymphomas. Talk to your doctor about whether a stem cell transplant is a treatment option for you.

Want more information?

www.LLS.org

You can view, print or order the free LLS publications *Blood and Marrow Stem Cell Transplantation* and *Cord Blood Stem Cell Transplantation* at www.LLS.org/resourcecenter or contact our Information Specialists for a copy.

Autologous Stem Cell Transplantation. Autologous transplantation is more frequently used than allogeneic transplantation as a treatment for non-Hodgkin lymphoma patients.

The goal of autologous stem cell transplantation is to help the body start a new supply of blood cells after high-dose chemotherapy. With an autologous transplant

- The patient's own stem cells are collected from the patient's blood or marrow and stored after the first cycles of drug therapy are completed.
- The patient is then given high-dose chemotherapy to kill the lymphoma cells. This treatment also kills normal stem cells in the marrow.
- The last step is to infuse the stem cells back into the patient through a central line.

Allogeneic Stem Cell Transplantation. An allogeneic transplant uses stem cells from a donor. The donor may be a brother or sister. Or, the donor can be an unrelated person with stem cells that "match" the patient's. Stem cells may also come from a cord blood unit (the blood in the umbilical cord after a baby's birth). Allogeneic transplants may be done in the hospital. First, the patient is given high-dose chemotherapy and/or radiation therapy to kill the lymphoma cells in the body. Stem cells are collected from a donor. The donor stem cells are given to the patient through an intravenous (IV) line or central line. The donor stem cells go from the patient's blood to the marrow and help start a new supply of red blood cells, white blood cells and platelets.

Reduced-intensity allogeneic stem cell transplantation (also called a **nonmyeloablative transplant**) uses lower doses of chemotherapy than a standard allogeneic transplant. Some older and sicker patients may be helped by this treatment.

Talk to your doctor about whether stem cell transplantation is a treatment option for you.

Childhood Non-Hodgkin Lymphoma

Burkitt lymphoma is the most common type of NHL in children aged 5 through 14 years. NHL will account for 4 percent of all cancers expected to be diagnosed in children and adolescents younger than 15 years.

Children and teens with NHL should be treated at medical centers that have a pediatric oncology team.

It is important for young adults and parents of children to talk to members of the oncology team about the

- Stage of the disease
- Type of NHL
- Lab test results.

Doctors use this information about the patient's disease in order to determine the most effective therapy. Treatments used for children with NHL may be different from those used for adults with NHL.

See *Pretreatment Considerations* on page 11 and *About Clinical Trials* on page 34 for more information.

Part 4

About Clinical Trials

There are new treatments under study for lymphoma patients of all ages. New treatments are studied in clinical trials. Clinical trials are also used to study new uses for approved drugs or treatments. For example, changing the amount of the drug or giving the drug along with another type of treatment might be more effective. Some clinical trials combine drugs for lymphoma in new sequences or dosages.

There are clinical trials for

- Newly diagnosed lymphoma patients
- Patients who do not get a good response to treatment
- Patients who relapse after treatment
- Patients who continue treatment after remission (maintenance).

A carefully conducted clinical trial may provide the best available therapy.

Ask your doctor if treatment in a clinical trial is right for you. You can also call our Information Specialists for information about clinical trials, or use our free clinical trial service at www.LLS.org/clinicaltrials.

Want more information?

You can view, print or order the free LLS publications *Understanding Clinical Trials for Blood Cancers* and *Knowing All Your Treatment Options* at www.LLS.org/resourcecenter or contact our Information Specialists for a copies.

Part 5

Side Effects and Follow-up Care

Side Effects of Lymphoma Treatment

Lymphoma patients should talk with their doctors about side effects before they begin any type of treatment. The aim of treatment for Hodgkin lymphoma and non-Hodgkin lymphoma is to kill the lymphoma cells. The term side effect is used to describe how treatment affects healthy cells. Patients react to treatments in different ways. Sometimes there are very mild side effects. Other side effects may be serious and last a long time, but they usually go away once treatment ends. Ask your doctor about the side effects you can expect from your treatment.

Lymphoma treatment may affect your blood counts.

- The number of red blood cells may decrease (this is called **anemia**). Blood transfusions or growth factors to increase red blood cells may be needed. Aranesp® and Procrit® are drugs that might be given to increase the red blood cell count.
- Patients may also have a drop in the number of platelets. A platelet transfusion may be needed to prevent bleeding if a patient's platelet count is very low.
- A severe drop in white blood cells may lead to an infection. Infections caused by bacteria or fungi are treated with antibiotics. To help improve a patient's white blood cell count
  - The amount of chemotherapy drugs may be reduced.
  - The time between treatments may be increased.
  - Growth factors, such as Neupogen®, Neulasta® and Leukine® may be given to increase neutrophil counts.

Common Side Effects. Some of the common side effects of treatment for HL and NHL may include

- Mouth sores
- Nausea
- Vomiting
- Diarrhea
- Constipation
- Bladder irritation
- Blood in the urine.

Other side effects of treatment may include

- Extreme tiredness
- Fever
- Cough
- Rash
- Hair loss
- Weakness
- Tingling sensation
- Lung, heart or nerve problems.

Talk to your doctor about the possible side effects of your treatment. You can also call our Information Specialists.

Not all patients have these side effects. Treatment to prevent or manage nausea, vomiting, diarrhea and other side effects can help patients feel more comfortable.

Want more information?

You can view, print or order the free LLS publication *Understanding Side Effects of Drug Therapy* at www.LLS.org/resourcecenter or contact our Information Specialists for a copy.

Long-Term and Late Effects

Long-term effects are medical problems that last for months or years after treatment ends. Fatigue is an example.

Late effects are medical problems that do not show up until years after treatment ends. Heart disease is an example.

Not everyone who is treated for lymphoma develops long-term or late effects. It depends on the patient's age, overall health and treatment.

Patients should talk with their doctors about any long-term or late effects that may be related to their treatment. Parents should talk to the doctor about when their child's learning skills should be checked.

Want more information?

You can view, print or order the free LLS publications *Long-term and Late Effects of Treatment for Childhood Leukemia or Lymphoma*, *Learning and Living with Cancer: Advocating for your child's educational needs* and *Long-term and Late of Effects of Treatment in Adults* at www.LLS.org/resourcecenter or contact our Information Specialists for copies.

Follow-up Care

Medical follow-up is important for every lymphoma patient. Follow-up care helps the doctor to see if more treatment is needed.

Children and adults who have been treated for lymphoma should see their primary care doctor and an oncologist (cancer specialist) for follow-up care. Patients should talk to the doctor about how often to have follow-up visits. You can ask what tests your doctor will need and find out how often to have the tests. It is important to get a record of the cancer treatment you received so that your doctor can follow up on specific long-term effects that may be associated with your treatment.

Follow-up care includes physical exams and blood tests. Sometimes marrow tests are also needed. The doctor may advise longer periods of time between follow-up visits if a patient

- ○ Continues to be free of signs of lymphoma
- ○ Does not need medical care for any long-term or late effects.

To find a follow-up clinic and other resources for child and adult survivors, contact our Information Specialists.

Tracking Your Lymphoma Tests

These tips may help you save time and know more about your health. Ask your doctor why certain tests are being done and what to expect.

- ○ Discuss test results with your doctor.
- ○ Ask for and keep copies of lab reports in a file folder or binder. Organize the reports in date order.
- ○ Find out if and when follow-up tests are needed.
- ○ Mark upcoming appointments on your calendar.

Take Care of Yourself

- Keep all appointments with the doctor.
- Discuss how you feel with the doctor at each visit. Ask any questions you may have about side effects.
- People with lymphoma may have more infections. Follow the doctor's advice for preventing infection.
- Eat healthy foods each day. It is okay to eat four or five smaller meals instead of three bigger ones.
- Contact the doctor about tiredness, fever or other symptoms.
- Do not smoke. Patients who smoke should get help to quit.
- Get enough rest and exercise. Talk with your doctor before starting an exercise program.
- Keep a healthcare file with copies of lab reports and treatment records.
- Have regular cancer screening. See your primary care doctor to keep up with other healthcare needs.
- Talk with family and friends about how you feel. When family and friends know about lymphoma and its treatment, they may worry less.
- Seek medical advice if you feel sad or depressed and your mood does not improve over time. For example, if you feel sad or depressed every day for a two-week period, seek help. Depression is an illness. It should be treated even when a person is being treated for lymphoma. Treatment for depression has benefits for people living with cancer.

Medical Terms

For longer definitions of words or for definitions of words you do not see in this section, visit www.LLS.org/glossary.

Antibiotics. Drugs that are used to treat infections caused by bacteria and fungi. Penicillin is one type of antibiotic.

Antibodies. Proteins made by plasma cells. Antibodies help to fight infection in the body.

Bone marrow aspiration. A procedure to remove and examine marrow cells to see if they are normal. A liquid sample containing cells is taken from the marrow and then the cells are looked at under a microscope.

Bone marrow biopsy. A procedure to remove and examine marrow cells to see if they are normal. A very small amount of bone filled with marrow cells is taken from the body, and the cells are looked at under a microscope.

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 **indwelling catheter**.

Chemotherapy or drug therapy. Treatment with chemical agents to treat lymphoma and other cancers.

Chromosomes. Any of the 23 pairs of certain basic structures in human cells. Chromosomes are made up of genes. Genes give the instructions that tell each cell what to do. The number or shape of chromosomes may be changed in blood cancer cells.

Clinical trials. Careful studies done by doctors to test new drugs or treatments, or new uses for approved drugs or treatments. The goal of clinical trials for blood cancers is to improve treatment and quality of life and to find cures.

Combination chemotherapy or drug therapy. The use of two or more drugs together to treat lymphoma and other cancers.

Diagnose. To detect a disease from a person's signs, symptoms and test results. The doctor diagnoses a patient.

FDA. The short name for the **US Food and Drug Administration**. Part of the FDA's job is to assure the safety and security of drugs, medical devices and the US food supply.

Hemoglobin. The part of the red blood cell that carries oxygen.

Hematologist. A doctor who treats blood cell diseases.

Immune response. The reaction of the body to foreign material. Examples of foreign material are an infection-causing microorganism, a vaccine or the cells of another person used for an allogeneic stem cell transplant.

Immune system. Cells and proteins in the body that defend it against infection. Lymphocytes, lymph nodes and the spleen are some parts of the immune system.

Immunophenotyping. A lab test that can be used to identify the type of lymphoma cells.

Lymph nodes. Small bean-shaped organs around the body that are part of the body's immune system.

Monoclonal antibody therapy. Immune proteins made in the laboratory. This type of therapy targets and kills specific cancer cells. It does not cause many of the side effects of chemotherapy.

Oncologist. A doctor who treats patients who have cancer.

Pathologist. A doctor who identifies diseases by studying cells and tissues under a microscope.

Platelet. A type of blood cell that helps prevent bleeding. Platelets cause plugs to form in the blood vessels at the site of an injury.

Radiation therapy. Treatment with x-rays or other high-energy rays.

Radioimmunotherapy. A treatment that uses antibodies to carry a radioactive substance to lymphoma cells to kill them.

Refractory lymphoma. Lymphoma that has not responded to initial treatment. Refractory disease may be disease that is getting worse or staying the same.

Relapsed lymphoma. Lymphoma that responded to treatment but then returns.

Remission. No sign of the disease and/or a period of time when the disease is not causing any health problems.

Spleen. An organ found on the left side of the body, near the stomach. It contains lymphocytes and removes red blood cells that no longer work from the blood.

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

White blood cell. A type of blood or immune cell that helps the body fight infection.

Notes

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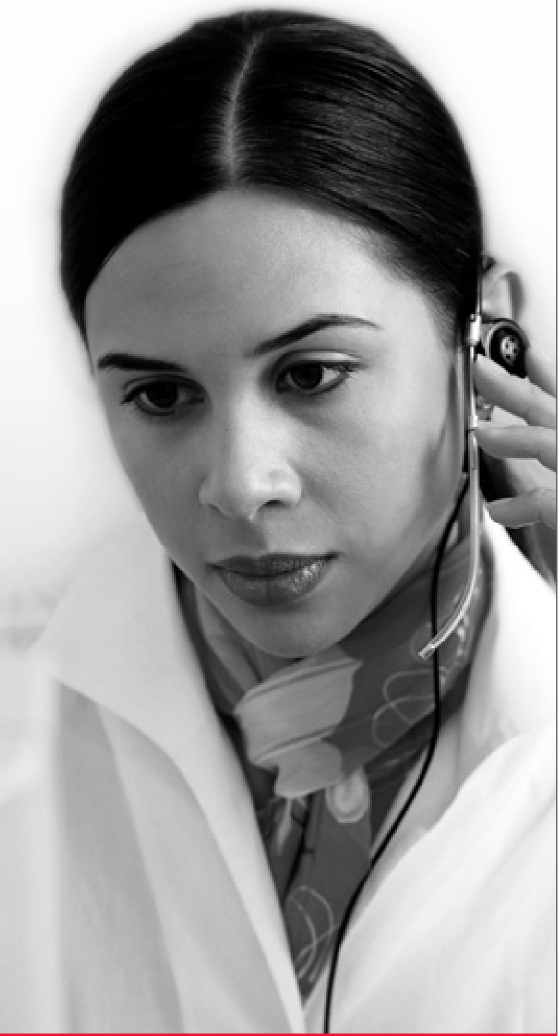
REACH OUT TO OUR INFORMATION SPECIALISTS



The Leukemia & Lymphoma Society's (LLS) Information Specialists provide patients, families and healthcare professionals with the latest information on leukemia, lymphoma and myeloma. Our team consists of master's level oncology professionals who are available by phone Monday through Friday, 9 am to 6 pm (ET).

Co-Pay Assistance

LLS's Co-Pay Assistance Program helps blood cancer patients cover the costs of private and public health insurance premiums, including Medicare and Medicaid, and co-pay obligations. Support for this program is based on the availability of funds by disease. **For more information, call 877.557.2672 or visit www.LLS.org/copay.**

For a complete directory of our patient services programs, contact us at

800.955.4572 or **www.LLS.org**

(Callers may request a language interpreter.)

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For more information, please contact:

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Contact our Information Specialists **800.955.4572** *(Language interpreters available upon request)*

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Our Mission:
Cure leukemia, lymphoma, Hodgkin's disease and myeloma, and improve the quality of life of patients and their families.

LLS is a nonprofit organization that relies on the generosity of individual, foundation and corporate contributions to advance its mission.