1 Introduction
1 What Is NHL?
2 Symptoms
2 Diagnosis
3 Types of NHL
3 Staging
3 Treatment
4 Second Opinion
4 Preparing for Treatment
4 Methods of Treatment
6 Clinical trials
6 Side effects
7 Methods
Chemotherapy
Radiation Therapy
Bone Marrow Transplantation
Biological Therapy
Surgery
8 Nutrition
8 Recovery
9 Follow-up Care
9 Support
10 Risk Factors
11 Dictionary

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Non-Hodgkin's lymphoma

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Introduction

The diagnosis of cancer brings with it many questions and a need for clear, understandable answers. This National Cancer Institute (NCI) booklet is intended to help people with non-Hodgkin's lymphoma and their families and friends better understand this type of cancer. We hope others will read it as well to learn more about this disease.

This booklet discusses symptoms, diagnosis, and treatment. It also has information about resources and sources of support for people with non-Hodgkin's lymphoma.

Medical research has led to real progress against non-Hodgkin's lymphoma—increased survival rates and improved quality of life. Through research, our knowledge about non-Hodgkin's lymphoma keeps increasing. For up-to-date information, call the National Cancer Institute's Cancer Information Service (CIS). The toll-free number is 1-800-4-CANCER (1-800-422-6237). The CIS provides the most current information on cancer for patients, health professionals, and the general public. Cancer information specialists can talk with callers and send information from PDQ®, the NCI's cancer information database, and other NCI materials.

Words that may be new to readers are printed in bold italics. Definitions of these and other terms related to non-Hodgkin's lymphoma are listed in the Dictionary at the end of this document. For some words, a "sounds-like" spelling is also given.

What Is Non-Hodgkin's Lymphoma?

Non-Hodgkin's lymphoma is a type of cancer. Lymphoma is a general term for cancers that develop in the ***lymphatic system***. Hodgkin's disease is one type of lymphoma. (Hodgkin's disease is the subject of another NCI booklet, What You Need To Know About™ Hodgkin's Disease.) All other lymphomas are grouped together and are called non-Hodgkin's lymphoma. Lymphomas account for about 5% of all cases of cancer in this country.

The lymphatic system is part of the body's ***immune system***. It helps the body fight disease and infection. The lymphatic system includes a network of thin tubes that branch, like blood vessels, into tissues throughout the body. Lymphatic vessels carry ***lymph***, a colorless, watery fluid that contains infection-fighting cells called ***lymphocytes***. Along this network of vessels are small organs called ***lymph nodes***. Clusters of lymph nodes are found in the underarms, ***groin***, neck, chest, and ***abdomen***. Other parts of the lymphatic system are the ***spleen***, ***thymus***, ***tonsils***, and ***bone marrow***. Lymphatic tissue is also found in other parts of the body, including the stomach, intestines, and skin.

Cancer is a group of many related diseases that begin in cells, the body's basic unit of life. To understand non-Hodgkin's lymphoma, it is helpful to know about normal cells and what happens when they become cancerous. The body is made up of many types of cells. Nor-

mally, cells grow and divide to produce more cells only when the body needs them. This orderly process helps keep the body healthy. Sometimes cells keep dividing when new cells are not needed, creating a mass of extra tissue. This mass is called a growth or ***tumor***. Tumors can be either ***benign*** (not cancerous) or ***malignant*** (cancerous).

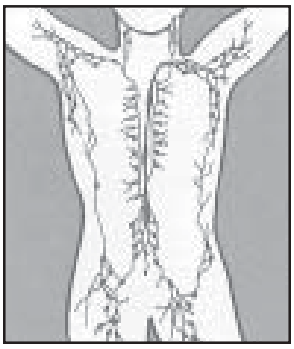
In non-Hodgkin's lymphoma, cells in the lymphatic system become abnormal. They divide and grow without any order or control, or old cells do not die as cells normally do. Because lymphatic tissue is present in many parts of the body, non-Hodgkin's lymphoma can start almost anywhere in the body. Non-Hodgkin's lymphoma may occur in a single lymph node, a group of lymph nodes, or in another organ. This type of cancer can spread to almost any part of the body, including the liver, bone marrow, and spleen.

Symptoms

The most common symptom of non-Hodgkin's lymphoma is a painless swelling of the lymph nodes in the neck, underarm, or groin. Other symptoms may include the following:

- Unexplained fever
- Night sweats
- Constant fatigue
- Unexplained weight loss
- Itchy skin
- Reddened patches on the skin

When symptoms like these occur, they are not sure signs of non-Hodgkin's lymphoma. They may also be caused by other, less serious conditions, such as the flu or other infections. Only a doctor can make a diagnosis.



When symptoms are present, it is im-portant to see a doctor so that any illness can be diagnosed and treated as early as possible. Do not wait to feel pain; early non-Hodgkin's lymphoma may not cause pain.

Diagnosis

If non-Hodgkin's lymphoma is suspected, the doctor asks about the person's medical history and performs a physical exam. The exam includes feeling to see if the lymph nodes in the neck, underarm, or groin are enlarged. In addition to checking general signs of health, the doctor may perform blood tests.

The doctor may also order tests that produce pictures of the inside of the body. These may include:

- ***X-rays***: Pictures of areas inside the body created by high-energy radiation.
- ***CT*** (or CAT) scan: A series of detailed pictures of areas inside the body. The pictures are created by a computer linked to an x-ray machine.
- ***MRI*** (magnetic resonance imaging): Detailed pictures of areas inside the body produced with a powerful magnet linked to a computer.
- ***Lymphangiogram***: Pictures of the lymphatic system taken with x-rays after a special dye is injected to outline the lymph nodes and vessels.

A ***biopsy*** is needed to make a diagnosis. A surgeon removes a sample of tissue so that a ***pathologist*** can examine it under a microscope to check for cancer cells. A biopsy for non-Hodgkin's lymphoma is usually taken from a lymph node, but other tissues may be sampled as well. Sometimes, an operation called a ***laparotomy*** may be performed. During this operation, a surgeon cuts into the abdomen and removes samples of tissue to be checked under a microscope.

A patient who needs a biopsy may want to ask the doctor some of the following questions:

- Why do I need to have a biopsy?
- How long will the biopsy take? Will it hurt?
- How soon will I know the results?
- If I do have cancer, who will talk with me about treatment? When?

Types of Non-Hodgkin's Lymphoma

Over the years, doctors have used a variety of terms to classify the many different types of non-Hodgkin's lymphoma. Most often, they are grouped by how the cancer cells look under a microscope and how quickly they are likely to grow and spread. ***Aggressive*** lymphomas, also known as intermediate and high-grade lymphomas, tend to grow and spread quickly and cause severe symptoms. ***Indolent*** lymphomas, also referred to as low-grade lymphomas, tend to grow quite slowly and cause fewer symptoms.

Staging

If non-Hodgkin's lymphoma is diagnosed, the doctor needs to learn the ***stage***, or extent, of the disease. Staging is a careful attempt to find out whether the cancer has spread and, if so, what parts of the body are affected. Treatment decisions depend on these findings.

The doctor considers the following to determine the stage of non-Hodgkin's lymphoma:

- The number and location of affected lymph nodes;
- Whether the affected lymph nodes are above, below, or on both sides of the ***diaphragm*** (the thin muscle under the lungs and heart that separates the chest from the abdomen); and
- Whether the disease has spread to the bone marrow, spleen, or to organs outside the lymphatic system, such as the liver.

In staging, the doctor may use some of the same tests used for the diagnosis of non-Hodgkin's lymphoma. Other staging procedures may include additional biopsies of lymph nodes, the liver, bone marrow, or other tissue. A ***bone marrow biopsy*** involves removing a sample of bone marrow through a needle inserted into the hip or another large bone. A pathologist examines the sample under a microscope to check for cancer cells.

Treatment

The doctor develops a treatment plan to fit each patient's needs. Treatment for non-Hodgkin's lymphoma depends on the stage of the disease, the type of cells involved, whether they are indolent or aggressive, and the age and general health of the patient.

Non-Hodgkin's lymphoma is often treated by a team of specialists that may include a ***hematologist***, ***medical oncologist***, and/or ***radiation oncologist***. Non-Hodgkin's lymphoma is usually treated with ***chemotherapy***, ***radiation therapy***, or a combination of these treatments. In some cases, ***bone marrow transplantation***, ***biological therapies***, or ***surgery*** may be options. For indolent lymphomas, the doctor may decide to wait until the disease causes symptoms before starting treatment. Often, this approach is called "watchful waiting."

Taking part in a ***clinical trial*** (research study) to evaluate promising new ways to treat non-Hodg-kin's lymphoma is an important option for many people with this disease. For more information, see the "Clinical Trials" section.

Getting a Second Opinion

Before starting treatment, patients may want a second opinion to confirm their diagnosis and treatment plan. Some insurance companies require a second opinion; others may cover a second opinion if the patient or doctor requests it.

There are a number of ways to find a doctor who can give a second opinion:

- The patient's doctor may be able to suggest specialists to consult.
- The Cancer Information Service, at 1-800-4-CANCER, can tell callers about cancer treatment facilities, including cancer centers and other programs supported by the NCI.
- Patients can get the names of doctors from their local medical society, a nearby hospital, or a medical school.
- The American Board of Medical Specialties (ABMS) has a list of doctors who have met certain education and training requirements and have passed specialty examinations. The Official ABMS Directory of Board Certified Medical Specialists lists doctors' names along with their specialty and their educational background. The directory is available in most public libraries. Also, ABMS offers this information on the Internet at *www.abms.org*. (Click on "Who's Certified.")

Preparing for Treatment

Many people with cancer want to learn all they can about their disease and their treatment choices so they can take an active part in decisions about their medical care. When a person is diagnosed with cancer, shock and stress are natural reactions. These feelings may make it difficult for people to think of everything they want to ask the doctor. Often, it helps to make a list of questions. To help remember what the doctor says, patients may take notes or ask whether they may use a tape recorder. Some people also want to have a family member or friend with them when they talk to the doctor—to take part in the discussion, to take notes, or just to listen.

These are some questions a patient may want to ask the doctor before treatment begins:

- What kind of non-Hodgkin's lymphoma do I have?
- What is the stage of the disease?
- What are my treatment choices? Which do you recommend for me? Why?
- What are the risks and possible ***side effects*** of each treatment?
- What side effects should I report to you?
- How long will treatment last?
- What are the chances that the treatment will be successful?
- Will treatment affect my normal activities? If so, for how long?
- Are new treatments under study? Would a clinical trial be appropriate for me?
- What is the treatment likely to cost?

Patients do not need to ask all their questions or remember all the answers at one time. They will have other chances to ask the doctor to explain things and to get more information.

Methods of Treatment

Chemotherapy and radiation therapy are the most common treatments for non-Hodgkin's lymphoma, although bone marrow transplantation, biological therapies, or surgery are sometimes used.

Chemotherapy is the use of drugs to kill cancer cells. Chemotherapy for non-Hodgkin's lymphoma usually consists of a combination of several drugs.

Patients may receive chemotherapy alone or in combination with radiation therapy.

Chemotherapy is usually given in cycles: a treatment period followed by a recovery period, then another treatment period, and so on. Most anticancer drugs are given by injection into a blood vessel (***IV***); some are given by mouth. Chemotherapy is a ***systemic treatment*** because the drugs enter the bloodstream and travel throughout the body.

Usually a patient has chemotherapy as an outpatient (at the hospital, at the doctor's office, or at home). However, depending on which drugs are given and the patient's general health, a short hospital stay may be needed.

These are some questions patients may want to ask the doctor before starting chemotherapy:

- What is the goal of this treatment?
- What drugs will I be taking?
- Will the drugs cause side effects? What can I do about them?
- What side effects should I report to you?
- How long will I need to take this treatment?
- What can I do to take care of myself during treatment?
- How will we know if the drugs are working?

Radiation therapy (also called radiotherapy) is the use of high-energy rays to kill cancer cells. Treatment with radiation may be given alone or with chemotherapy. Radiation therapy is ***local treatment***; it affects cancer cells only in the treated area. Radiation therapy for non-Hodgkin's lymphoma comes from a machine that aims the high-energy rays at a specific area of the body. There is no radioactivity in the body when the treatment is over.

These are some questions a patient may want to ask the doctor before having radiation therapy:

- What is the goal of this treatment?
- What are its risks and possible side effects?
- What side effects should I report to you?
- How will radiation be given?
- When will the treatments begin? When will they end?
- What can I do to take care of myself during therapy?
- How will we know if the radiation therapy is working?
- How will treatment affect my normal activities?

Sometimes patients are given chemotherapy and/or radiation therapy to kill undetected cancer cells that may be present in the ***central nervous system*** (CNS). In this treatment, called central nervous system ***prophylaxis***, the doctor injects anticancer drugs directly into the ***cerebrospinal fluid***.

Bone marrow transplantation (BMT) may also be a treatment option, especially for patients whose non-Hodgkin's lymphoma has ***recurred*** (come back). BMT provides the patient with healthy ***stem cells*** (very immature cells that produce blood cells) to replace cells damaged or destroyed by treatment with very high doses of chemotherapy and/or radiation therapy. The healthy bone marrow may come from a donor, or it may be marrow that was removed from the patient, treated to destroy cancer cells, stored, and then given back to the person following the high-dose treatment. Until the transplanted bone marrow begins to produce enough white blood cells, patients have to be carefully protected from infection. They usually stay in the hospital for several weeks.

These are some questions patients may want to ask the doctor before having a BMT:

- What are the benefits of this treatment?
- What are the risks and possible side effects? What can be done about them?
- What side effects should I report to you?
- How long will I be in the hospital? What care will I need after I leave the hospital?
- How will the treatment affect my normal activities?
- How will I know if the treatment is working?

Biological therapy (also called immunotherapy) is a form of treatment that uses the body's immune system, either directly or indirectly, to fight cancer or to lessen the side effects that can be caused by some cancer treatments. It uses materials made by the body or made in a laboratory to boost, direct,

For more treatment information, call Project Inform's toll-free National HIV/AIDS Treatment Information Hotline at 1-800-822-7422.

or restore the body's natural defenses against disease. Biological therapy is sometimes also called biological response modifier therapy.

These are some questions patients may want to ask the doctor before starting biological therapy:

- What is the goal of this treatment?
- What drugs will I be taking?
- Will the treatment cause side effects? If so, what can I do about them?
- What side effects should I report to you?
- Will I have to be in the hospital to get treatment?
- How long will I need to take this treatment?
- When will I be able to resume my normal activities?

Surgery may be performed to remove a tumor. Tissue around the tumor and nearby lymph nodes may also be removed during the operation.

These are some questions a patient may want to ask the doctor before surgery:

- What kind of operation will it be?
- How will I feel after the operation?
- If I have pain, how will you help?
- Will I need more treatment after surgery?
- How long will I be in the hospital?
- When will I be able to resume my normal activities?

Clinical Trials

Many people with non-Hodgkin's lymphoma take part in ***clinical trials*** (research studies). Doctors conduct clinical trials to learn about the effectiveness and side effects of new treatments. In some trials, all patients receive the new treatment. In others, doctors compare different therapies by giving the new treatment to one group of patients and the standard therapy to another group; or they may compare one standard treatment with another. Research like this has led to significant advances in the treatment of cancer. Each achievement brings researchers closer to the eventual control of cancer.

Doctors are studying radiation therapy, new ways of giving chemotherapy, new anticancer drugs and drug combinations, biological therapies, bone marrow transplantation, ***peripheral blood stem cell transplantation***, and new ways of combining various types of treatment. Some studies are designed to find ways to reduce the side effects of treatment and to improve the patient's quality of life.

People who take part in these studies have the first chance to benefit from treatments that have shown promise in earlier research. They also make an important contribution to medical science.

Patients who are interested in taking part in a clinical trial should talk with their doctor. They may also want to read the National Cancer Institute booklet Taking Part in Clinical Trials: What Cancer Patients Need To Know, which describes how studies are carried out and explains their possible benefits and risks. The NCI Web site at *www.cancer.gov* provides detailed information about ongoing studies for non-Hodgkin's lymphoma. Another way to learn about clinical trials is through the Cancer Information Service.

Side Effects of Treatment

Treatments for non-Hodgkin's lymphoma are very powerful. It is hard to limit the effects of therapy so that only cancer cells are removed or destroyed. Because treatment also damages healthy cells and tissues, it often causes side effects.

The side effects of cancer treatment depend mainly on the type and extent of the therapy. Side effects may not be the same for everyone, and they may even change from one treatment to the next. Doctors and nurses can explain the possible side effects of treatment. They can also lessen or control many of the side effects that may occur during and after therapy.

Chemotherapy

The side effects of chemotherapy depend mainly on the drugs and the doses the patient receives. As with other types of treatment, side effects may vary from person to person.

Anticancer drugs generally affect cells that divide rapidly. In addition to cancer cells, these include blood cells, which fight infection, help the blood to clot, or carry oxygen to all parts of the body. When blood cells are affected, the patient is more likely to get infections, may bruise or bleed easily, and may feel unusually weak and tired. The patient's blood count is monitored during chemotherapy and, if necessary, the doctor may decide to postpone treatment to allow blood counts to recover.

Cells in hair roots also divide rapidly; therefore, chemotherapy may lead to hair loss. Patients may have other side effects such as poor appetite, nausea and vomiting, or mouth and lip sores. They may also experience dizziness and darkening of skin and fingernails.

Most side effects go away gradually during the recovery periods between treatments or after treatment is over. However, certain anticancer drugs can increase the risk of developing a second cancer later in life.

In some men and women, chemotherapy causes a loss of ***fertility*** (the ability to produce children). Loss of fertility may be temporary or permanent, depending on the drugs used and the patient's age. For men, ***sperm banking*** before treatment may be an option. Women's menstrual periods may stop, and they may have hot flashes and vaginal dryness. Menstrual periods are more likely to return in young women. The National Cancer Institute booklet Chemotherapy and You has helpful information about chemotherapy and coping with side effects.

Radiation Therapy

The side effects of radiation depend on the treatment dose and the part of the body that is treated. During radiation therapy, people are likely to become extremely tired, especially in the later weeks of treatment. Rest is important, but doctors usually advise patients to try to stay as active as they can.

It is common to lose hair in the treated area and for the skin to become red, dry, tender, or itchy. There may also be permanent darkening or "bronzing" of the skin in the treated area.

When the chest and neck are treated, patients may have a dry, sore throat and trouble swallowing. Some patients may have tingling or numbness in their arms, legs, and lower back. Radiation therapy to the abdomen may cause nausea, vomiting, diarrhea, or urinary discomfort. Often, changes in diet or medicine can ease these problems.

Radiation therapy also may cause a decrease in the number of white blood cells, cells that help protect the body against infection. If that happens, patients need to be careful to avoid possible sources of infection. The doctor monitors a patient's blood count during radiation therapy. In some cases, treatment may have to be postponed to allow blood counts to recover.

Although the side effects of radiation therapy can be difficult, they can usually be treated or controlled. It may also help to know that, in most cases, side effects are not permanent. However, patients may want to discuss with their doctor the possible long-term effects of radiation treatment on fertility and the increased chance of second cancers after treatment is over. The National Cancer Institute booklet Radiation Therapy and You has helpful information about radiation therapy and managing side effects.

Bone Marrow Transplantation

Patients who have a bone marrow transplant face an increased risk of infection, bleeding, and other side effects from the large doses of chemotherapy and radiation they receive. In addition, ***graft-versus-host disease*** (GVHD) may occur in patients who receive bone marrow from a donor. In GVHD, the donated marrow attacks the patient's tissues (most often the liver, the skin, and the digestive tract). GVHD can range from mild to very severe. It can occur any time after the transplant (even years later). Drugs may be given to reduce the risk of GVHD and to treat the problem if it occurs.

Biological Therapy

The side effects caused by biological therapy vary with the specific type of treatment. These treatments may cause flu-like symptoms such as chills, fever, muscle aches, weakness, loss of appetite, nausea, vomiting, and diarrhea. Patients also may bleed or bruise easily, get a skin rash, or retain fluid. These problems can be severe, but they usually go away after treatment stops.

Surgery

The side effects of surgery depend on the location of the tumor, the type of operation, the patient's general health, and other factors. Although patients are often uncomfortable during the first few days after surgery, the pain can usually be controlled with medicine. People can talk with their doctor or nurse about pain relief. It is also common for patients to feel tired or weak for a while. The length of time it takes to recover from an operation varies for each patient.

Nutrition During Cancer Treatment

Eating well during cancer treatment means getting enough calories and protein to help prevent weight loss and regain strength. Good nutrition often helps people feel better and have more energy.

Some people with cancer find it hard to eat a balanced diet because they may lose their appetite. In addition, common side effects of treatment, such as nausea, vomiting, or mouth sores, can make eating difficult. Often, foods taste different. Also, people being treated for cancer may not feel like eating when they are uncomfortable or tired.

Doctors, nurses, and dietitians can offer advice on how to get enough calories and protein during cancer treatment. Patients and their families also may want to read the National Cancer Institute booklet Eating Hints for Cancer Patients, which contains many useful suggestions.

Recovery and Outlook

It is natural for anyone facing cancer to be concerned about what the future holds. Understanding the nature of cancer and what to expect can help patients and their loved ones plan treatment, anticipate lifestyle changes, and make quality of life and financial decisions.

Cancer patients frequently ask their doctors or search on their own for an answer to the question,

"What is my ***prognosis***?" Prognosis is a prediction of the future course and outcome of a disease and an indication of the likelihood of recovery. However, it is only an estimate. When doctors discuss a patient's prognosis, they are attempting to project what is likely to occur for that individual patient.

Sometimes patients use statistics to try to figure out their chances of being cured. However, statistics reflect the experience of a large group of patients and cannot be used to predict what will happen to a particular patient because no two patients are alike. The prognosis for a person with non-Hodgkin's lymphoma can be affected by many factors, particularly the type and stage of the cancer and the patient's age, general health, and response to treatment. The doctor who is most familiar with a patient's situation is in the best position to help interpret statistics and discuss that person's prognosis.

When doctors talk about surviving cancer, they may use the term ***remission*** rather than cure. Although many people with non-Hodgkin's lymphoma are successfully treated, doctors use the term remission because cancer can return. It is important to discuss the possibility of recurrence with the doctor.

Follow-up Care

People who have had non-Hodgkin's lymphoma should have regular follow-up examinations after their treatment is over. Follow-up care is an important part of the overall treatment plan, and people should not hesitate to discuss it with their health care provider. Regular follow-up care ensures that patients are carefully monitored, any changes in health are discussed, and new or recurrent cancer can be detected and treated as soon as possible. Between follow-up appointments, people who have had non-Hodgkin's lymphoma should report any health problems as soon as they appear.

Support for People with Cancer

Living with a serious disease is not easy. People with cancer and those who care about them face many problems and challenges. Coping with these problems is often easier when people have helpful information and support services. Several useful booklets are available from the Cancer Information Service (*http://cis.nci.nih.gov/*)

Friends and relatives can be very supportive. Also, it helps many patients to discuss their concerns with others who have cancer. Cancer patients often get together in support groups, where they can share what they have learned about coping with cancer and the effects of treatment. It is important to keep in mind, however, that each person is different. Treatments and ways of dealing with cancer that work for one person may not be right for another—even if they both have the same kind of cancer. It is always a good idea to discuss the advice of friends and family members with the health care provider.

People living with cancer may worry about what the future holds. They may worry about holding their jobs, caring for their families, keeping up with daily activities, or personal relationships. Concerns about tests, treatments, hospital stays, and medical bills are also common. Doctors, nurses, and other members of the health care team can answer questions about treatment, working, or other activities. Meeting with a social worker, counselor, psychologist, or member of the clergy can be helpful to people who want to talk about their feelings or discuss their concerns. Often, a social worker can suggest groups that can help with rehabilitation, emotional support, financial aid, transportation, or home care.

Additional information about locating support services for people with cancer and their families is available through the Cancer Information Service and other sources described in the "National Cancer Institute Information Resources" section.

Risk Factors Associated with Non-Hodgkin's Lymphoma

The incidence of non-Hodgkin's lymphoma has increased dramatically over the last couple of decades. This disease has gone from being relatively rare to being the fifth most common cancer in the United States. At this time, little is known about the reasons for this increase or about exactly what causes non-Hodgkin's lymphoma.

Doctors can seldom explain why one person gets non-Hodgkin's lymphoma and another does not. It is clear, however, that cancer is not caused by an injury, and is not contagious; no one can "catch" non-Hodgkin's lymphoma from another person.

By studying patterns of cancer in the population, researchers have found certain ***risk factors*** that are more common in people who get non-Hodgkin's lymphoma than in those who do not. However, most people with these risk factors do not get non-Hodgkin's lymphoma, and many who do get this disease have none of the known risk factors.

The following are some of the risk factors associated with this disease:

- Age/Sex—The likelihood of getting non-Hodgkin's lymphoma increases with age and is more common in men than in women.
- Weakened Immune System—Non-Hodgkin's lymphoma is more common among people with inherited immune deficiencies, autoimmune diseases, or HIV/AIDS, and among people taking immunosuppressant drugs following organ transplants.
- Viruses—Human T-lymphotropic virus type I (HTLV-1) and Epstein-Barr virus are two infectious agents that increase the chance of developing non-Hodgkin's lymphoma.
- Environment—People who work extensively with or are otherwise exposed to certain chemicals, such as pesticides, solvents, or fertilizers, have a greater chance of developing non-Hodgkin's lymphoma.

People who are concerned about non-Hodgkin's lymphoma should talk with their doctor about the disease, the symptoms to watch for, and an appropriate schedule for checkups. The doctor's advice will be based on the person's age, medical history, and other factors.

a note about this publication

This publication is reprinted here from another source (*www.cancer.gov*). We do not always have the resources at Project Inform to produce our own treatment information on every treatment topic. In these cases, we try to provide reliable information from other sources but cannot confirm that every fact in these publications is accurate. This information is designed to support, not replace, the relationship that exists between you and your doctor or medical provider.

TEXT LAST UPDATED: SEPTEMBER 2002

Dictionary of Terms

- **abdomen (AB-do-men)**
  The area of the body that contains the pancreas, stomach, intestines, liver, gallbladder, and other organs.
- **aggressive**
  A quickly growing cancer.
- **benign (beh-NINE)**
  Not cancerous. Benign tumors do not spread to tissues around them or to other parts of the body.
- **biological therapy (by-o-LAHJ-i-kul)**
  Treatment to stimulate or restore the ability of the immune system to fight infections and other diseases. Also used to lessen side effects that may be caused by some cancer treatments. Also known as immunotherapy, biotherapy, or biological response modifier (BRM) therapy.
- **biopsy (BY-op-see)**
  The removal of cells or tissues for examination under a microscope. When only a sample of tissue is removed, the procedure is called an incisional biopsy or core biopsy. When an entire lump or suspicious area is removed, the procedure is called an excisional biopsy. When a sample of tissue or fluid is removed with a needle, the procedure is called a needle biopsy or fine-needle aspiration.
- **bone marrow**
  The soft, sponge-like tissue in the center of most large bones. It produces white blood cells, red blood cells, and platelets.
- **bone marrow biopsy (BY-op-see)**
  The removal of a sample of tissue from the bone marrow with a needle for examination under a microscope.
- **bone marrow transplantation (trans-plan-TAY-shun)**
  A procedure to replace bone marrow that has been destroyed by treatment with high doses of anticancer drugs or radiation. Transplantation may be autologous (an individual's own marrow saved before treatment), allogeneic (marrow donated by someone else), or syngeneic (marrow donated by an identical twin).
- **cancer**
  A term for diseases in which abnormal cells divide without control. Cancer cells can invade nearby tissues and can spread through the bloodstream and lymphatic system to other parts of the body. There are several main types of cancer. Carcinoma is cancer that begins in the skin or in tissues that line or cover internal organs. Sarcoma is cancer that begins in bone, cartilage, fat, muscle, blood vessels, or other connective or supportive tissue. Leukemia is cancer that starts in blood-forming tissue such as the bone marrow, and causes large numbers of abnormal blood cells to be produced and enter the bloodstream. Lymphoma is cancer that begins in the cells of the immune system.
- **central nervous system**
  CNS. The brain and spinal cord.
- **cerebrospinal fluid (seh-REE-broe-SPY-nal)**
  CSF. The fluid flowing around the brain and spinal cord. Cerebrospinal fluid is produced in the ventricles in the brain.
- **chemotherapy (kee-mo-THER-a-pee)**
  Treatment with anticancer drugs.
- **clinical trial**
  A type of research study that uses volunteers to test new methods of screening, prevention, diagnosis, or treatment of a disease. The trial may be carried out in a clinic or other medical facility. Also called a clinical study.
- **CT scan**
  Computed tomography scan. A series of detailed pictures of areas inside the body taken from different angles; the pictures are created by a computer linked to an x-ray machine. Also called computerized tomography and computerized axial tomography (CAT) scan.
- **diaphragm (DYE-a-fram)**
  The thin muscle below the lungs and heart that separates the chest from the abdomen.
- **fertility (fer-TIL-i-tee)**
  The ability to produce children.
- **graft-versus-host disease**
  GVHD. A reaction of donated bone marrow or peripheral stem cells against the recipient's tissue.
- **groin**
  The area where the thigh meets the abdomen.
- **hematologist (hee-ma-TOL-o-jist)**
  A doctor who specializes in treating blood disorders.
- **immune system (im-YOON)**
  The complex group of organs and cells that defends the body against infections and other diseases.
- **indolent lymphoma**
  A type of lymphoma that tends to grow and spread slowly, and has few symptoms. Also called low-grade lymphoma.
- **IV**
  Intravenous (in-tra-VEE-nus). Injected into a blood vessel.
- **laparotomy (lap-a-RAH-toe-mee)**
  A surgical incision made in the wall of the abdomen.
- **local therapy**
  Treatment that affects cells in the tumor and the area close to it.
- **lymph (limf)**
  The clear fluid that travels through the lymphatic system and carries cells that help fight infections and other diseases. Also called lymphatic fluid.
- **lymph node (limf node)**
  A rounded mass of lymphatic tissue that is surrounded by a capsule of connective tissue. Lymph nodes filter lymph (lymphatic fluid), and they store lymphocytes (white blood cells). They are located along lymphatic vessels. Also called a lymph gland.
- **lymphangiogram (lim-FAN-jee-o-gram)**
  An x-ray of the lymphatic system. A dye is injected into a lymphatic vessel and travels throughout the lymphatic system. The dye outlines the lymphatic vessels and organs on the x-ray.
- **lymphatic system (lim-FAT-ik SIS-tem)**
  The tissues and organs that produce, store, and carry white blood cells that fight infections and other diseases. This system includes the bone marrow, spleen, thymus, lymph nodes, and lymphatic vessels (a network of thin tubes that carry lymph

Dictionary of Terms

and white blood cells). Lymphatic vessels branch, like blood vessels, into all the tissues of the body.

- **lymphocyte (LIM-fo-site)**
  A type of white blood cell. Lymphocytes have a number of roles in the immune system, including the production of antibodies and other substances that fight infection and diseases.
- **lymphoma (lim-FO-ma)**
  Cancer that begins in cells of the immune system. There are two basic categories of lymphomas. One kind is Hodgkin's lymphoma, which is marked by the presence of a type of cell called the Reed-Sternberg cell. The other category is non-Hodgkin's lymphomas, which includes a large, diverse group of cancers of immune system cells. Non-Hodgkin's lymphomas can be further divided into cancers that have an indolent (slowly progressing) course and those that have an aggressive (rapidly progressing) course. These subtypes behave and respond to treatment differently. Both Hodgkin's and non-Hodgkin's lymphomas can occur in children and adults, and prognosis and treatment depend on the stage and the type of cancer.
- **malignant (ma-LIG-nant)**
  Cancerous. Malignant tumors can invade and destroy nearby tissue and spread to other parts of the body.
- **medical oncologist (MED-i-kul on-KOL-o-jist)**
  A doctor who specializes in diagnosing and treating cancer using chemotherapy, hormonal therapy, and biological therapy. A medical oncologist often is the main health care provider for a person who has cancer. A medical oncologist also may coordinate treatment provided by other specialists.
- **MRI**
  Magnetic resonance imaging (mag-NET-ik REZ-o-nans IM-a-jing). A procedure in which radio waves and a powerful magnet linked to a computer are used to create detailed pictures of areas inside the body. These pictures can show the difference between normal and diseased tissue. MRI makes better images of organs and soft tissue than other scanning techniques, such as CT or X-ray. MRI is especially useful for imaging the brain, spine, the soft tissue of joints, and the inside of bones. Also called nuclear magnetic resonance imaging.
- **pathologist (pa-THOL-o-jist)**
  A doctor who identifies diseases by studying cells and tissues under a microscope.
- **peripheral stem cell transplantation (per-IF-er-al)**
  A method of replacing blood-forming cells destroyed by cancer treatment. Immature blood cells (stem cells) in the circulating blood that are similar to those in the bone marrow are given to the patient after treatment. This helps the bone marrow recover and continue producing healthy blood cells. Transplantation may be autologous (an individual's own blood cells saved earlier), allogeneic (blood cells donated by someone else), or syngeneic (blood cells donated by an identical twin). Also called peripheral stem cell support.
- **prognosis (prog-NO-sis)**
  The likely outcome or course of a disease; the chance of recovery or recurrence.
- **prophylaxis**
  An attempt to prevent disease.
- **radiation oncologist (ray-dee-AY-shun on-KOL-o-jist)**
  A doctor who specializes in using radiation to treat cancer.
- **radiation therapy (ray-dee-AY-shun THER-ah-pee)**
  The use of high-energy radiation from x-rays, gamma rays, neutrons, and other sources to kill cancer cells and shrink tumors. Radiation may come from a machine outside the body (external-beam radiation therapy), or it may come from radioactive material placed in the body near cancer cells (internal radiation therapy, implant radiation, or brachytherapy). Systemic radiation therapy uses a radioactive substance, such as a radiolabeled monoclonal antibody, that circulates throughout the body. Also called radiotherapy.
- **recur**
  To occur again.
- **remission**
  A decrease in or disappearance of signs and symptoms of cancer. In partial remission, some, but not all, signs and symptoms of cancer have disappeared. In complete remission, all signs and symptoms of cancer have disappeared, although cancer still may be in the body.
- **risk factor**
  Something that may increase the chance of developing a disease. Some examples of risk factors for cancer include age, a family history of certain cancers, use of tobacco products, certain eating habits, obesity, exposure to radiation or other cancer-causing agents, and certain genetic changes.
- **sperm banking**
  Freezing sperm for use in the future. This procedure can allow men to father children after loss of fertility.
- **spleen**
  An organ that is part of the lymphatic system. The spleen produces lymphocytes, filters the blood, stores blood cells, and destroys old blood cells. It is located on the left side of the abdomen near the stomach.
- **stage**
  The extent of a cancer within the body. If the cancer has spread, the stage describes how far it has spread from the original site to other parts of the body.
- **surgery (SER-juh-ree)**
  A procedure to remove or repair a part of the body or to find out whether disease is present. An operation.
- **systemic therapy (sis-TEM-ik THER-a-pee)**
  Treatment using substances that travel through the bloodstream, reaching and affecting cells all over the body.
- **thymus**
  An organ that is part of the lymphatic system, in which T lymphocytes grow and multiply. The thymus is in the chest behind the breastbone.
- **tumor (TOO-mer)**
  A mass of excess tissue that results from abnormal cell division. Tumors perform no useful body function. They may be benign (not cancerous) or malignant (cancerous).
- **x-ray**
  A type of high-energy radiation. In low doses, x-rays are used to diagnose diseases by making pictures of the inside of the body. In high doses, x-rays are used to treat cancer.