



Patient Information

What **you** need to know about
Non-Hodgkin Lymphoma

Baxter

This brochure is a part of a Patient Information Series supported by Baxter.

This information is not meant to be a substitute for the advice provided by your own physician or other medical professional. You should not use this information for diagnosing a health problem or disease but should always consult your own physician.

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3rd Update

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1. Introduction

This booklet is about non-Hodgkin lymphoma, a cancer that starts in the immune system. Non-Hodgkin lymphoma is also called NHL. Each year, more than 63,000 US-Americans learn they have non-Hodgkin lymphoma.

This booklet is only about non-Hodgkin lymphoma. It is not about Hodgkin lymphoma (also called Hodgkin disease). People with Hodgkin lymphoma have different treatment options.

This booklet tells about diagnosis, treatment, and supportive care. Learning about the medical care for people with lymphoma can help you take an active part in making choices about your own care.

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

2. What is Non-Hodgkin Lymphoma

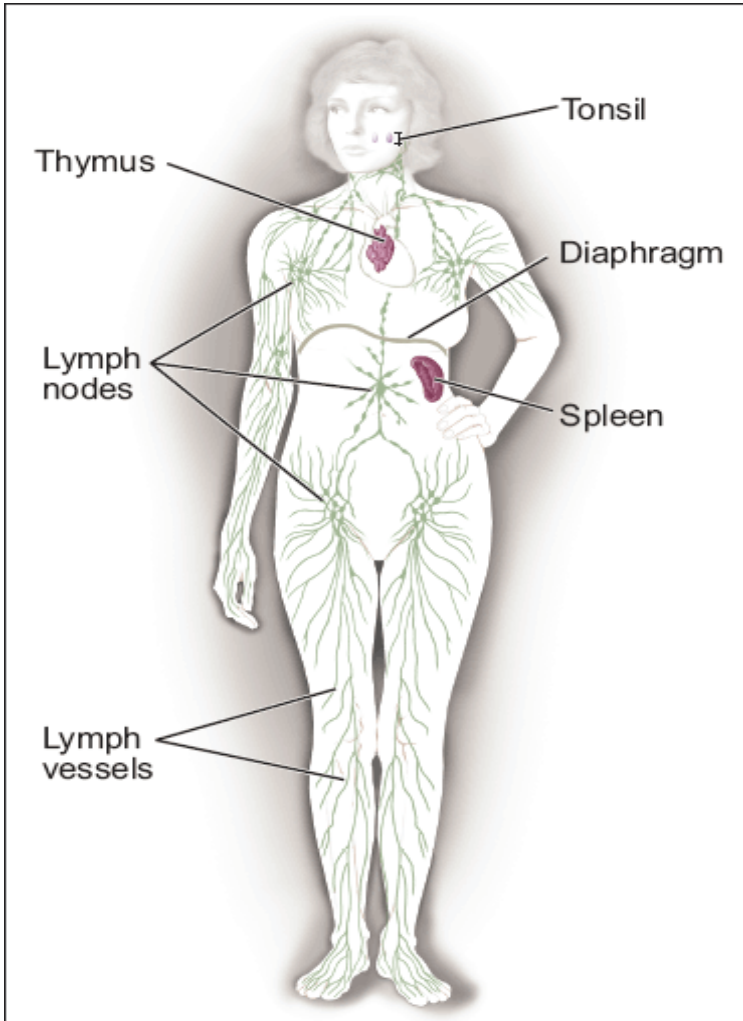
Type of cancer that develops in the lymphatic system

Non-Hodgkin lymphoma is cancer that begins in cells of the immune system. The immune system fights infections and other diseases.

The lymphatic system is part of the immune system. The lymphatic system includes the following:

The lymphatic system

- **Lymph vessels:** The lymphatic system has a network of lymph vessels. Lymph vessels branch into all the tissues of the body.
- **Lymph:** The lymph vessels carry clear fluid called lymph. Lymph contains white blood cells, especially lymphocytes such as B cells and T cells.
- **Lymph nodes:** Lymph vessels are connected to small, round masses of tissue called lymph nodes. Groups of lymph nodes are found in the neck, underarms, chest, abdomen, and groin. Lymph nodes store white blood cells. They trap and remove bacteria or other harmful substances that may be in the lymph.
- **Other parts of the lymphatic system:** Other parts of the lymphatic system include the tonsils, thymus, and spleen. Lymphatic tissue is also found in other parts of the body including the stomach, skin, and small intestine.



This picture shows lymph nodes above and below the diaphragm. It also shows the lymph vessels, tonsils, thymus, and spleen.

Because lymphatic tissue is in many parts of the body, non-Hodgkin lymphoma can start almost anywhere. Usually, it's first found in a lymph node.

Cancer:
uncontrolled cell
division and
growth without
order

Non-Hodgkin lymphoma cells

Non-Hodgkin lymphoma begins when a lymphocyte (usually a B cell) becomes abnormal. The abnormal cell divides to make copies of itself. The new cells divide again and again, making more and more abnormal cells. The abnormal cells do not die when they should. They don't protect the body from infections or other diseases. The buildup of extra cells often forms a mass of tissue called a growth or tumor.

See the Staging section for information about lymphoma that has spread.

3. Risk Factors

Doctors seldom know why one person develops non-Hodgkin lymphoma and another does not. But research shows that certain risk factors increase the chance that a person will develop this disease.

Non-Hodgkin lymphoma, as cancer in general, is not contagious

In general, the risk factors for non-Hodgkin lymphoma include the following:

- **Weakened immune system:** The risk of developing lymphoma may be increased by having a weakened immune system (such as from an inherited condition or certain drugs used after an organ transplant).
- **Certain infections:** Having certain types of infections increases the risk of developing lymphoma. However, lymphoma is not contagious. You cannot catch lymphoma from another person. The following are the main types of infection that can increase the risk of lymphoma:
 - **Human immunodeficiency virus (HIV):** HIV is the virus that causes AIDS. People who have HIV infection are at much greater risk of some types of non-Hodgkin lymphoma.
 - **Epstein-Barr virus (EBV):** Infection with EBV has been linked to an increased risk of lymphoma. In Africa, EBV infection is linked to Burkitt lymphoma.
 - **Helicobacter pylori:** H. pylori are bacteria that can cause stomach ulcers. They also increase a person's risk of lymphoma in the stomach lining.
 - **Human T-cell leukemia/lymphoma virus type 1 (HTLV-1):** Infection with HTLV-1 increases a person's risk of lymphoma and leukemia.
 - **Hepatitis C virus:** Some studies have found an increased risk of lymphoma in people with hepatitis C virus. More research is needed to understand the role of hepatitis C virus.

- **Age:** Although non-Hodgkin lymphoma can occur in young people, the chance of developing this disease goes up with age. Most people with non-Hodgkin lymphoma are older than 60. (For information about this disease in children, call the NCI's Cancer Information Service at 1-800-4-CANCER.)

Researchers are studying obesity and other possible risk factors for non-Hodgkin lymphoma. People who work with herbicides or certain other chemicals may be at increased risk of this disease. Researchers are also looking at a possible link between using hair dyes before 1980 and non-Hodgkin lymphoma.

Having one or more risk factors does not mean that a person will develop non-Hodgkin lymphoma. Most people who have risk factors never develop cancer.

4. Symptoms

Non-Hodgkin lymphoma can cause many symptoms:

- Swollen, painless lymph nodes in the neck, armpits, or groin
- Unexplained weight loss
- Fever
- Soaking night sweats
- Coughing, trouble breathing, or chest pain
- Weakness and tiredness that don't go away
- Pain, swelling, or a feeling of fullness in the abdomen

Most common:
enlarged lymph
nodes

Most often, these symptoms are not due to cancer. Infections or other health problems may also cause these symptoms. Anyone with symptoms that do not go away within 2 weeks should see a doctor so that problems can be diagnosed and treated.

5. Diagnosis

If you have swollen lymph nodes or another symptom that suggests non-Hodgkin lymphoma, your doctor will try to find out what's causing the problem. Your doctor may ask about your personal and family medical history.

You may have some of the following exams and tests:

- **Physical exam:** Your doctor checks for swollen lymph nodes in your neck, underarms, and groin. Your doctor also checks for a swollen spleen or liver.
- **Blood tests:** The lab does a complete blood count to check the number of white blood cells. The lab also checks for other cells and substances, such as lactate dehydrogenase (LDH). Lymphoma may cause a high level of LDH.
- **Chest x-rays:** You may have x-rays to check for swollen lymph nodes or other signs of disease in your chest.
- **Biopsy:** A biopsy is the only sure way to diagnose lymphoma. Your doctor may remove an entire lymph node (excisional biopsy) or only part of a lymph node (incisional biopsy). A thin needle (fine needle aspiration) usually cannot remove a large enough sample for the pathologist to diagnose lymphoma. Removing an entire lymph node is best. The pathologist uses a microscope to check the tissue for lymphoma cells.

You may want to ask your doctor these questions before having a biopsy:

- How will the biopsy be done?
- Where will I have my biopsy?
- Will I have to do anything to prepare for it?
- How long will it take? Will I be awake? Will it hurt?
- Are there any risks? What are the chances of swelling, infection, or bleeding after the biopsy?
- How long will it take me to recover?
- How soon will I know the results? Who will explain them to me?
- If I do have cancer, who will talk to me about next steps? When?

Types of non-Hodgkin lymphoma

When lymphoma is found, the pathologist reports the type. There are many types of lymphoma. The most common types are diffuse large B-cell lymphoma and follicular lymphoma.

Lymphomas may be grouped by how quickly they are likely to grow:

- **Indolent (also called low-grade) lymphomas** grow slowly. They tend to cause few symptoms.
- **Aggressive (also called intermediate-grade and high-grade) lymphomas** grow and spread more quickly. They tend to cause severe symptoms. Over time, many indolent lymphomas become aggressive lymphomas.

It's a good idea to get a second opinion about the type of lymphoma that you have. The treatment plan varies by the type of lymphoma. A pathologist at a major referral center can review your biopsy. See the Second Opinion section for more information.

6. Staging

Treatment depends on the extent of the disease

Your doctor needs to know the extent (stage) of non-Hodgkin lymphoma to plan the best treatment. Staging is a careful attempt to find out what parts of the body are affected by the disease.

Lymphoma usually starts in a lymph node. It can spread to nearly any other part of the body. For example, it can spread to the liver, lungs, bone, and bone marrow. Staging may involve one or more of the following tests:

- **Bone marrow biopsy:** The doctor uses a thick needle to remove a small sample of bone and bone marrow from your hipbone or another large bone. Local anesthesia can help control pain. A pathologist looks for lymphoma cells in the sample.
- **CT scan:** An x-ray machine linked to a computer takes a series of detailed pictures of your head, neck, chest, abdomen, or pelvis. You may receive an injection of contrast material. Also, you may be asked to drink another type of contrast material. The contrast material makes it easier for the doctor to see swollen lymph nodes and other abnormal areas on the x-ray.
- **MRI:** Your doctor may order MRI pictures of your spinal cord, bone marrow, or brain. MRI uses a powerful magnet linked to a computer. It makes detailed pictures of tissue on a computer screen or film.
- **Ultrasound:** An ultrasound device sends out sound waves that you cannot hear. A small hand-held device is held against your body. The waves bounce off nearby tissues, and a computer uses the echoes to create a picture. Tumors may produce echoes that are different from the echoes made by healthy tissues. The picture can show possible tumors.

- **Spinal tap:** The doctor uses a long, thin needle to remove fluid from the spinal column. Local anesthesia can help control pain. You must lie flat for a few hours afterward so that you don't get a headache. The lab checks the fluid for lymphoma cells or other problems.
- **PET scan:** You receive an injection of a small amount of radioactive sugar. A machine makes computerized pictures of the sugar being used by cells in your body. Lymphoma cells use sugar faster than normal cells, and areas with lymphoma look brighter on the pictures.

The stage is based on where lymphoma cells are found (in the lymph nodes or in other organs or tissues). The stage also depends on how many areas are affected. The stages of non-Hodgkin lymphoma are as follows:

- **Stage I:** The lymphoma cells are in one lymph node group (such as in the neck or underarm). Or, if the abnormal cells are not in the lymph nodes, they are in only one part of a tissue or organ (such as the lung, but not the liver or bone marrow).
- **Stage II:** The lymphoma cells are in at least two lymph node groups on the same side of (either above or below) the diaphragm. (See the picture of the diaphragm.) Or, the lymphoma cells are in one part of an organ and the lymph nodes near that organ (on the same side of the diaphragm). There may be lymphoma cells in other lymph node groups on the same side of the diaphragm.
- **Stage III:** The lymphoma is in lymph nodes above and below the diaphragm. It also may be found in one part of a tissue or an organ near these lymph node groups.
- **Stage IV:** Lymphoma cells are found in several parts of one or more organs or tissues (in addition to the lymph nodes). Or, it is in the liver, blood, or bone marrow.
- **Recurrent:** The disease returns after treatment.

In addition to these stage numbers, your doctor may also describe the stage as A or B:

- **A:** You have not had weight loss, drenching night sweats, or fevers.
- **B:** You have had weight loss, drenching night sweats, or fevers.

7. Treatment

Treatment depends on many factors

Your doctor can describe your treatment choices and the expected results. You and your doctor can work together to develop a treatment plan that meets your needs.

Your doctor may refer you to a specialist, or you may ask for a referral. Specialists who treat non-Hodgkin lymphoma include hematologists, medical oncologists, and radiation oncologists. Your doctor may suggest that you choose an oncologist who specializes in the treatment of lymphoma. Often, such doctors are associated with major academic centers. Your health care team may also include an oncology nurse and a registered dietitian.

The choice of treatment depends mainly on the following:

- The type of non-Hodgkin lymphoma (for example, follicular lymphoma)
- Its stage (where the lymphoma is found)
- How quickly the cancer is growing (whether it is indolent or aggressive lymphoma)
- Your age
- Whether you have other health problems

If you have indolent non-Hodgkin lymphoma without symptoms, you may not need treatment for the cancer right away. The doctor watches your health closely so that treatment can start when you begin to have symptoms. Not getting cancer treatment right away is called watchful waiting.

If you have indolent lymphoma with symptoms, you will probably receive chemotherapy and biological therapy. Radiation therapy may be used for people with Stage I or Stage II lymphoma.

If you have aggressive lymphoma, the treatment is usually chemotherapy and biological therapy. Radiation therapy also may be used.

If non-Hodgkin lymphoma comes back after treatment, doctors call this a relapse or recurrence. People with lymphoma that comes back after treatment may receive high doses of chemotherapy, radiation therapy, or both, followed by stem cell transplantation.

You may want to know about side effects and how treatment may change your normal activities. Because chemotherapy and radiation therapy often damage healthy cells and tissues, side effects are common. Side effects may not be the same for each person, and they may change from one treatment session to the next. Before treatment starts, your health care team will explain possible side effects and suggest ways to help you manage them.

At any stage of the disease, you can have supportive care. Supportive care is treatment to control pain and other symptoms, to relieve the side effects of therapy, and to help you cope with the feelings that a diagnosis of cancer can bring. See the Supportive Care section.

You may want to talk to your doctor about taking part in a clinical trial, a research study of new treatment methods. See the Taking Part in Cancer Research section.

You may want to ask your doctor these questions before you begin treatment:

- What type of lymphoma do I have? May I have a copy of the report from the pathologist?
- What is the stage of my disease? Where are the tumors?
- What are my treatment choices? Which do you recommend for me? Why?
- Will I have more than one kind of treatment?
- What are the expected benefits of each kind of treatment? How will we know the treatment is working? What tests will be used to check its effectiveness? How often will I get these tests?
- What are the risks and possible side effects of each treatment? What can we do to control the side effects?

- How long will treatment last?
- Will I have to stay in the hospital? If so, for how long?
- What can I do to take care of myself during treatment?
- What is the treatment likely to cost? Will my insurance cover the cost?
- How will treatment affect my normal activities?
- Would a clinical trial be right for me?
- How often will I need checkups?

Watchful waiting

People who choose watchful waiting put off having cancer treatment until they have symptoms. Doctors sometimes suggest watchful waiting for people with indolent lymphoma. People with indolent lymphoma may not have problems that require cancer treatment for a long time. Sometimes the tumor may even shrink for a while without therapy. By putting off treatment, they can avoid the side effects of chemotherapy or radiation therapy.

If you and your doctor agree that watchful waiting is a good idea, the doctor will check you regularly (every 3 months). You will receive treatment if symptoms occur or get worse.

Some people do not choose watchful waiting because they don't want to worry about having cancer that is not treated. Those who choose watchful waiting but later become worried should discuss their feelings with the doctor.

You may want to ask your doctor these questions before choosing watchful waiting:

- If I choose watchful waiting, can I change my mind later on?
- Will the disease be harder to treat later?
- How often will I have checkups?
- Between checkups, what problems should I report?

Chemotherapy uses drugs to kill cancer cells throughout the body

Chemotherapy

Chemotherapy for lymphoma uses drugs to kill lymphoma cells. It is called systemic therapy because the drugs travel through the bloodstream. The drugs can reach lymphoma cells in almost all parts of the body.

You may receive chemotherapy by mouth, through a vein, or in the space around the spinal cord. Treatment is usually in an outpatient part of the hospital, at the doctor's office, or at home. Some people need to stay in the hospital during treatment.

Chemotherapy is given in cycles. You have a treatment period followed by a rest period. The length of the rest period and the number of treatment cycles depend on the stage of your disease and on the anticancer drugs used.

If you have lymphoma in the stomach caused by *H. pylori* infection, your doctor may treat this lymphoma with antibiotics. After the drug cures the infection, the lymphoma also may go away.

The side effects depend mainly on which drugs are given and how much. The drugs can harm normal cells that divide rapidly:

Side effects are generally short-term and depend on drugs used and dose given

- **Blood cells:** When chemotherapy lowers your levels of healthy blood cells, you are more likely to get infections, bruise or bleed easily, and feel very weak and tired. Your health care team gives you blood tests to check for low levels of blood cells. If levels are low, there are medicines that can help your body make new blood cells.
- **Cells in hair roots:** Chemotherapy may cause hair loss. If you lose your hair, it will grow back, but it may be somewhat different in color and texture.

- **Cells that line the digestive tract:** Chemotherapy can cause poor appetite, nausea and vomiting, diarrhea, trouble swallowing, or mouth and lip sores. Ask your health care team about medicines or other treatments that help with these problems.

The drugs used for non-Hodgkin lymphoma also may cause skin rashes or blisters, and headaches or other aches. Your skin may become darker. Your nails may develop ridges or dark bands. Your doctor can suggest ways to control many of these side effects.

You may want to ask your doctor these questions before having chemotherapy:

- Which drugs will I have? What are the expected benefits?
- When will treatment start? When will it end? How often will I have treatments?
- Where will I go for treatment? Will I be able to drive home afterward?
- What can I do to take care of myself during treatment?
- How will we know the treatment is working?
- What side effects should I tell you about? Can I prevent or treat any of these side effects?
- Will there be lasting side effects?

Biological therapy

People with certain types of non-Hodgkin lymphoma may have biological therapy. This type of treatment helps the immune system fight cancer.

Biological therapy uses the body's natural ability to fight cancer

Monoclonal antibodies are the type of biological therapy used for lymphoma. They are proteins made in the lab that can bind to cancer cells. They help the immune system kill lymphoma cells. People receive this treatment through a vein at the doctor's office, clinic, or hospital.

Flu-like symptoms such as fever, chills, headache, weakness, and nausea may occur. Most side effects are easy to treat. Rarely, a person may have more serious side effects, such as breathing problems, low blood pressure, or severe skin rashes. Your doctor or nurse can tell you about the side effects that you can expect and how to manage them.

You may want to ask the doctor these questions before having biological therapy:

- What will the treatment do?
- Will I have to stay in the hospital?
- How will we know if the treatment is working?
- How long will I be on biological therapy?
- Will I have side effects during treatment? How long will they last? What can we do about them?

Radiation therapy

Radiation therapy (also called radiotherapy) uses high-energy rays to kill lymphoma cells. It can shrink tumors and help control pain.

Two types of radiation therapy are used for people with lymphoma:

- **External radiation:** A large machine aims the rays at the part of the body where lymphoma cells have collected. This is local therapy because it affects cells in the treated area only. Most people go to a hospital or clinic for treatment 5 days a week for several weeks.
- **Systemic radiation:** Some people with lymphoma receive an injection of radioactive material that travels throughout the body. The radioactive material is bound to monoclonal antibodies that seek out lymphoma cells. The radiation destroys the lymphoma cells.

The side effects of radiation therapy depend mainly on the type of radiation therapy, the dose of radiation, and the part of the body that is treated. For example, external radiation to your abdomen can cause nausea, vomiting, and diarrhea. When your chest and neck are treated, you may have a dry, sore throat and some trouble swallowing. In addition, your skin in the treated area may become red, dry, and tender. You also may lose your hair in the treated area.

You are likely to become very tired during external radiation therapy, especially in the later weeks of treatment. Resting is important, but doctors usually advise people to try to stay as active as they can. People who get systemic radiation also may feel very tired. They may be more likely to get infections.

Stay active despite feeling tired

If you have radiation therapy and chemotherapy at the same time, your side effects may be worse. The side effects can be distressing. You can talk with your doctor about ways to relieve them.

You may want to ask your doctor these questions before having radiation therapy:

- Why do I need this treatment?
- When will the treatments begin? When will they end?
- How will I feel during treatment?
- How will we know if the radiation treatment is working?
- Are there any lasting side effects?

Stem cell transplantation

If lymphoma returns after treatment, you may receive stem cell transplantation. A transplant of your own blood-forming stem cells allows you to receive high doses of chemotherapy, radiation therapy, or both. The high doses destroy both lymphoma cells and healthy blood cells in the bone marrow.

Stem cell transplants take place in the hospital. After you receive high-dose treatment, healthy blood-forming stem cells are given to you through a flexible tube placed in a large vein in your neck or chest area. New blood cells develop from the transplanted stem cells.

The stem cells may come from your own body or from a donor:

- **Autologous stem cell transplantation:** This type of transplant uses your own stem cells. Your stem cells are removed before high-dose treatment. The cells may be treated to kill lymphoma cells that may be present. The stem cells are frozen and stored. After you receive high-dose treatment, the stored stem cells are thawed and returned to you.
- **Allogeneic stem cell transplantation:** Sometimes healthy stem cells from a donor are available. Your brother, sister, or parent may be the donor. Or the stem cells may come from an unrelated donor. Doctors use blood tests to be sure the donor's cells match your cells.
- **Syngeneic stem cell transplantation:** This type of transplant uses stem cells from a patient's healthy identical twin.

You may want to ask the doctor these questions before having a stem cell transplant:

- What are the possible benefits and risks of different types of transplants?
- What kind of stem cell transplant will I have? If I need a donor, how will we find one?
- How long will I need to be in the hospital? Will I need special care? How will I be protected from germs?
- How will we know if the treatment is working?
- What can we do about side effects?
- How will treatment affect my normal activities?
- What is my chance of a full recovery?

8. Second Opinion

Before starting treatment, you might want a second opinion about your diagnosis and your treatment plan. Many insurance companies cover a second opinion if you or your doctor requests it.

It may take some time and effort to gather your medical records and see another doctor. In most cases, a brief delay in starting treatment will not make treatment less effective. To make sure, you should discuss this delay with your doctor. Sometimes people with non-Hodgkin lymphoma need treatment right away.

There are many ways to find a doctor for a second opinion. You can ask your doctor, a local or state medical society, a nearby hospital, or a medical school for names of specialists. Other sources can be found in the NCI fact sheet [How To Find a Doctor or Treatment Facility If You Have Cancer](#).

Nonprofit groups with an interest in lymphoma may be of help. Many such groups are listed in the NCI fact sheet [National Organizations That Offer Services to People With Cancer and Their Families](#).

9. Supportive Care

Non-Hodgkin lymphoma and its treatment can lead to other health problems. You may receive supportive care to prevent or control these problems and to improve your comfort and quality of life during treatment.

You may receive antibiotics and other drugs to help protect you from infections. Your health care team may advise you to stay away from crowds and from people with colds and other contagious diseases. If an infection develops, it can be serious, and you will need treatment right away.

Non-Hodgkin lymphoma and its treatment also can lead to anemia, which may make you feel very tired. Drugs or blood transfusions can help with this problem.

10. Nutrition and Physical Activity

It's important for you to take care of yourself by eating well and staying as active as you can.

Ask your
healthcare
professional
about your
nutrition

You need the right amount of calories to maintain a good weight. You also need enough protein to keep up your strength. Eating well may help you feel better and have more energy.

Sometimes, especially during or soon after treatment, you may not feel like eating. You may be uncomfortable or tired. You may find that foods do not taste as good as they used to. In addition, the side effects of treatment (such as poor appetite, nausea, vomiting, or mouth sores) can make it hard to eat well. Your doctor, a registered dietitian, or another health care provider can suggest ways to deal with these problems.

Many people find they feel better when they stay active. Walking, yoga, swimming, and other activities can keep you strong and increase your energy. Exercise may reduce nausea and pain and make treatment easier to handle. It also can help relieve stress. Whatever physical activity you choose, be sure to talk to your doctor before you start. Also, if your activity causes you pain or other problems, be sure to let your doctor or nurse know about it.

11. Follow-Up Care

Report any health problems immediately

You'll need regular checkups after treatment for non-Hodgkin lymphoma. Your doctor will watch your recovery closely and check for recurrence of the lymphoma. Checkups help make sure that any changes in your health are noted and treated as needed. Checkups may include a physical exam, lab tests, chest x-rays, and other procedures. Between scheduled visits, you should contact the doctor right away if you have any health problems.

You may want to ask your doctor these questions after you have finished treatment:

- How often will I need checkups?
- Which follow-up tests do you suggest for me?
- Between checkups, what health problems or symptoms should I tell you about?

12. Sources of Support

Learning you have non-Hodgkin lymphoma can change your life and the lives of those close to you. These changes can be hard to handle. It's normal for you, your family, and your friends to have many different and sometimes confusing feelings.

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

Here's where you can go for support:

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

13. Taking Part in Cancer Research

Doctors all over the country are studying new ways to treat lymphoma. Clinical trials (research studies in which people volunteer to take part) find out whether promising approaches to treatment are safe and effective. Research already has led to advances.

Researchers are studying many types of treatments for lymphoma:

- **Chemotherapy:** Doctors are testing new drugs that kill cancer cells. They are working with many drugs and drug combinations. They also are looking at ways of combining drugs with other treatments, such as biological therapy.
- **Radiation therapy:** Doctors are testing radiation treatment alone and with chemotherapy.
- **Biological therapy:** New types of biological therapy are under study. For example, researchers are making cancer vaccines that may help the immune system kill lymphoma cells. Also, doctors are studying a type of biological therapy that delivers radiation directly to cancer cells.
- **Stem cell transplantation:** Doctors are studying stem cell transplantation in people with newly diagnosed lymphoma and those who have already been treated.

People who join clinical trials may be among the first to benefit if a new approach is effective. And even if participants do not benefit directly, they still help doctors learn more about lymphoma and how to control it. Although clinical trials may pose some risks, researchers do all they can to protect their patients.

If you are interested in being part of a clinical trial, you should talk with your doctor.

14. Glossary

The following is a comprehensive glossary of cancer-related terms and their definitions.

Adjuvant therapy: Treatment given in addition to the primary treatment to enhance the effectiveness of the primary treatment.

Aspiration: Removal of fluid from a lump, often a cyst, with a needle and a syringe.

Atypical hyperplasia: A benign (non cancerous) condition in which tissue has certain abnormal features.

Axilla: The underarm.

Axillary: Pertaining to the lymph nodes under the arm.

Axillary dissection: Surgery to remove lymph nodes under the arm.

Benign: Not cancerous; does not invade nearby tissue or spread to other parts of the body.

Benign tumor: A non-cancerous growth that does not spread to other parts of the body.

Bilateral: Affecting the right and left side of body.

Biological therapy: The use of the body's immune system, either directly or indirectly, to fight cancer or to lessen side effects that may be caused by some cancer treatments. Also known as immunotherapy, biotherapy, or biological response modifier therapy.

Biopsy: The removal of a sample of tissue, which is then examined under a microscope to check for cancer cells.

Bone marrow: The soft spongy tissue in the center of large bones that produces white blood cells, red blood cells, and platelets.

Bone marrow transplantation: A procedure in which doctors replace marrow destroyed by treatment with high doses of anticancer drugs or radiation. The replacement marrow may be taken from the patient before treatment or may be donated by another person.

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.

Carcinoma: Cancer that begins in the lining or covering of an organ.

Carcinoma in situ: Cancer that involves only the cells in which it began and has not spread into other tissues.

Chemotherapy: Treatment with anticancer drugs.

Clinical trials: Research studies that involve patients. Each study is designed to find better ways to prevent, detect, diagnose, or treat cancer and to answer scientific questions.

Colony-stimulating factors: Substances that stimulate the production of blood cells. Treatment with colony-stimulating factors (CSF) can help the blood-forming tissue recover from the effects of chemotherapy and radiation therapy.

Combination chemotherapy: Treatment in which two or more chemicals are used to obtain more effective results.

Computed tomography: An x-ray procedure that uses a computer to produce a detailed picture of a cross section of the body; also called CAT or CT scan.

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. Also called computed tomography scan or computed axial tomography scan.

Diagnosis: The process of identifying a disease by signs and symptoms.

Etiology: The study of the causes of abnormal condition or disease.

External radiation: Radiation therapy that uses a machine to aim high-energy rays at the cancer.

Fertility: The ability to produce children.

Grade: Describes how closely a cancer resembles normal tissue of its same type, and the cancer's probable rate of growth.

Grading: A system for classifying cancer cells in terms of how malignant or aggressive they appear microscopically. The grading of a tumor indicates how quickly cancer cells are likely to spread and plays a role in treatment decisions.

Hair follicles: The sacs in the scalp from which hair grows.

Imaging: Tests that produce pictures of areas inside the body.

Implant (or internal) radiation: Internal radiation therapy that places radioactive materials in or close to the cancer.

Infertility: The inability to produce children.

Infiltrating cancer: See invasive cancer.

Internal radiation: Radiation therapy that uses radioactivity materials placed near or in the tumor.

Intravenous: Injected in a vein. Also called IV.

Invasive cancer: Cancer that has spread beyond the layer of tissue in which it developed.

IV (intravenous): Injected in a vein.

Local: Reaching and affecting only the cells in a specific area.

Local therapy: Treatment that affects cells in the tumor and the area close to it.

Lymph: The almost colorless fluid that travels through the lymphatic system and carries cells that help fight infection and disease.

Lymph nodes: Small, bean-shaped organs located along the channels of the lymphatic system. The lymph nodes store special cells that can trap bacteria or cancer cells travelling through the body in lymph. Clusters of lymph are found in the underarms, groin, neck, chest, and abdomen. Also called lymph glands.

Lymphangiogram: An x-ray of the lymphatic system. A dye is injected to outline the lymphatic vessels and organs.

Lymphangiography: X-ray study of lymph nodes and lymph vessels made visible by the injection of a special dye.

Lymphatic system: The tissues and organs that produce, store, and carry white blood cells that fight infection and disease. This system includes the bone marrow, spleen, thymus, and lymph nodes and a network of thin tubes that carry lymph and white blood cells. These tubes branch, like blood vessels, into all the tissues of the body.

Lymphedema: A condition in which excess fluid collects in tissue and causes swelling. It may occur in the arm or leg after lymph vessels or lymph nodes in the underarm or groin have been removed.

Magnetic resonance imaging: A procedure in which a magnet linked to a computer is used to create detailed pictures of areas inside the body. Also called MRI.

Malignant: Cancerous; can invade nearby tissue and spread to other parts of the body.

Medical oncologist: A doctor who specializes in treating cancer. Some oncologists specialize in a particular type of cancer treatment. For example, a radiation oncologist specializes in treating cancer with radiation.

Metastasize: To spread from one part of the body to another. When cancer cells metastasize and form secondary tumors, the cells in the metastatic tumor are like those in the original (primary) tumor.

Morphology: The science of the form and structure of organisms (plants, animals, and other forms of life).

MRI (magnetic resonance imaging): A procedure in which a magnet linked to a computer is used to create detailed pictures of areas inside the body.

Neoplasia: Abnormal new growth of cells.

Neoplasm: A new growth of tissue. Can be referred to as benign or malignant.

Oncologist: A doctor who specializes in treating cancer. Some oncologists specialize in a particular type of cancer treatment. For example, a radiation oncologist specializes in treating cancer with radiation.

Oncology: The study of tumors encompassing the physical, chemical, and biologic properties.

Palliative treatment: Treatment that does not alter the course of a disease, but improves the quality of life.

Palpation: A technique in which a doctor presses on the surface of the body to feel the organs or tissue underneath.

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

Peripheral blood stem cell transplantation: A procedure that is similar to bone marrow transplantation. Doctors remove healthy immature cells (stem cells) from a patient's blood and store them before the patient receives high-dose chemotherapy and possibly radiation therapy to destroy the cancer cells. The stem cells are then returned to the patient, where they can produce new blood cells to replace cells destroyed by the treatment.

Peripheral stem cell support: A method of replacing blood-forming cells destroyed by cancer treatment. Certain cells (stem cells) in the blood that are similar to those in the bone marrow are removed from the patient's blood before treatment. The cells are given back to the patient after treatment.

Plastic surgeon: A surgeon who specializes in reducing scarring or disfigurement that may occur as a result of accidents, birth defects, or treatment for diseases (such as melanoma).

Precancerous: A term used to describe a condition that may or is likely to become cancer.

Prognosis: The probable outcome or course of a disease; the chance of recovery.

Radiation oncologist: A doctor who specializes in using radiation to treat cancer.

Radiation therapy: Treatment with high-energy rays (such as x-rays) to kill cancer cells. The radiation may come from outside the body (external radiation) or from radioactive materials placed directly in the tumor (implant radiation). Also called radiotherapy.

Radioactive: Giving off radiation.

Radiologist: A doctor who specializes in creating and interpreting pictures of areas inside the body. The pictures are produced with x-rays, sound waves, or other types of energy.

Recur: To occur again. Recurrence is the reappearance of cancer cells at the same site or in another location.

Relapse: The return of signs and symptoms of a disease after a period of improvement.

Remission: Disappearance of the signs and symptoms of cancer. When this happens, the disease is said to be “in remission.” A remission can be temporary or permanent.

Remission induction therapy: The initial chemotherapy a patient receives to bring about a remission.

Reproductive cells: Egg and sperm cells. Each mature reproductive cell carries a single set of 23 chromosomes.

Risk factor: Something that increases the chance of developing a disease.

Scans: Pictures of organs in the body. Scans often used in diagnosing, staging, and monitoring patients include liver scans, bone scans, and computed tomography (CT) or computed axial tomography (CAT) scans. In liver scanning and bone scanning, radioactive substances that are injected into the bloodstream collect in these organs. A scanner that detects the radiation is used to create pictures. In CT scanning, an x-ray machine linked to a computer is used to produce detailed pictures of organs inside the body.

Screening: Checking for disease when there are no symptoms.

Side effect: Problems that occur when treatment affects healthy cells. Common side effects of cancer treatment are fatigue, nausea, vomiting, decreased blood cell counts, hair loss, and mouth sores.

Stage: The extent of a cancer, especially whether the disease has spread from the original site to other parts of the body.

Staging: Doing exams and tests to learn the extent of the cancer, especially whether it has spread from its original site to other parts of the body.

Stem cells: The cells from which all blood cells develop.

Supportive care: Treatment given to prevent, control, or relieve complications and side effects and to improve the patient’s comfort and quality of life.

Surgery: A procedure to remove or repair a part of the body or to find out if disease is present.

Systemic therapy: Treatment that uses substances that travel through the bloodstream, reaching and affecting cancer cells all over the body.

Systemic treatment: Treatment using substances that travel through the bloodstream, reaching and affecting cancer cells all over the body.

Tissue: A group or layer of cells that together perform specific functions.

Tumor: An abnormal mass of tissue that results from excessive cell division. Tumors perform no useful body function. They may either be benign (not cancerous) or malignant (cancerous).

Tumor debulking: Surgically removing as much of the tumor as possible.

Tumor marker: A substance in blood or other body fluids that may suggest that a person has cancer.

Ultrasonography: A test in which sound waves (called ultrasound) are bounced off tissues and the echoes are converted into a picture (sonogram).

X-ray: High-energy radiation used in low doses to diagnose diseases and in high doses to treat cancer.



Patient Information:
Non-Hodgkin Lymphoma

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