



## Lymphoma Cancer Treatment

### What is Lymphoma?

Lymphoma is a cancer that develops in the white blood cells (lymphocytes) of the lymphatic system, which is part of the body's immune system.

There are two major types of lymphoma: Hodgkin (HL) and non-Hodgkin (NHL), each of which has several subtypes. Hodgkin lymphoma—also known as Hodgkin's disease—is far less common than non-Hodgkin lymphoma. Individual lymphomas differ in how they behave, spread and respond to treatment.

In the United States, there are approximately 70,000 new cases of non-Hodgkin lymphoma and 9,000 new cases of Hodgkin lymphoma diagnosed every year.

### What are my treatment options?

#### Treatment options overview

Treatment options are based on the type and stage of lymphoma and the age and overall health of the patient. For some types of lymphoma, if the disease is advanced but slow-growing (indolent), a wait-and-see approach may be an option. Treatment is also determined by the patient's age, medical history, overall health, and tolerance for specific medications and therapies.

Standard options include:

- **Chemotherapy**, used alone or in combination with radiation therapy, is one of the main methods of treatment for lymphoma. Drugs are given intravenously or orally to kill cancer cells. Chemotherapy is often given to decrease the chance of the tumor returning elsewhere in the body. Like radiation therapy, chemotherapy can ease disease symptoms and increase length of survival for patients with tumors that have spread. It is usually given over time and alternated with periods of no treatment. This alleviates potential side effects, such as abnormal blood-cell counts, fatigue, diarrhea, mouth sores, and a compromised immune system.
  - **CNS prophylaxis**, in which chemotherapy is injected into the spinal column through a lumbar puncture, may be used to treat certain types of non-Hodgkin lymphoma that have spread to the brain or are at high risk for such spread. In addition, steroid drugs may be used to relieve swelling and inflammation.

- **Radiation therapy:** High-energy radiation is used to kill cancer cells. Patients with lymphoma may be treated with radiation therapy alone or in combination with chemotherapy. Radiation therapy uses high-energy radiation to shrink tumors and kill cancer cells.
  - **External beam therapy:** This method delivers a beam of high-energy x-rays to the location of the tumor. The beam is generated outside the patient (usually by a linear accelerator) and is targeted at the tumor site. These x-rays can destroy the cancer cells and careful treatment planning allows the surrounding normal tissues to be spared. No radioactive sources are placed inside the patient's body. See the [External Beam Therapy](#) page for more information.
- **Monoclonal antibody therapy** (also called targeted therapy): This is a treatment involving laboratory-produced molecules called monoclonal antibodies that are engineered to recognize and bind to the surface of cancer cells. Monoclonal antibodies mimic naturally produced antibodies in the body that attack invading foreign substances, such as bacteria and viruses. Monoclonal antibodies may be combined with a chemotherapy drug or radioactive material, allowing the antibody to deliver a direct dose of the cancer-killing agent to the cancer cell. Two monoclonal antibodies used for lymphoma are:
  - **Rituximab**, a monoclonal antibody designed to seek out and lock onto the protein receptor (CD20) found on a specific type of lymphocyte (B cells), which causes the lymphoma cell to die. This treatment is used for many patients with “B-cell” lymphoma and may be combined with chemotherapy and/or radiation therapy.
  - **Brentuximab vedotin (Adcetris®)**, which combines a chemotherapy drug with a monoclonal antibody that attaches to a specific molecule (CD30) on the surface of Hodgkin disease cells.
- **Radioimmunotherapy** (also called radiolabeled monoclonal antibody therapy): This therapy pairs a monoclonal antibody with a radioactive material, such as Yttrium-90 with Ibritumomab Tiuxetan (Zevalin®). The radiolabeled monoclonal antibody travels to and binds to cancer cells, allowing a high dose of radiation to be delivered directly to the tumor. See the [Radioimmunotherapy](#) page for more information.
- **Biologic therapy:** This treatment involves natural or laboratory-made substances designed to boost, direct or restore the body's natural defenses against cancer. Interferon is one type of biologic therapy that affects the division of cancer cells and can slow tumor growth. Lenalidomide and ibrutinib interfere with metabolic pathways within the lymphoma cells.
- **Stem cell transplant:** In this treatment, diseased bone marrow is replaced with the patient's own healthy stem cells (called autologous) or the stem cells of a donor (called allogeneic) in order to help new bone marrow grow. A stem cell transplant may be an option if lymphoma returns after treatment. Patients undergoing a stem cell transplant may first receive whole-body external beam radiation along with high-dose chemotherapy to eliminate as many lymphoma cells as possible throughout the body.

## How can I choose from among the options?

The team of physicians responsible for your care will provide you with information specific to your care. Your physicians will recommend the appropriate type/s of treatment for you, and will discuss these options with you. Generally, patients undergo a specific therapy because a cancer specialist, after analyzing all available data and the condition of the patient, has recommended it as the best way to treat the cancer. Occasionally, different options may be equally effective, but associated with different potential risks or side effects.

If you are to undergo radiation therapy, a radiation oncologist will determine how much radiation is needed, to which areas of the body it should be delivered, and how many doses of radiation will be necessary.

## How effective is modern radiation treatment of lymphoma?

Radiation therapy is an extremely effective modality in lymphoma – most lymphomas are quite radiosensitive, however, it is uncommonly used alone. For many lymphomas of early stage, patients receive chemotherapy followed by radiation limited to the initial site(s) of involvement. In advanced disease, radiation may be added to sites that were initially bulky or which have not responded adequately to chemotherapy. It may also be used, in very low doses, as “palliative” therapy to control local symptoms in any stage. For some unusual types of lymphoma that present with limited disease (marginal zone lymphoma, nodular lymphocyte predominance Hodgkin lymphoma, and follicular lymphoma), radiation therapy alone may be a curative treatment.

## What happens during radiation therapy?

Radiation therapy uses high energy x-rays (photons) or a stream of particles. When radiation is used at high doses—much higher than the amount used to obtain x-ray images—it can destroy abnormal cells that cause cancer. It does this by damaging the cell's DNA, which eventually causes the cell to die.

Because of the importance of treating the cancer but sparing healthy tissue, you will visit the medical center before actual therapy for treatment planning and simulation. Correct patient positions for radiation exposure are determined for accurate, effective therapeutic results. Your skin may be marked with permanent ink. Custom-made lead shields may be constructed to protect your healthy organs from the radiation, or the radiation fields may be shaped for your situation with special blocks inside the radiation machine. CT or MRI scans may be used to better localize the tumor and the sensitive normal tissues for treatment planning.

A patient undergoing involved field or involved site radiation therapy receives radiation only to the parts of the body known to be involved by lymphoma. This is the most common type of radiation therapy used for lymphoma and is often combined with chemotherapy. Total nodal irradiation involves the delivery of radiation to all the lymph nodes in the body and is used primarily as an immunosuppressive therapy to facilitate stem cell or organ transplantation. Total body irradiation, in which the entire body receives radiation, is performed prior to chemotherapy and a stem cell transplant. Radiation therapy may also be used effectively as a palliative therapy to relieve symptoms caused by lymphoma that has spread to the brain or spinal cord or that is putting pressure on nerves or that is obstructing a vital organ function.

## What are possible side effects of radiation therapy?

Side effects that develop during treatment vary from person to person. However, some side effects are typical.

There are usually no immediate side effects from each radiation treatment. Most patients develop mild fatigue that builds up gradually over the course of therapy. This slowly goes away one to two months following the radiation therapy. Some patients develop some reddening, dryness and itching of the skin after a few weeks. Skin reactions usually heal completely within a few weeks of completing radiotherapy.

If treatment is administered to the abdomen or pelvis, diarrhea, frequent bowel movements or appetite loss may occur at some point during the course of treatment. Generally, side effects stop gradually once treatment is discontinued.

## What kind of treatment follow-up should I expect?

Lymphoma can recur, or reappear, in a patient previously treated for the disease. Because patients can sometimes be cured after their tumor recurs, follow-up care is critically important.

- **Physical examination:** Patients will undergo frequent physical examinations from a few weeks to many years after treatment, especially if side effects from the treatment do not subside or new symptoms develop.
- **Blood tests:** Follow-up evaluation usually includes periodic blood tests to check for a lymphoma recurrence and general organ function.
- **Imaging:** During follow-up examinations, a patient may undergo plain x-rays, computed tomography (CT), positron emission tomography (PET), or magnetic resonance imaging (MRI). The images obtained will help assess your response to therapy and look for signs of cancer recurrence or treatment-related side effects.

## Are there any new developments in treating my disease?

Patients are often cured of their lymphoma following contemporary therapy. As a result, efforts are being made to help cancer survivors maintain optimal health. Researchers are also focused on defining the least complicated cures for newly diagnosed patients and gaining a better understanding of lymphoma, including its risk factors and ways to prevent the disease.

- **Clinical Trials:** Several elements to improve lymphoma treatment are being studied in clinical trials, including:
  - Targeted therapy drugs that identify and block the growth of cancer cells.
  - New chemotherapy drugs as well as new ways to deliver chemotherapy in different doses and sequences.
  - Lymphoma vaccines designed to treat early stage lymphoma or patients whose lymphoma is in remission.

For more information and resources about clinical trials and to learn about current clinical trials being conducted, see:

- [Clinical Trials](#) – from RadiologyInfo’s news section
- [Clinical Trials](#) – from the National Cancer Institute’s web site

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