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For patients

Lymphoma Cancer Treatment

What is Lymphoma

Lymphoma is a cancer that develops in the white blood cells (lymphocytes (http://www.radiologyinfo.org)) of the lymphatic system (http://www.radiologyinfo.org) . The lymphatic system is part of your body's immune system.

There are two major types of lymphoma: Hodgkin (HL) (http://www.radiologyinfo.org) and non-Hodgkin (NHL) (http://www.radiologyinfo.org) . Both have several subtypes. HL is far less common than NHL. Individual lymphomas behave, spread, and respond to treatment differently from one another.

What are my treatment options?

Treatment options overview

Treatment depends on the type and stage of your lymphoma. It also depends on your age, overall health, medical history, and tolerance for specific therapies. Sometimes, the disease is advanced but slow growing with no symptoms. If so, your doctor may take a "wait-and-see" approach.

Standard options include:

- **Chemotherapy** is a primary treatment for lymphoma. You may receive it by vein (IV) or in pill form. Your doctor may use it alone or with radiation therapy (http://www.radiologyinfo.org) . Chemotherapy may decrease the chance lymphoma will return in other areas of the body. Like radiation therapy, it can ease symptoms and extend life for patients with tumors that have spread. Your doctor will usually give chemotherapy over time with periods of no treatment. This lowers possible side effects, such as abnormal blood-cell counts, fatigue, diarrhea, mouth sores, and risk of infection.
    - **Central nervous system prophylaxis** injects chemotherapy into the spinal column through a lumbar puncture (https://www.radiologyinfo.org/en/info/spinaltap) . Your doctor may use it to treat certain types of NHL that have spread to the brain or are at high risk for such spread. Also, your doctor may prescribe steroids to relieve swelling and inflammation.
- **Radiation therapy (https://www.radiologyinfo.org/en/info/intro_onco)** uses high-energy radiation to shrink tumors and kill cancer cells. Your doctor may use it alone or with chemotherapy.
    - ***External beam therapy (EBT) (https://www.radiologyinfo.org/en/info/ebt)*** targets a beam of high-energy x-rays directly to the tumor. These x-rays can destroy cancer cells while sparing healthy tissue. EBT does not place radioactive sources inside your body.
- **Monoclonal antibody therapy** (targeted therapy) uses man-made molecules called monoclonal antibodies. Natural antibodies attack invading foreign substances, such as bacteria and viruses. Monoclonal antibodies act like natural antibodies by recognizing and binding to the surface of cancer cells. Your doctor may combine them with a chemotherapy drug or radioactive material (http://www.radiologyinfo.org) . This allows the antibody to deliver the cancer-killing agent directly to the cancer cell. Monoclonal antibodies for lymphoma treatment include the following:
    - **Rituximab** seeks out and locks onto the protein receptor (CD20) found on a specific type of lymphocyte (B cells). This causes the lymphoma cell to die. This treatment is for patients with "B-cell" lymphoma. You may receive it with

chemotherapy and/or radiation therapy.

- **Tafasitamab-cxix** attaches to protein receptor CD19.
- **Brentuximab vedotin (Adcetris®)** combines a chemotherapy drug with a monoclonal antibody that attaches to a specific molecule (CD30) on the surface of HL disease cells.
- **Polatuzumab vedotin (Polivy®)** attaches to protein receptor CD79b.

- **Radioimmunotherapy (https://www.radiologyinfo.org/en/info/radio-immuno)** (radiolabeled monoclonal antibody therapy) pairs a monoclonal antibody with a radioactive material. The radiolabeled monoclonal antibody travels and binds to cancer cells. This delivers a high dose of radiation directly to the tumor.
- **Biologic therapy** uses natural or man-made substances to boost, direct, or restore the body's natural defenses against cancer. Interferon is one type of biologic therapy. It affects cancer cell division and can slow tumor growth. Other therapies interfere with metabolic pathways within the cancer cells to slow growth.
- **Stem cell transplant (SCT)** helps grow new bone marrow by replacing diseased bone marrow with the patient's (or a donor's) healthy stem cells. SCT may be an option if lymphoma returns after treatment. Before SCT, patients may receive whole-body EBT and high-dose chemotherapy to rid the body of as many lymphoma cells as possible.
- **Anti-CD19 CAR T-cell therapy** uses the patient's own T cells. T cells are removed from the bloodstream and chimeric antigen receptor (CAR) is added in a lab. The "educated" CAR T-cells are injected back into the patient to find and kill the lymphoma cells.

How can I choose from among the options?

Your doctors will provide you with information specific to your care. They will recommend appropriate treatment(s) and discuss them with you. Your cancer specialist will analyze the data and assess your condition before recommending your best treatment option. Occasionally, different options may be equally effective. However, each may come with different potential risks or side effects.

If you receive radiation, a radiation oncologist will determine how many treatments to give and where.

How effective is modern radiation treatment of lymphoma?

Radiation is extremely effective in treating lymphoma. This is because most lymphomas are quite radiosensitive. Meaning, they respond well to moderate doses of radiation. For early stage, intermediate, and high-grade lymphoma, patients receive chemotherapy and then radiation to the initial area(s) of concern. In advanced disease, your doctor may add radiation to previously bulky sites or sites that are not responding well to treatment. Your doctor may also use radiation in very low doses to control local symptoms in any stage. For some unusual types of low-grade lymphoma that present with limited disease, radiation therapy alone may be curative.

What happens during radiation therapy?

Radiation therapy uses high energy x-rays. High doses of radiation—much higher than x-ray imaging—can destroy abnormal cells that cause cancer. Radiation damages cancer cells' DNA and eventually causes them to die.

It is important to spare healthy tissue while treating cancer. Radiation planning and design relies on imaging the area to be treated. At the time of "simulation," you will meet a Radiation Therapy Technologist (RTT). The RTT will work with your doctor to determine the correct body position for the best results from the radiation. Once your treatment position is set, you will have a CT scan. The RTT may mark your skin with semi-permanent ink or tiny dot tattoos. Treatment planning may use CT, PET or MRI scans to better localize the tumor and the surrounding healthy tissue. After the simulation, the radiation oncologist will work with other team members (dosimetrist and medical physicist) to design and calculate the best plan for radiation.

Involved site radiation therapy (http://www.radiologyinfo.org) delivers radiation only to the areas where lymphoma is present. This is the most common type of radiation therapy for lymphoma. You may receive it after chemotherapy with PET scan. Total

nodal irradiation (http://www.radiologyinfo.org) delivers radiation to all the lymph nodes in the body. This immunosuppressive therapy helps facilitate stem cell or organ transplantation. Total body irradiation (http://www.radiologyinfo.org) delivers radiation to the entire body. Stem cell transplant (SCT) patients receive it prior to chemotherapy and transplant. Radiation may relieve symptoms caused by lymphoma that spreads to the brain or spinal cord, puts pressure on nerves, or obstructs organ function.

What are possible side effects of radiation therapy?

While side effects vary from person to person, some are typical.

Radiation treatments usually have no immediate side effects. Most patients have mild fatigue that builds up gradually over the course of therapy. This slowly goes away one to two months after radiation therapy. Some patients have some reddening, dryness, and itchy skin after a few weeks. Skin reactions usually heal completely within a few weeks of completing treatment.

If you have radiation to the abdomen or pelvis, diarrhea, frequent bowel movements or appetite loss may occur. Medication can ease these side effects. Generally, side effects gradually stop once treatment is complete.

What kind of treatment follow-up should I expect?

Lymphoma can reappear (recur) in previously treated patients. Because patients can sometimes be cured after their tumor recurs, follow-up care is critically important.

- **Physical exam**: You will have physical exams from a few weeks to many years after treatment, especially if side effects do not ease, or new symptoms develop.
- **Blood tests**: Your doctor will test your blood periodically to check general organ function and for a lymphoma recurrence.
- **Imaging**: During follow-up exams, you may have x-ray, computed tomography (CT) (http://www.radiologyinfo.org) , positron emission tomography (PET) (https://www.radiologyinfo.org/en/info/pet) , or magnetic resonance imaging (MRI) (http://www.radiologyinfo.org) . These images will help assess your response to therapy. They will also look for signs of side effects and whether your cancer is back.

Are there any new developments in treating my disease?

Contemporary therapy often cures lymphoma patients. Your doctor will advise you on how to maintain optimal health. Meanwhile, researchers are exploring the least complicated cures for newly diagnosed patients. They are also gaining a better understanding of lymphoma, including its risk factors and ways to prevent the disease.

- Clinical Trials are studying several ways to improve lymphoma treatment, including:
  - Targeted therapy drugs to identify and block cancer cell growth.
  - New chemotherapy drugs and new methods to deliver them in different doses and sequences.
  - Lymphoma vaccines to treat early stage lymphoma or patients who are in remission.

For more information and resources about clinical trials, including current clinical trials, see:

- Clinical Trials (https://www.radiologyinfo.org/en/info/screening-clinical-trials) – from RadiologyInfo's Screening section
- Clinical Trials (http://www.cancer.gov/clinicaltrials/) – from the National Cancer Institute's web site

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