

ADULT NON-HODGKIN'S LYMPHOMA

Non-Hodgkin's lymphoma is a type of cancer of white blood cells called lymphocytes. It develops in the lymph system found throughout the body. Non-Hodgkin's lymphoma can begin in almost any part of the body and spread to almost any tissue or organ in the body.

Lymph fluid travels through lymph vessels and lymph nodes. The fluid is clear and watery and carries lymphocytes to help fight infections. Clusters of lymph nodes are located in the underarm, pelvis, neck, abdomen, and groin. The spleen is an organ on the left side of the abdomen near the stomach that produces lymphocytes carried by the lymph system. The thymus is in the chest behind the breastbone and is where lymphocytes grow and multiply. Tonsils are at the back of the throat and also produce lymphocytes. Bone marrow is soft, spongy tissue at the center of bones and makes white blood cells.

RISK FACTORS for developing non-Hodgkin's lymphoma include being older, male and white; having certain inherited immune disorders; having an autoimmune disease such as rheumatoid arthritis or psoriasis; having HIV/AIDS; being infected with Human T-lymphotrophic virus type I or Epstein-Barr virus; having had Helicobacter pylori infection; taking immunosuppressant drugs after an organ transplant; being exposed to certain pesticides; a diet high in meats and fat; past treatment for Hodgkin's lymphoma.

SYMPTOMS TO REPORT include:

- *Swollen lymph nodes in the neck, underarm, stomach or groin
- *Pain in the chest, abdomen, or bones for no known reason
- *Feeling very tired
- *Fever for no known reason
- *Weight loss for no known reason
- *Drenching night sweats
- *Itchy skin or skin rash

Other conditions, such as infection, may cause the same symptoms. Any of these symptoms that do not go away should be reported to a care provider.

DIAGNOSING AND STAGING

The following tests and procedures will be used to diagnose Hodgkin's lymphoma and determine the stage of the disease. Staging is the process of finding out if the cancer has spread to other parts of the body. It helps to determine the correct treatment.

- ***Physical exam** of entire body, including health habits and past illnesses and treatments
- ***Chest x-ray** with a high energy beam that goes through body onto film to make pictures of areas inside the body
- ***Blood tests** of complete blood count, sedimentation rate, and blood chemistry studies
- ***Immunophenotyping** to examine blood or bone marrow cells to find out if the cancer began from B lymphocytes or T lymphocytes
- ***Lymph node biopsy**, where all or part of a lymph node is removed either through a needle or, more commonly, an incision to be examined under a microscope by a pathologist
- ***Bone marrow biopsy** is a procedure done with local anesthetic using a special needle to remove a piece of bone (typically from the hip) to determine whether cancer is present within the bones.
- ***Liver function tests** to check for an enzyme called lactate dehydrogenase (LDH)
- ***Lumbar puncture** to collect cerebrospinal fluid from the spinal column is collected in certain individuals such as those with lymphoma in the bones, nasal sinuses, testes, or bone marrow
- ***Computerized Tomography (CT)** scans of the chest, abdomen and pelvis produce images of the size and location of tumors and metastases, or places where tumors have spread.
- * **Positron emission tomography (PET) scan** uses radioactive sugar molecules injected intravenously. Cancer cells absorb sugar more quickly than normal cells, so they "light up" on the scan.
- ***Magnetic Resonance Imaging (MRI)** uses radio wave pulses to make images of variations in the absorption and emission of energy between healthy tissue and tumors.

Non-Hodgkin's lymphomas are described by how fast they grow and the location of affected lymph nodes. **Indolent lymphomas** tend to grow and spread slowly and have few symptoms. **Aggressive lymphomas** spread quickly and have severe symptoms. These include Diffuse Large Cell Lymphomas, Lymphoblastic lymphoma, Burkitt lymphoma, and mantle cell lymphoma.

STAGES

Stage I: Cancer is found in only one lymph node group

Stage IE: Cancer is found in an organ of the body

Stage II: Cancer is found in two or more lymph node groups on the same side of the diaphragm (the thin muscle below the lungs that helps breathing and separates the chest and abdomen)

Stage IIE: Cancer is found in an organ as well as in lymph nodes near that organ and may have spread to other lymph node groups on the same side of the diaphragm

Stage III: Cancer is found in lymph node groups on both sides of the diaphragm

Stage IIIE: Cancer is found in lymph node groups on both sides of the diaphragm and in an organ

Stage IIIS: Cancer is found in lymph nodes on both sides of the diaphragm and in the spleen

Stage IIIS+E: Cancer is found in lymph node groups on both sides of the diaphragm, in an organ, and in the spleen

Stage IV: Cancer is found throughout one or more organs and may be in the lymph nodes close to those organs; or, is found in only one organ as well as in lymph nodes far from that organ

TREATMENT OPTIONS

Certain factors affect the chance of recovery and the choices for treatment. These include the stage, type of non-Hodgkin's lymphoma, level of LDH in the blood, patient's age and general health.

Chemotherapy uses drugs taken by mouth or injections through a vein or muscle to stop the growth of cancer cells. Chemotherapy can be one drug or a combination of drugs.

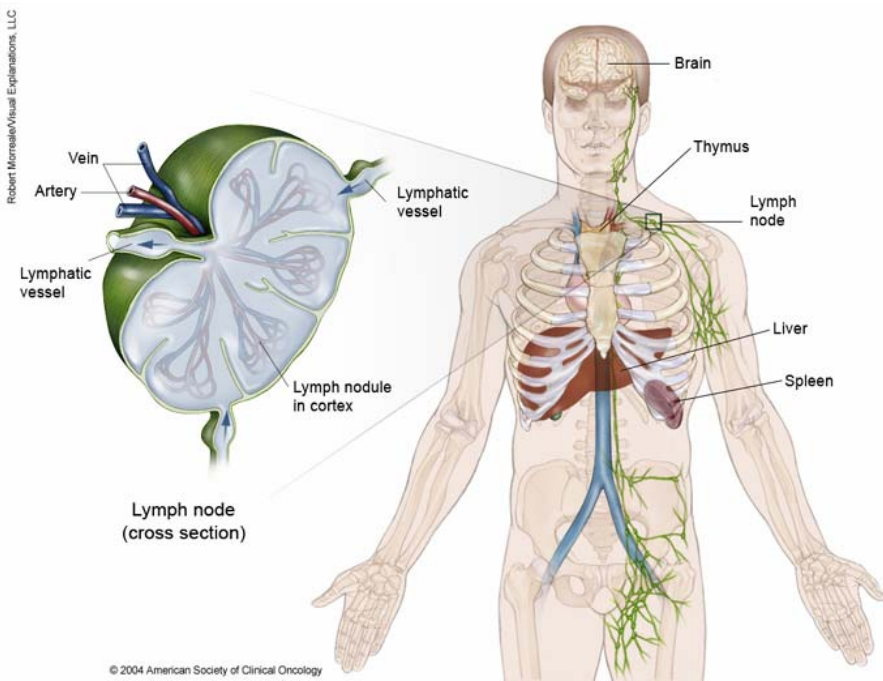
Radiation therapy uses high-energy x-rays to kill cancer cells. External radiation therapy uses a machine outside of the body to send radiation toward the cancer. Internal radiation therapy uses a radioactive substance sealed in needles, seeds, wires or catheters that are placed directly into or near the cancer.

Biologic Therapy is a treatment that uses the patient's own immune system to fight cancer. This is also called biotherapy or immunotherapy. Substances made by the body or made in a laboratory are used to boost, direct, or restore the body's natural defenses against cancer. One type of biologic therapy is monoclonal antibody therapy. This therapy uses antibodies made in the laboratory from a single type of immune system cell. Monoclonal antibodies are given by infusion. They may be used alone or in combination with chemotherapy or radiation therapy.

Radioimmunotherapy is treatment that attaches a radioactive particle to an antibody. The antibody brings the radioactive particle to the tumor where it delivers localized radiation.

Watchful waiting is closely monitoring a patient's condition without giving any treatment until symptoms appear or change. This is commonly done in patients with indolent lymphomas. People can have these for many years and require no therapy or only intermittent therapy. Aggressive lymphomas are almost always treated with combinations of chemotherapy drugs or, in some cases, radiation as well.

Clinical trials are tests of new types of treatment. These include a type of biologic therapy called vaccine therapy. It uses a substance that causes the immune system to respond to a tumor and kill it. High-dose Chemotherapy and Radiation Therapy with Stem Cell Transplant is another new type of treatment. High doses of chemotherapy and radiation therapy destroy blood-forming cells. Stem cells are immature blood cells that are removed from the blood or bone marrow of the patient or donor and then frozen until needed. The stem cells are given back to the patient through an infusion after the high-dose chemotherapy and radiation therapy are completed. The reinfused stem cells grow into and restore the body's blood cells.



adapted from National Cancer Institute (NCI) and People Living with Cancer, February, 2007



<http://cancer.med.unc.edu>