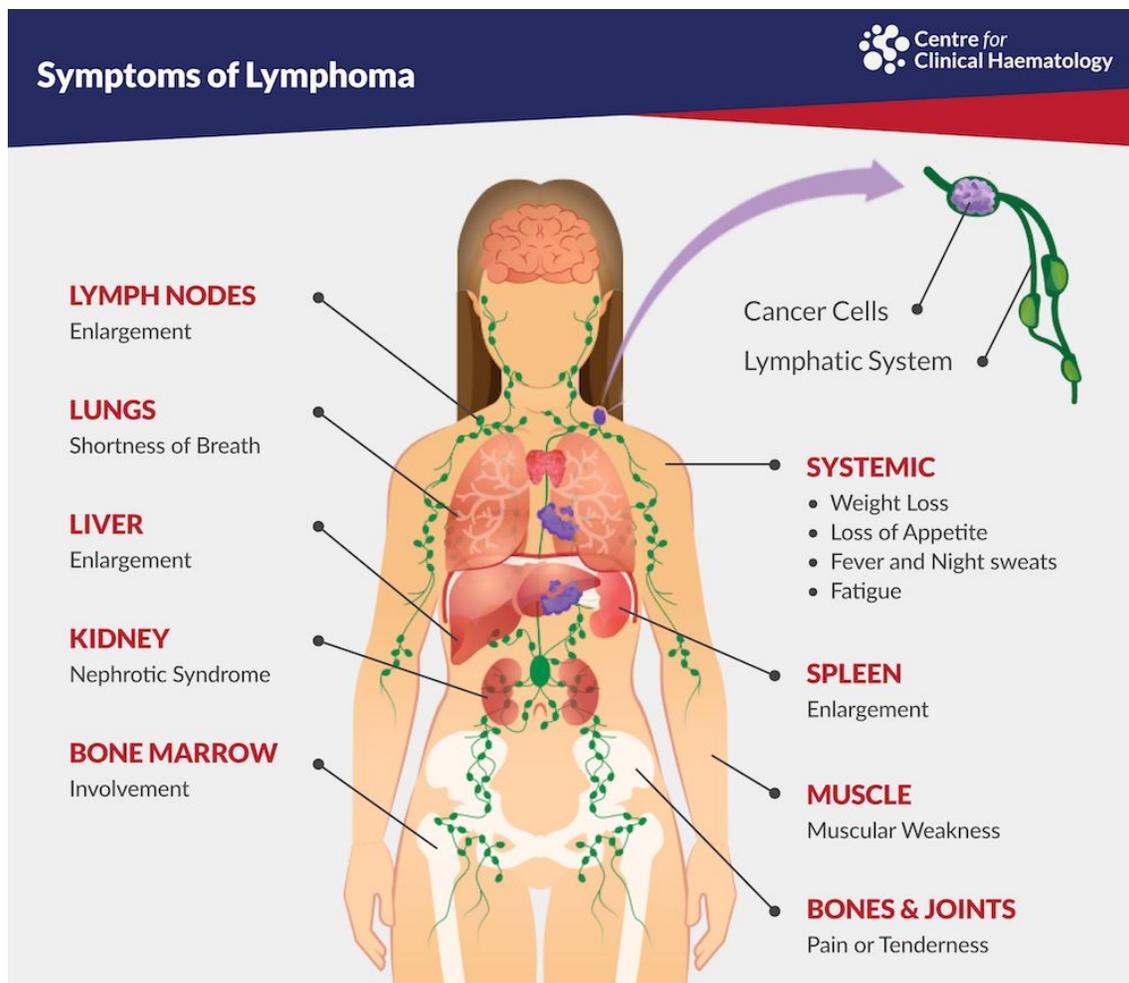


What is Lymphoma?

Lymphoma is a type of blood cancer that begins in the cells of the lymphatic system which is responsible for fighting disease and infection. It affects the infection-fighting cells of the immune system known as lymphocytes. There are two types of lymphocytes called B cells and T cells. These cells have the ability to recognise and destroy infectious microorganisms and abnormal cells. Because the immune system is found throughout the body, lymphoma can begin almost anywhere.

Lymphoma occurs when the lymphocytes multiply abnormally and collect at specific parts of the lymphatic system, such as the lymph nodes, bone marrow and spleen. These affected lymphocytes also lose their infection-fighting ability making the body more vulnerable to infection.



There are more than 60 specific types of Lymphomas. The two most common types of Lymphoma are Hodgkin Lymphoma and Non-Hodgkin Lymphoma.

The main difference between Hodgkin lymphoma and Non-Hodgkin lymphoma is in the specific lymphocyte affected. There is an abnormal cell called a Reed-Sternberg cell which is present in Hodgkin lymphoma, but absent in Non-Hodgkin Lymphoma.

Hodgkin Lymphoma

Hodgkin Lymphoma is a form of cancer affecting the lymphatic system. Hodgkin Lymphoma occurs when the cells in the lymphatic system begin to grow abnormally and spread to different organs and tissues.

What are the signs & symptoms?

The signs and symptoms of Hodgkin Lymphoma include:

- Painless swelling of the lymph nodes in the neck, armpit, or groin
- Itching of the skin all over the body
- Persistent fatigue
- Fever
- Unintentional weight loss
- Severe night sweats
- Pain in the lymph nodes after alcohol consumption
- Coughing and trouble breathing
- Pain in the chest, abdomen, or bones

What are the causes of Hodgkin Lymphoma?

Hodgkin Lymphoma may occur when the infection-fighting cells called lymphocytes undergo genetic mutations resulting in the uncontrolled growth and multiplication of these affected cells.

These abnormal lymphocytes usually grow and accumulate in a particular part of the lymphatic system, such as the neck or groin, and crowd out the healthy cells. Over time, the abnormal lymphocytes can spread to other parts of the body, such as the spleen, bone marrow, liver, and lungs.

What are the risk factors for Hodgkin Lymphoma?

The factors that can increase the risk of Hodgkin Lymphoma include:

- **Age:** People can be diagnosed with Hodgkin Lymphoma at any age although the most common age of diagnosis is between 20 and 40 years old, and those above 55 years old.
- **Gender:** Hodgkin Lymphoma is slightly more common in males than in females.
- **Previous exposure to Epstein-Barr virus:** This virus is known to alter the DNA of B-lymphocytes. An infection caused by the Epstein-Barr virus may result in a condition called infectious mononucleosis that can increase the risk of Hodgkin Lymphoma.
- **Family history:** People with a first-degree relative (parent, sibling or child) who has Lymphoma may have a higher risk of developing it, although it is not clear if it is due to an inherited genetic mutation or lifestyle factors.
- **Weak immune system:** People with a weakened immune system because of their medical condition (such as AIDS) or are on medications (such as immunosuppressants) are at increased risk.
- **Environmental factors:** Early birth order, having fewer siblings or playmates, and single-family homes are associated with a higher risk of Hodgkin Lymphoma.
- **Genetic syndromes:** Patients with Klinefelter's syndrome and Down syndrome are at increased risk.

Non-Hodgkin Lymphoma

Non-Hodgkin Lymphoma represents a group of cancers originating in the lymphatic and immune systems. It affects the lymph nodes and the blood cells called lymphocytes.

What are the signs & symptoms?

The signs and symptoms of Non-Hodgkin Lymphoma may include:

- Painless swelling of the lymph nodes in the neck, armpit or groin
- Anaemia or reduced red blood cell count (if the bone marrow is affected)
- Unexplained weight loss
- Fever
- Persistent fatigue
- Night sweats
- Coughing, difficulty in breathing, and chest pain
- Loss of appetite
- Pain, swelling, or sensation of fullness in the abdomen
- Itching of the skin all over the body

What are the causes of Non-Hodgkin Lymphoma?

Non-Hodgkin Lymphoma occurs due to the rapid multiplication of lymphocytes. The life cycle of lymphocytes involves the formation of new cells that can replace the old lymphocytes. Non-Hodgkin Lymphoma occurs when the lymphocytes grow indefinitely resulting in an increased number of immature lymphocytes in the blood. This results in the accumulation of a large number of lymphocytes in the lymph nodes, causing them to swell.

Non-Hodgkin Lymphoma usually affects the B-lymphocytes that produce antibodies to fight infections. The subtypes of Non-Hodgkin Lymphoma affecting B cells include follicular Lymphoma, diffuse large B-cell Lymphoma, Burkitt Lymphoma, and mantle cell Lymphoma.

In rare cases, Non-Hodgkin Lymphoma may occur in T lymphocytes that attack and destroy foreign bodies directly. The subtypes of Non-Hodgkin Lymphoma affecting T cells include cutaneous T-cell lymphoma and peripheral T-cell Lymphoma.

What are the risk factors for Non-Hodgkin Lymphoma?

- **Age:** The risk of developing this disease increases with age. People above 60 years of age have an increased risk of developing Non-Hodgkin Lymphoma.
- **Weak immune system:** People with weakened immune systems due to a medical condition (such as AIDS) or are on medication (such as immunosuppressants) are at increased risk.
- **Environmental factors:** People working with herbicides may be at a higher risk of this disease.

How is Lymphoma diagnosed?

- **Physical examination**
Our doctor will check for swollen lymph nodes in your armpits, neck, and groins for the possible diagnosis of Lymphoma. Enlargement of the spleen or liver can also be a sign of Lymphoma. Biopsies are then usually done to confirm the diagnosis.
- **Biopsy**
A lymph node biopsy that involves the removal of part or all of a swollen lymph node can help to confirm the diagnosis of Lymphoma. The sample is sent to a laboratory to detect the presence of cancer cells. Analysing the lymph node tissue in a laboratory will help to identify the type of Lymphoma.

- **Blood and urine tests**
Our doctor may recommend blood and urine tests to rule out infections or other diseases.
- **Imaging tests**
Imaging tests such as X-ray, CT, MRI, and PET (Positron Emission Tomography) can help in the diagnosis of Lymphoma.
- **Bone marrow aspiration**
A **bone marrow biopsy** and aspiration involve inserting a needle into the hipbone to draw a sample of the bone marrow. The sample is then analysed in a laboratory to detect Lymphoma cells.

Treatment of Lymphoma

Treatment of lymphoma can be given via different modalities of therapy.

First line treatment of lymphoma is usually given in cycles of therapy. Each cycle is typically 3-4 weeks in duration with treatment given over a few days as a combination of different chemotherapy drugs (sometimes with targeted therapy).

- **Radiation Therapy**
Radiation therapy involves exposure of the affected tissues to high-powered energy beams such as protons and X-rays to destroy the cancer cells. During radiation therapy, you will be asked to lie on a table. A large machine will move around you to direct the beams of energy to the affected lymph nodes to destroy them.
- **Chemotherapy**
Chemotherapy can help to kill cancer cells. These medications can be given orally or by injections. It can be combined with other treatments such as radiation for improved outcomes.
- **Stem Cell Transplant**
Stem cell transplant involves the removal of healthy stem cells from you or a donor's bone marrow to be later infused into your bloodstream. The healthy stem cells, once injected into your body, flow to your bones and rebuild the bone marrow, thereby restoring the normal production of lymphocytes. Stem Cell Transplantation for lymphoma is usually reserved for patients with high risk subtypes of lymphoma or patients with relapsed lymphoma

- **Other Drug Therapy**

Biological therapy that involves the use of medications such as rituximab can be effective for treating Lymphoma. These drugs work by improving the functions of your immune system.

- Rituximab is a monoclonal antibody that can attach itself to B lymphocytes and make them more visible to your immune system. This allows the immune cells to identify and attack the cancer cells more effectively.
- Another drug called ibrutinib can be used for the treatment of Non-Hodgkin Lymphoma.
- Radioimmunotherapy drugs like Ibritumomab tiuxetan are made of monoclonal antibodies carrying radioactive isotopes. These drugs facilitate the attachment of antibodies to cancer cells, thus allowing radiation to be directed precisely at them. These treatments can help to limit the growth and spread of Lymphoma.

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