What are leukemia and lymphoma?

Leukemia and lymphoma are both considered cancers of the blood, though leukemia starts in the bone marrow, where blood cells are made, and lymphoma starts in the lymphatic system, which is responsible for fighting disease along with your immune system.

Cancer is a disease that begins in the cells of our body, and causes them to behave abnormally. Instead of growing, working, reproducing and then dying in a normal cycle, cancer cells grow and divide uncontrollably. In organ cancers, abnormal cells cause lumps or tumors, but leukemia and lymphoma don’t usually do that, because they form abnormal cells that circulate in the blood, bone marrow, and lymphatic system.

There are four different types of leukemia:
- Acute myelogenous leukemia (AML)
- Acute lymphocytic leukemia (ALL)
- Chronic myelogenous leukemia (CML)
- Chronic lymphocytic leukemia (CLL)

Acute leukemia progresses rapidly without treatment, while chronic leukemia is slower to develop compared to the acute form. Myelogenous, or myeloid, refers to the fact that the cancer begins in bone marrow cells that go on to produce blood cells or platelets. Lymphocytic, or lymphoblastic, refers to cancer that normally begins in cells that go on to produce lymphocytes, which is a special type of white blood cell.

There are two main types of lymphoma:
- Hodgkin lymphoma
- Non-Hodgkin Lymphoma

Hodgkin lymphoma is distinguished from other lymphomas partly by the presence of Reed-Sternberg cells, which are large, malignant cells named for the scientist who discovered them. Non-Hodgkin lymphoma is the name for a group of other lymphomas that each have their own unique characteristics.

How common are leukemia and lymphoma?

According to figures from Statistics Canada, it is estimated that 186,400 new cases of cancer will be diagnosed in Canada in 2012. Amongst new diagnoses, the expected number of lymphoma and leukemia cases are 8,750 and 5,600 respectively. The most common types of leukemia in adults are chronic lymphocytic leukemia and acute myelogenous leukemia whereas acute lymphocytic leukemia is the most common type in children. Non-Hodgkin’s lymphoma is much more common than Hodgkin’s lymphoma.

Who gets leukemia and lymphoma?

Leukemia and lymphoma affect people of all ages, though leukemia is most common in people over the age of 60. Lymphoma tends to be a bit more common in men.

The reasons for developing these blood cancers are still relatively unknown. Each disease has some identified risk factors, listed below, but many people develop leukemia or lymphoma without any of the known risks.
Leukemia risk factors

- Being older
- Previous radiation or chemotherapy treatment
- Exposure to high levels of radiation (i.e., nuclear fallout)
- Exposure to chemicals such as benzene

Hodgkin lymphoma risk factors

- Prior Epstein-Barr virus infection (mononucleosis)
- Human immunodeficiency virus (HIV)
- Family history of Hodgkin lymphoma

Non-Hodgkin lymphoma risk factors

- Smoking
- Being older and male
- Certain genetic disorders or abnormalities (i.e., Down syndrome)
- Having a weakened immune system (i.e., immunosuppressant drugs, HIV/AIDS, auto-immune diseases)
- Family history
- Prior Epstein-Barr or HTLV-1 infection
- Having a blood disorder such as myelodysplastic syndrome (MDS)
- Exposure to pesticides
- Prior viral infection with Human T-cell (HTLV-1)
- Previous radiation or chemotherapy treatment

How to prevent leukemia and lymphoma

Since we don’t really know what causes these cancers, it's difficult to be definitive about how to prevent them. Avoiding any of the known risk factors that are within your control is a good idea, especially not smoking, but it should be noted that most people who have these risk factors don’t develop leukemia or lymphoma, and many who don’t have them will develop these cancers anyway. However, it should be noted that in most people who develop these cancers risk factors remain unknown.

What are the signs and symptoms?

The signs and symptoms of blood cancers vary depending on which one you have. In leukemia, this mostly depends on whether you have an acute or chronic type of leukemia vs cancer.

In acute leukemia (ALL and AML), the disease sets in very rapidly, and the signs are evident early on. If you have too few normal white blood cells (called neutropenia), you will be more susceptible to infection. If it is your red blood cells that are more affected, you may develop anemia, which can make you very tired, pale, and short of breath. When the platelets are reduced (thrombocytopenia), you may develop unusual bleeding, bruising, or small purple or red spots on your skin, especially on the arms and legs. Some other general acute leukemia symptoms may include:

- Fever
- Unexplained weight loss
- General discomfort
- Sore throat
• Swollen gums
• Night sweats that soak you
• Headache
• Vomiting
• Problems with vision
• Bone or joint pain
• Swollen lymph nodes (painless)

In early chronic leukemia (CLL and CML), you may have no symptoms because the leukemia cells may function almost normally. Chronic leukemia is most often discovered by a blood test during a regular check-up. The symptoms that do appear begin as mild and gradually get worse, and may include:
• Fatigue
• General discomfort
• Reduced appetite
• Unexplained weight loss
• Night sweats that soak you
• Swollen lymph nodes (painless)

It should be noted that the general symptoms of leukemia are not very specific and they are more often caused by other health problems like the flu or another type of infection.

The signs and symptoms of lymphoma are almost identical no matter the type. The most common symptom is swollen lymph nodes in the neck or underarm. The only difference is that you may find a swollen node in the groin area if you have non-Hodgkin lymphoma, or in the chest if you have Hodgkin lymphoma. Because the nodes are usually not painful in the early stages, they are often discovered during a routine doctor check-up. Other symptoms may include:
• Unexplained weight loss
• Unexplained fever
• Night sweats that soak you
• Low energy and fatigue
• Itchy skin

As with leukemia, the symptoms associated with lymphoma are often due to some other sickness, including a flu or another kind of infection.

How are the diseases diagnosed?

For both leukemia and lymphoma, diagnosis is confirmed with a sample of the cells that are suspected to be abnormal. That means examining blood and bone marrow cells for leukemia, and lymph node cells for lymphoma.

A diagnosis of leukemia usually begins with a blood test called a complete blood count (CBC). This test, used for many other diseases as well, can identify abnormal amounts of red and white blood cells, as well as platelets, and
find any leukemia cells in the blood sample. Often, a bone marrow biopsy is performed to confirm the diagnosis, and to look for other abnormalities that help identify the type of leukemia. This involves removing a bit of marrow from inside a bone with a needle, usually from the back of the hip, and is normally done in a clinic or at the hospital with no overnight stay required. Discovering whether the leukemia is acute or chronic, myelogenous or lymphocytic is key to planning treatment.

Your doctor will also decide what subtype of leukemia you have. The subtype is based on the unique characteristics of the actual leukemia cells when examined under a microscope. For example, ALL is broken up into subtypes depending on which type of lymphocyte is involved (B- or T-cell), and how mature the cell is.

To diagnose lymphoma, a lymph node biopsy is required. You will also have other tests so that your doctor can better understand the type of lymphoma, as well as to find out where the cancer is in your body, and how far along it is, which is referred to as its stage. These may include tests like a blood test, a bone marrow biopsy, and an imaging test like an MRI to see if the cancer has spread to any tissues or organs.

### Stages of lymphoma

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Cancer is found in only one group of lymph nodes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 2</td>
<td>Cancer is found in two or more groups of lymph nodes on the same side of the diaphragm (a muscle separating your chest and abdomen)—either above or below.</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Cancer is found in groups of lymph nodes both above and below the diaphragm.</td>
</tr>
<tr>
<td>Stage 4</td>
<td>Cancer has spread to one or more organ or tissue sites, outside the lymphatic system, such as the liver, bones, lungs or bone marrow. Cancer cells may or may not be found in lymph nodes near the affected organs or tissues.</td>
</tr>
</tbody>
</table>

The doctor may assign one or more of the following letters to your cancer type, along with the stage number, to more accurately describe it.

<table>
<thead>
<tr>
<th>E (extranodal)</th>
<th>The cancer is found in an area or organ other than the lymph nodes or has spread to tissues outside the lymphatic system.</th>
</tr>
</thead>
<tbody>
<tr>
<td>S (spleen)</td>
<td>Cancer is also found in the spleen.</td>
</tr>
<tr>
<td>A</td>
<td>You have no symptoms of fever, night sweats or unexplained weight loss.</td>
</tr>
<tr>
<td>B</td>
<td>You have symptoms of fever, night sweats or unexplained weight loss.</td>
</tr>
</tbody>
</table>
In non-Hodgkin lymphoma, there is another measurement called the grade, which describes how quickly the cancer is growing.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Indolent</td>
<td>Indolent lymphomas tend to grow very slowly, and may need little or no treatment for months or even years. Usually treated only when symptoms appear. Can shrink or sometimes disappear with treatment, but they tend to come back.</td>
</tr>
<tr>
<td>Aggressive</td>
<td>Aggressive lymphomas grow quickly, and usually cause symptoms and require treatment immediately. Can sometimes be cured with intensive chemotherapy.</td>
</tr>
</tbody>
</table>

Knowing the type, stage, and grade of your blood cancer will help your healthcare team choose an appropriate treatment for you.

**How are the diseases treated?**

Your healthcare team will take many things into consideration when deciding what treatment plan to use to fight your cancer. They will look at the type, subtype, stage and grade, as well as your overall health. They will decide to use one or more of the treatments listed below. Plus, they will consider what side effects you may experience with each treatment. And they will include you in the final decision.

Possible Treatments for Leukemia and Lymphoma:

<table>
<thead>
<tr>
<th>Treatment type</th>
<th>Leukemia</th>
<th>Hodgkin Lymphoma</th>
<th>Non-Hodgkin Lymphoma</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Watchful waiting</strong> – No immediate treatment, but cancer followed very closely by team. Treatment considered if signs of cancer appear or change.</td>
<td>✔ (CLL)</td>
<td></td>
<td>✔ (indolent-A)</td>
</tr>
<tr>
<td><strong>Chemotherapy</strong> – Injections or pills with drugs meant to interfere with cancer cell growth and ability to spread. Also damages healthy cells, and can lead to side effects like nausea, vomiting, fatigue, hair loss, and increased risk of infection. May be used with other treatments.</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td><strong>Radiation therapy</strong> – Also called external beam radiation therapy, this involves using a large machine to aim a beam of radiation at a specific area of the body, like a tumour. The radiation also damages healthy cells in the line of the beam. Side effects depend on where the beam is aimed in your body, and can include fatigue, diarrhea, and red or tender skin at the treatment site.</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td><strong>Stem cell transplant</strong> – Stem cells in your bone marrow and blood develop into the blood cells in your body. A high-dose of chemotherapy, usually used for cancer that has returned, will destroy most of these cells. You may have a transplant of your own cells, or those of an appropriate donor, to replace the cells destroyed by treatment. It is a complex procedure carried out by highly trained medical specialists under careful conditions, and can take months of recovery.</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>
### Treatment type

<table>
<thead>
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<th>Leukemia</th>
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<tr>
<td><strong>Biological therapy</strong> – Injections of natural body substances, or drugs made from them, which are used to boost the immune system to fight cancer or help control other treatment side effects. Two types are currently used to treat leukemia (monoclonal antibodies and interferon alfa), and one to treat non-Hodgkin lymphoma (monoclonal antibodies). Side effects include flu-like symptoms, with rare serious side effects such as severe skin rash, breathing problems, and low blood pressure.</td>
<td>✔️ (depends on leukemia type)</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td><strong>Targeted therapy</strong> – Drugs that attack specific types of cancer cells without damaging healthy cells; i.e., cancer growth inhibitors, to interfere with cancer cell growth and division. Side effects usually occur early on in treatment, and may subside over time.</td>
<td>✔️</td>
<td>✔️ (not CLL)</td>
<td></td>
</tr>
<tr>
<td><strong>Complementary and alternative therapies</strong> – complementary therapies are non-traditional therapies used together with conventional ones, while alternative therapies are used instead of the conventional treatments. The safety and effectiveness of these treatments are usually unknown.</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td><strong>Clinical treatment trials</strong> – Your healthcare team may know of a new approach to treatment that is being investigated in a clinical trial, and may recommend that you participate to receive the new therapy.</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>

### Living with leukemia or lymphoma

Everyone’s experience of cancer is unique. You will have your own reaction to diagnosis, treatment, and follow-up care. You will have to organize your life differently to accommodate the many changes that come with cancer treatment, make some tough decisions, and deal with a range of emotions, both yours and those of the people closest to you. Here are a few tips and things to consider as you begin your own unique blood cancer fight:

- Keep all your doctor’s appointments
- Use your healthcare team for support—even emotional
- Follow the advice of your healthcare team
- Eat a balanced diet; when you feel less like eating, eat less, but more often
- Let your doctor know about any new symptoms or side effects
- Don’t smoke—get help to quit
- Balance rest and activity to keep your energy levels up
- Don’t stop seeing your family doctor
- Be open with family and friends, and accept their support
- Keep an eye on your moods, especially if you begin feeling really low
- Stay positive

Learning as much as possible about your disease—and actively working with your health care professionals—are effective ways to regain control over your life. There is a great deal of information out there that can help. Check out some of the websites listed below to get started.
Empowering both the patient and the caregiver

Patients as well as their caregivers can access the following sites to find out more information about leukemia and lymphoma, their symptoms, treatment options as well as recent related scientific discoveries.

Resources

Helpful information and support networks on the internet:

- Canadian Cancer Society ([www.cancer.ca](http://www.cancer.ca))
- Leukemia and Lymphoma Society ([www.lls.org](http://www.lls.org))
- Cancer Advocacy Coalition Canada ([www.canceradvocacy.ca](http://www.canceradvocacy.ca))
- Cancer Care Ontario ([www.cancercare.on.ca](http://www.cancercare.on.ca))
- BC Cancer Agency ([www.bccancer.bc.ca](http://www.bccancer.bc.ca))
- Cancer Recovery Foundation of Canada ([www.cancerrecovery.ca](http://www.cancerrecovery.ca))
- National Cancer Institute ([www.cancer.gov](http://www.cancer.gov))
- American Cancer Society ([www.cancer.org](http://www.cancer.org))
- American Association for Cancer Research ([www.aacr.org](http://www.aacr.org))