Patient Education

مـركزالكويـت لمكافحـة السـرطان
Kuwait Cancer Control Center

What is Leukemia?

Developed in partnership with
UHN Princess Margaret Cancer Centre
INTERNATIONAL

Created: 1/2013

Form Code: 05HD1

An Educational Booklet for Patients

This information booklet can help you learn more about Leukemia. A better understanding may give you a greater sense of control and help you work with your healthcare team to choose the best treatment and care for you.

What is Leukemia?

Leukemia is cancer of the blood or bone marrow. Leukemia is a cancer that starts in the stem cells of the bone marrow that make blood cells. Bone marrow is the soft, spongy material that fills the center of most bones (where blood cells are made). Blood stem cells (immature blood cells) develop into either myeloid stem cells or lymphoid stem cells.

Myeloid stem cells develop into one of three types of mature blood cells:

- Red blood cells carry oxygen to all tissues of the body.
- Platelets form clots in damaged blood vessels to prevent bleeding.
- White blood cells called granulocytes and monocytes destroy bacteria and help to fight infection.

Lymphoid stem cells develop into lymphocytes. Lymphocytes are another type of white blood cell that is usually found in the lymph nodes and lymphatic system, such as the spleen and the blood. Lymphocytes make antibodies to help fight infection.

Leukemia develops when the blood stem cells in the bone marrow make abnormal blood cells. These abnormal cells are called leukemia cells. Over time, the leukemia cells crowd out normal blood cells. This makes it hard for the white blood cells, red blood cells and platelets to do their jobs.

Types of Leukemia

There are several different types of leukemia. The types of leukemia are first divided according to the type of stem cell they developed from:

- Myelogenous leukemias (CML or AML) develop from abnormal myeloid cells.
- Lymphocytic leukemias (CLL or ALL, also known as lymphoblastic leukemias) develop from abnormal lymphoid cells.
- The types of leukemia are further grouped according to how quickly the leukemia develops and grows:
  - Acute leukemias (AML or ALL) start suddenly, developing within days or weeks. The number of leukemia cells in the blood can rise very fast and the blood cannot do its job. Acute leukemias get worse quickly and need to be treated right away.
  - Chronic leukemias (CLL or CML) develop slowly over months or years, and may not cause any symptoms early in the disease. Symptoms start to appear as the number of leukemia cells in the blood or bone marrow increases.

Because each type of leukemia develops and grows differently, each type is treated differently. It is important for your doctor to find out which type of leukemia you have so you can get the treatment that works best for that type.

Why does Leukemia occur?

Cancer is caused by changes or mistakes in our DNA, which is our genetic material. A mistake may be caused by a genetic predisposition or a physical or chemical agent, known as a carcinogen. Environmental and other influences can also affect the DNA. There is no single cause of leukemia, but some factors increase the risk of developing it.

- being older
- previous treatment with radiation or chemotherapy for cancer or other conditions
- exposure to high levels of radiation, for example from nuclear fallout
- exposure to chemicals such as benzene or insecticides
- smoking
- having a genetic disorder (such as Down Syndrome) or chromosomal abnormality (people with CML often have an abnormal chromosome called the Philadelphia chromosome)
- family history – having an inherited faulty gene or a family history of CLL
- having a blood disorder, such as myelodysplastic syndrome (also called MDS) having had a viral infection such as human T-cell leukemia/lymphoma virus (HTLV1)

Some people develop leukemia without any of these risk factors.

Symptoms of Leukemia

Symptoms start to appear as the number of leukemia cells grow and your bone marrow can no longer make the normal blood cells your body needs. Having too few normal white blood cells, red blood cells or platelets can cause a number of symptoms. In acute leukemia, symptoms appear and get worse quickly.

Acute leukemia can cause you to have too few normal white blood cells (a condition called neutropenia). You will not be able to fight infection very well. If you have too few red blood cells (anemia), you may feel very tired, be short of breath or look pale. Too few platelets (thrombocytopenia) can lead to unusual bleeding. You may bruise easily or notice small purple or red spots on your skin, especially on your arms and legs. Other general symptoms of acute leukemia may include:

- fever
- unexplained weight loss
- general discomfort
- sore throat
- swollen gums

- drenching night sweats
- headache
- vomiting
- vision problems
- bone or joint pain
- painless swelling of the lymph nodes

In the early stages of chronic leukemia (CML and CLL), the leukemia cells can function almost normally and cause no symptoms. The disease is often discovered during a routine blood test. When symptoms do appear, they generally are mild at first and get worse gradually. General symptoms of chronic leukemia may include:

- fatigue
- general discomfort
- loss of appetite
- unexplained weight loss
- drenching night sweats
- painless swelling of the lymph nodes

Often, these symptoms are not caused by leukemia. Other health problems can cause them, such as the flu or an infection. Testing is needed to make a diagnosis.

Diagnosing Leukemia

After taking your medical history and completing a physical examination, your doctor may suspect you have leukemia. To confirm the diagnosis, your doctor will arrange special tests. These tests may also be used to classify the leukemia. You may have one or more of the following tests.

Blood Tests

Blood is taken and studied to see if the different types of blood cells are normal in number and appearance. The results can also show how well your kidneys, liver and other organs are working. These tests may suggest whether or not you have leukemia.

Imaging Studies

Imaging studies allow tissues, organs and bones to be looked at in more detail. Using X-rays, ultrasounds, CT scans or MRIs, your healthcare team can get a picture of where the cancer is and see if it involves your organs, such as the spleen, liver or lymph nodes. These tests are usually painless and do not require an anesthetic.

Bone Marrow Biopsy Study

A biopsy is usually necessary to make a definite diagnosis of leukemia. To diagnose leukemia, cells are removed from the bone marrow, usually from the back of the hip bone. The cells are checked under a microscope. If leukemia cells are found in the bone marrow, they will be studied further to see how fast they are growing. There are two ways to get a bone marrow sample.

- For a bone marrow aspiration, the doctor uses a thin needle to remove samples of bone marrow.
- A bone marrow biopsy uses a thicker needle to remove a sample of bone marrow and a small piece of bone.

Both types of biopsies use a local anesthetic (freezing) to numb the area. It can be painful when cells are pulled into the syringe, but this lasts only a few seconds. Usually, bone marrow aspirations and biopsies are done in a clinic or hospital on an outpatient basis (you will not stay overnight).

If you have enlarged lymph nodes, a lymph node biopsy may be done. Clusters of lymph nodes are found throughout your body. They are part of your lymph or immune system. A lymph node biopsy may remove part or all of a lymph node. If the enlarged lymph node can be easily reached with a needle, a local anesthetic will be used. A general anesthetic (you will be unconscious) may be necessary if the enlarged lymph node is deep in your chest or abdomen.

Lumbar Puncture

A lumbar puncture (also called a spinal tap) may be done to see if the leukemia has spread to your nervous system. A needle is inserted between two vertebrae in the backbone and a small amount of cerebrospinal fluid is removed and checked for leukemia cells. Cerebrospinal fluid is the fluid that surrounds the spinal cord and the brain. A local anesthetic is used. A lumbar puncture takes about 30 minutes. You must lie flat for 1 to 2 hours afterward to lessen the chances of getting a headache.

Cytogenetics

Cytogenetic tests (also called chromosome analyses) are done on the bone marrow sample to look for changes in the chromosomes in the cells. Chromosomes are the part of a cell that contains genetic information. In the different types of leukemia, there are often distinct genetic abnormalities that cause changes in the structure of the chromosomes in leukemia cells. These tests help to identify the type of leukemia you may have and therefore which treatment may work best.

Treatment for leukemia

It is important to note that treatment options differ based on the type of leukemia, cytogenetics, age, and health status of each patient.

Chemotherapy

Chemotherapy may be given as pills or by injection. Chemotherapy drugs interfere with the ability of cancer cells to grow and spread, but they also damage healthy cells. Although healthy cells can recover over time, you may experience side effects from your treatment like nausea, vomiting, loss of appetite, fatigue, hair loss and an increased risk of infection.

Stem Cell Transplant

Sometimes high doses of chemotherapy are used to treat leukemia that has come back or if there is a high risk that it may come back. High-dose chemotherapy destroys the bone marrow cells as well as the leukemia cells, so the bone marrow will need to be replaced with a transplant of stem cells. All blood cells develop from stem cells found in the bone marrow and in the bloodstream.

Before high-dose chemotherapy is given, stem cells will be taken from you or from a donor whose bone marrow is a close match to your own. Soon after the chemotherapy treatment, the stem cells are put back into your blood. Within a few weeks, the new stem cells will start to make blood cells.

A stem cell transplant is a complex procedure. For this reason, stem cell transplants are done in specialized transplant centres or hospitals by a team of highly trained healthcare professionals. Side effects can be very serious and may even be life-threatening. You will be watched very closely after a stem cell transplant and carefully followed up for a period of time after leaving the hospital. It may take several months to fully recover after a stem cell transplant.

Radiation Therapy

In external beam radiation therapy, a large machine is used to carefully aim a beam of radiation. The radiation damages the cells in the path of the beam – normal cells as well as cancer cells. Radiation side effects will be different depending on what part of the body receives the radiation. You may feel more tired than usual, have some diarrhea, or notice changes to the skin (it may be red or tender) where the treatment was given.

Radiation may be used for some types of leukemia to treat the disease or prevent it from spreading. If you need a stem cell transplant, you may also be given radiation to the whole body to destroy the bone marrow cells. This is called Total Body Irradiation (TBI).

Biological Therapy

Biological therapy uses your immune system to fight cancer or to help control side effects of other cancer treatments. Natural body substances or drugs made from natural body substances are used to boost the body's own defenses against illness.

There are two forms of biological therapy used to treat leukemia: monoclonal antibodies and interferon alfa. Both are given by injection. Monoclonal antibodies are sometimes used to treat people with CLL, ALL and AML. Interferon Alfa may also be used for CML (although people with CML are more likely to be treated with cancer growth inhibitors). Side effects of these drugs often cause flu-like symptoms, such as chills, fever, muscle aches, weakness and nausea. More serious side effects are rare. Some people may have a severe skin rash, breathing problems or low blood pressure.

The side effects usually disappear once treatment is finished. Be sure to discuss the risks and benefits of this treatment with your healthcare team.

Targeted Therapy

Targeted therapies use drugs that attack specific types of cancer cells without damaging healthy cells. Cancer growth inhibitors are a type of targeted therapy. They interfere with a cancer cell's ability to grow and divide. Some cancer growth inhibitors can be used to treat people with CML, ALL and AML. These drugs are taken by pill or capsule. Side effects are most likely to occur during the first few months of treatment. Side effects may get better as treatment continues.

Watchful Waiting

Watchful waiting is a treatment option that may be offered to people with CLL who have no symptoms. Watchful waiting means your healthcare team will watch the leukemia closely. You will visit your doctor regularly for a physical examination. Other tests may be done from time to time. Active treatment, such as chemotherapy or radiation, may be considered if signs of leukemia appear or change. Once the symptoms are controlled, you and your doctor may decide to return to a watchful waiting program.

Surgery

Surgery is rarely used to treat chronic leukemia, but some people with chronic leukemia will need to have their spleen removed. The spleen is located in the abdomen and is adjacent to the stomach, left kidney and colon. In chronic leukemia, the spleen may become enlarged. An enlarged spleen can cause discomfort and pain. It also destroys red blood cells and platelets, causing anemia and bleeding. If chemotherapy or radiation doesn't shrink the spleen, then it may be removed by surgery. Surgery to remove the spleen is called splenectomy. It is done under general anesthetic (you will be unconscious).

After surgery you may have some pain or bleeding. These side effects are temporary, and can usually be controlled. Without a spleen, you may be more at risk of infections.

Side Effects of Treatment

Relieving pain

Try to learn more about ways to manage and control your pain and discomfort, side effects and stress when you are having cancer treatments by asking your treating doctor.

Coping with Cancer

Everyone's cancer experience is different. Whether you are newly diagnosed, in active treatment, or are caring for someone with cancer, you will probably need to deal with many day-to-day issues, make tough decisions, and cope with a range of emotions.

In the last decade, there have been several advancements in the treatment of leukemia which has led to many cases of this disease being treated successfully.

If you have any questions, please speak to your treating physician or health care provider.

الآثار الجانبية للعلاج

تخفيف الألم

يجب أن تتعلم المزيد عن الطرق التي تتمكن بها من إدارة الألم والسيطرة عليه وعدم الارتياح والآثار الجانبية والضغط عندما تتعاطى العلاج من السرطان.

التكيف مع السرطان

تختلف تجربة السرطان بالنسبة لكل شخص. سواء تم تشخيص حالتك، أخيراً، أو كنت في مرحلة العلاج النشط أو كنت تهتم بشخص آخر مصاب بالسرطان، من المحتمل أنك سوف تحتاج للتعامل مع الكثير من المسائل اليومية واتخاذ قرارات صعبة والتوافق مع مجموعة من العواطف والمشاعر.

لقد تحقق خلال العقود الأخيرة الكثير من التقدم في علاج سرطانات الدم (اللوكيميا) بحيث أصبحت قابلة للعلاج بل قابلة للشفاء في كثير من الأحوال ولذلك أصبح الخوف من عواقب هذا المرض لا تبرره الحقائق العلمية الراهنة التي أوصلت إلى هذا التقدم المدهش في علاج هذه الأمراض.

وفي حال وجود أي أسئلة أو استفسارات لا تتردد في مناقشتها مع طبيبك أو الفريق المعالج لك.

نتمنى لكم الشفاء العاجل
We wish you a quick recovery