

Blood Cancer

Acute Lymphoblastic Leukemia

Definitions

Acute: Developing quickly and requiring urgent care.

Bone marrow: The spongy material that fills the bone cavity; the source of red blood cells, platelets, and many white blood cells.

Lymphoblastic: Referring to lymphoblasts, an immature lymphocyte, which is a type of white blood cell.

Malignant: Cancerous and capable of spreading.

Pathologist: A physician who examines tissues and fluids to diagnose disease in order to assist in making treatment decisions.

What is acute lymphoblastic leukemia (ALL)?

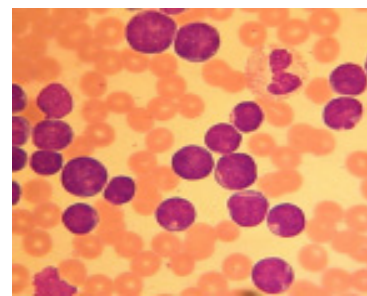
This type of cancer begins in the blood and bone marrow or mediastinum. The abnormal cells interfere with the production of normal white cells that protect from infection and prevent bleeding. Nearly 4,000 cases of ALL occur each year in the United States. Most children who are treated are cured. While adults have a lower cure rate, they too can be successfully treated.

Who is most likely to have ALL?

ALL is the most common leukemia among children. About 60 percent of those diagnosed with ALL are under the age of 20; the disease is most common between the ages of 2 and 5 and may be more common among boys.

Among adults, those over the age of 70 have the highest risk. Other risk factors include having previously received chemotherapy or radiation therapy and having a brother or sister with ALL. Genetic disorders such as Down syndrome and exposure to radiation also increase risk.

Symptoms include fever; fatigue or weakness; easy bruising or bleeding; shortness of breath; weight or appetite loss; bone or stomach pain; and painless lumps in the neck, underarm or groin. These symptoms may be caused by conditions other than leukemia—that's why seeing a physician for examination and diagnosis is important.



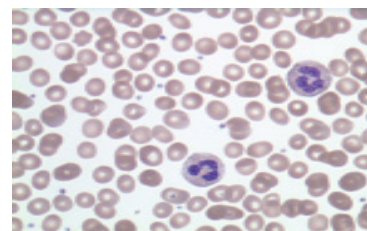
ALL is characterized by a proliferation of immature cells known as lymphoblasts.

What characterizes ALL?

ALL is characterized by a proliferation of immature lymphoid cells, known as lymphoblasts, which do not mature into normal lymphocytes. Mature lymphocytes help the body fight infection. Instead, the body manufactures large numbers of lymphoblasts that crowd out healthy white and red blood cells and platelets, making the body less able to fight infection. The overproduction of lymphoblasts results in what is known as leukemia.

How does the pathologist make a diagnosis?

Your primary care physician conducts a physical exam and medical history. Depending on your symptoms, your physician may order tests including a **complete blood count** and a **peripheral blood smear** so that the pathologist can measure the number of red blood cells, white blood cells and platelets and check for the presence of abnormal cells.



Normal blood cells.

What else does the pathologist look for?

If leukemia is suspected, a physician (often a specialist called a hematologist) will obtain a **bone marrow aspirate and biopsy** by inserting a needle into your hipbone or breastbone. The pathologist examines this specimen under a microscope, looking for abnormal cells. **Cytogenetic analysis** may also be performed on the bone marrow specimen to look for chromosomal abnormalities associated with leukemia. Another diagnostic test the pathologist conducts is **immunophenotyping**. During this test, the pathologist looks at the specimen to see if the leukemia originates from B or T lymphocytes. Making this distinction helps physicians to recommend the best treatment. About 85 percent of ALL derives from B-lymphocytes. Known as precursor B ALL, it is a lower-risk type of ALL than ALL originating from T lymphocytes.

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What kinds of questions should I ask my doctors?

Ask any question you want. There are no questions you should be reluctant to ask. Here are a few to consider:

- Please describe the type of cancer I have and what treatment options are available.
- What stage is the cancer in?
- What are the chances for full remission?
- What treatment options do you recommend? Why do you believe these are the best treatments?
- What are the pros and cons of these treatment options?
- What are the side effects?
- Should I receive a second opinion?
- Is your medical team experienced in treating the type of cancer I have?

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To determine whether or not the cancer has spread, your physician may order a **chest x-ray**, **lumbar puncture** (which collects fluid from the spinal column), **ultrasound or CT (computed tomography) scan**.

How do doctors determine what surgery or treatment will be necessary?

The pathologist consults with your primary care physician after reviewing the test results. Together, using their combined experience and knowledge, they determine treatment options most appropriate for your condition. Important factors influencing treatment decisions include the age of the patient and whether the cancer has been treated before. The disease is then classified as **untreated, in remission or recurrent**.

What kinds of treatments are available for ALL?

The treatment of ALL is done in multiple phases. The first phase kills the leukemia cells in the blood and puts the cancer into remission. The second phase kills any remaining cancer, with the purpose of preventing relapse.

During each phase, a treatment called **central nervous system (CNS) sanctuary therapy** is usually given. This treatment directs an injections of **chemotherapy** drugs directly into the membrane surrounding the spinal cord to reach leukemia cells that standard chemotherapy cannot reach. Chemotherapy drugs also are given to stop the growth of cancer cells throughout the body or can be localized to attack cancer in a particular area of the body.

Chemotherapy with stem cell transplantation allows your physician to provide more aggressive cancer-fighting treatment—higher-than-usual doses of chemotherapy in rare refractory cases. This aggressive hospital treatment kills both leukemia cells and normal blood cells in the bone marrow with chemotherapy. After these cells have been destroyed, you receive healthy stem cells transplanted through a flexible tube placed in a large vein in your neck or chest area. New, healthy blood cells develop from the transplanted stem cells, which usually come from a healthy part of your body (autologous) or from a donor (allogeneic).

Clinical trials of new treatments for ALL may be found at www.cancer.gov/clinicaltrials. These treatments are highly experimental in nature but may be a potential option for advanced cancers. Some trials may involve biologic therapy, which uses the natural defenses of the immune system to fight cancer.

For more information, go to: www.cancer.gov (National Cancer Institute), www.leukemia-lymphoma.org (Leukemia and Lymphoma Society) or www.mayoclinic.com (Mayo Clinic). Type the keywords **acute lymphoblastic leukemia** or **leukemia** into the search box.

Healing begins with the pathologist's diagnosis. Pathologists are core members of your patient care team.