



[Home](#) → [Health Topics](#) → Acute Lymphocytic Leukemia

URL of this page: <https://medlineplus.gov/acuteleukemia.html>

# Acute Lymphocytic Leukemia

**Also called:** Acute lymphoblastic leukemia, ALL

## What is leukemia?

Leukemia [<https://medlineplus.gov/leukemia.html>] is a term for cancers of the blood cells. Leukemia starts in blood-forming tissues such as the bone marrow. Your bone marrow makes the cells which will develop into white blood cells, red blood cells, and platelets. Each type of cell has a different job:

- White blood cells help your body fight infection
- Red blood cells deliver oxygen from your lungs to your tissues and organs
- Platelets [<https://medlineplus.gov/plateletdisorders.html>] help form clots to stop bleeding

When you have leukemia, your bone marrow makes large numbers of abnormal cells. This problem most often happens with white blood cells. These abnormal cells build up in your bone marrow and blood. They crowd out the healthy blood cells and make it hard for your cells and blood to do their work.

## What is acute lymphocytic leukemia (ALL)?

Acute lymphocytic leukemia is a type of acute leukemia. It's also called ALL and acute lymphoblastic leukemia. "Acute" means that it usually gets worse quickly if it's not treated. ALL is the most common type of cancer in children [<https://medlineplus.gov/childhoodleukemia.html>]. It can also affect adults.

In ALL, the bone marrow makes too many lymphocytes, a type of white blood cell. These cells normally help your body fight infection. But in ALL, they are abnormal and cannot fight infection very well. They also crowd out the healthy cells, which can lead to infection, anemia [<https://medlineplus.gov/anemia.html>], and easy bleeding. These abnormal cells can also spread to other parts of the body, including the brain and spinal cord.

## What causes acute lymphocytic leukemia (ALL)?

ALL happens when there are changes in the genetic material (DNA) in bone marrow cells. The cause of these genetic changes is unknown. However, there are certain factors that raise your risk of ALL.

## Who is at risk for acute lymphocytic leukemia (ALL)?

The factors that raise your risk of ALL include:

- Being male
- Being white
- Being over age 70
- Having had chemotherapy [<https://medlineplus.gov/cancerchemotherapy.html>] or radiation therapy [<https://medlineplus.gov/radiationtherapy.html>]
- Having been exposed to high levels of radiation [<https://medlineplus.gov/radiationexposure.html>]
- Having certain genetic disorders [<https://medlineplus.gov/geneticdisorders.html>], such as Down syndrome [<https://medlineplus.gov/downsyndrome.html>]

## What are the symptoms of acute lymphocytic leukemia (ALL)?

The signs and symptoms of ALL include:

- Weakness or feeling tired [<https://medlineplus.gov/fatigue.html>]
- Fever [<https://medlineplus.gov/fever.html>] or night sweats
- Easy bruising [<https://medlineplus.gov/bruises.html>] or bleeding [<https://medlineplus.gov/bleedingdisorders.html>]
- Petechiae, which are tiny red dots under the skin. They are caused by bleeding.
- Shortness of breath [<https://medlineplus.gov/breathingproblems.html>]
- Weight loss or loss of appetite
- Pain in the bones or stomach
- Pain or feeling of fullness below the ribs
- Swollen lymph nodes - you may notice them as painless lumps in the neck, underarm, stomach, or groin
- Having had many infections

## How is acute lymphocytic leukemia (ALL) diagnosed?

Your health care provider may use many tools to diagnose ALL and figure out which subtype you have:

- A physical exam
- A medical history
- Blood tests, such as
  - Complete blood count (CBC) with differential [<https://medlineplus.gov/lab-tests/complete-blood-count-cbc/>]
  - Blood chemistry tests such as a basic metabolic panel (BMP) [<https://medlineplus.gov/lab-tests/basic-metabolic-panel-bmp/>] , comprehensive metabolic panel (CMP) [<https://medlineplus.gov/lab-tests/comprehensive-metabolic-panel-cmp/>] , kidney function tests [<https://medlineplus.gov/kidneytests.html>] , liver function tests [<https://medlineplus.gov/lab-tests/liver-function-tests/>] , and electrolyte panel [<https://medlineplus.gov/lab-tests/electrolyte-panel/>]
  - Blood smear [<https://medlineplus.gov/lab-tests/blood-smear/>]
- Bone marrow tests [<https://medlineplus.gov/lab-tests/bone-marrow-tests/>] . There are two main types - bone marrow aspiration and bone marrow biopsy. Both tests involve removing a sample of bone marrow and bone. The samples are sent to a lab for testing.
- Genetic tests [<https://medlineplus.gov/geneticstesting.html>] to look for gene and chromosome changes

If you are diagnosed with ALL, you may have additional tests to see whether the cancer has spread. These include imaging tests [<https://medlineplus.gov/diagnosticimaging.html>] and a lumbar puncture [<https://medlineplus.gov/lab-tests/cerebrospinal-fluid-csf-analysis/>] , which is a procedure to collect and test cerebrospinal fluid (CSF).

## What are the treatments for acute lymphocytic leukemia (ALL)?

Treatments for ALL include:

- Chemotherapy
- Radiation therapy
- Chemotherapy with stem cell transplant [<https://medlineplus.gov/stemcells.html>]
- Targeted therapy, which uses drugs or other substances that attack specific cancer cells with less harm to normal cells

Treatment is usually done in two phases:


- The goal of the first phase is to kill the leukemia cells in the blood and bone marrow. This treatment puts the leukemia into remission. Remission means that the signs and symptoms of cancer are reduced or have disappeared.
- The second phase is known as post-remission therapy. Its goal is to prevent a relapse (return) of the cancer. It involves killing any remaining leukemia cells that may not be active but could begin to regrow.

Treatment during both phases also usually includes central nervous system (CNS) prophylaxis therapy. This therapy helps prevent the spread of leukemia cells to the brain and spinal cord. It may be high dose chemotherapy or chemotherapy



injected into the spinal cord. It also sometimes includes radiation therapy.

*NIH: National Cancer Institute*

## Start Here

- Acute Lymphoblastic Leukemia (ALL) [<https://www.nmdp.org/patients/understanding-transplant/diseases-treated-by-transplant/acute-lymphoblastic-leukemia>] (National Marrow Donor Program)
- Acute Lymphocytic Leukemia [<https://www.mayoclinic.org/diseases-conditions/acute-lymphocytic-leukemia/symptoms-causes/syc-20369077?p=1>] (Mayo Foundation for Medical Education and Research)
- General Information about Adult Acute Lymphoblastic Leukemia [[https://www.cancer.gov/types/leukemia/patient/adult-all-treatment-pdq#\\_1](https://www.cancer.gov/types/leukemia/patient/adult-all-treatment-pdq#_1)]  (National Cancer Institute)  
Also in Spanish [[https://www.cancer.gov/espanol/tipos/leucemia/paciente/tratamiento-lla-adultos-pdq#\\_1](https://www.cancer.gov/espanol/tipos/leucemia/paciente/tratamiento-lla-adultos-pdq#_1)]
- What Is Acute Lymphocytic Leukemia (ALL)? [<https://www.cancer.org/cancer/types/acute-lymphocytic-leukemia/about/what-is-all.html>] (American Cancer Society)  
Also in Spanish [<https://www.cancer.org/es/cancer/tipos/leucemia-linfocitica-aguda/acerca/que-es-leucemia-linfocitica-aguda.html>]


## Diagnosis and Tests

- Acute Lymphocytic Leukemia (ALL) Subtypes and Prognostic Factors [<https://www.cancer.org/cancer/types/acute-lymphocytic-leukemia/detection-diagnosis-staging/how-classified.html>] (American Cancer Society)  
Also in Spanish [<https://www.cancer.org/es/cancer/tipos/leucemia-linfocitica-aguda/deteccion-diagnostico-clasificacion-por-etapas/como-se-clasifica.html>]
- BCR ABL Genetic Test [<https://medlineplus.gov/lab-tests/bcr-abl-genetic-test/>]  (National Library of Medicine)  
Also in Spanish [<https://medlineplus.gov/spanish/pruebas-de-laboratorio/prueba-genetica-bcr-abl/>]
- Blood Tests [<https://www.nhlbi.nih.gov/health/blood-tests>]  (National Heart, Lung, and Blood Institute)  
Also in Spanish [<https://www.nhlbi.nih.gov/es/salud/analisis-de-sangre>]
- Can Acute Lymphocytic Leukemia (ALL) Be Found Early? [<https://www.cancer.org/cancer/types/acute-lymphocytic-leukemia/detection-diagnosis-staging/detection.html>] (American Cancer Society)  
Also in Spanish [<https://www.cancer.org/es/cancer/tipos/leucemia-linfocitica-aguda/deteccion-diagnostico-clasificacion-por-etapas/deteccion.html>]
- Lab and Imaging Tests [<https://www.lls.org/treatment/lab-and-imaging-tests>] (Leukemia & Lymphoma Society)  
Also in Spanish [[https://www.lls.org/sites/default/files/2021-05/PS41S\\_SP\\_Understanding\\_Labs\\_FINAL\\_2020.pdf](https://www.lls.org/sites/default/files/2021-05/PS41S_SP_Understanding_Labs_FINAL_2020.pdf)]
- Stages of Adult Acute Lymphoblastic Leukemia [[https://www.cancer.gov/types/leukemia/patient/adult-all-treatment-pdq#\\_123](https://www.cancer.gov/types/leukemia/patient/adult-all-treatment-pdq#_123)]  (National Cancer Institute)  
Also in Spanish [[https://www.cancer.gov/espanol/tipos/leucemia/paciente/tratamiento-lla-adultos-pdq#\\_70](https://www.cancer.gov/espanol/tipos/leucemia/paciente/tratamiento-lla-adultos-pdq#_70)]
- Tests for Acute Lymphocytic Leukemia (ALL) [<https://www.cancer.org/cancer/types/acute-lymphocytic-leukemia/detection-diagnosis-staging/how-diagnosed.html>] (American Cancer Society)  
Also in Spanish [<https://www.cancer.org/es/cancer/tipos/leucemia-linfocitica-aguda/deteccion-diagnostico-clasificacion-por-etapas/como-se-diagnostica.html>]

## Prevention and Risk Factors

- Risk Factors for Acute Lymphocytic Leukemia [<https://www.cancer.org/cancer/types/acute-lymphocytic-leukemia/causes-risks-prevention/risk-factors.html>] (American Cancer Society)  
Also in Spanish [<https://www.cancer.org/es/cancer/tipos/leucemia-linfocitica-aguda/causas-riesgos-prevencion/factores-de-riesgo.html>]


## Treatments and Therapies

- Blood Transfusion [<https://www.lls.org/treatment/types-treatment/blood-transfusion>] (Leukemia & Lymphoma Society)
- Bone Marrow Transplantation: MedlinePlus Health Topic [<https://medlineplus.gov/bonemarrowtransplantation.html>]  (National Library of Medicine)  
Also in Spanish [<https://medlineplus.gov/spanish/bonemarrowtransplantation.html>]
- Immunotherapy [<https://www.lls.org/treatment/types-treatment/immunotherapy>] (Leukemia & Lymphoma Society)



Also in Spanish [[https://www.lls.org/sites/default/files/file\\_assets/FS9S\\_SP\\_Immunotherapy2020.pdf](https://www.lls.org/sites/default/files/file_assets/FS9S_SP_Immunotherapy2020.pdf)]

- Integrative Medicine and Complementary and Alternative Therapies [<https://www.lls.org/treatment/integrative-medicine-and-complementary-therapies>] (Leukemia & Lymphoma Society)  
Also in Spanish [[https://www.lls.org/sites/default/files/2022-05/FS8S\\_Integrative\\_Medicine\\_Complementary\\_Therapies\\_04.22\\_Spanish.pdf](https://www.lls.org/sites/default/files/2022-05/FS8S_Integrative_Medicine_Complementary_Therapies_04.22_Spanish.pdf)]
- Targeted Therapy for Acute Lymphocytic Leukemia (ALL) [<https://www.cancer.org/cancer/types/acute-lymphocytic-leukemia/treating/targeted-therapy.html>] (American Cancer Society)  
Also in Spanish [<https://www.cancer.org/es/cancer/tipos/leucemia-linfocitica-aguda/tratamiento/terapia-dirigida.html>]
- Treatment of Adult Acute Lymphoblastic Leukemia in Remission [[https://www.cancer.gov/types/leukemia/patient/adult-all-treatment-pdq#\\_217](https://www.cancer.gov/types/leukemia/patient/adult-all-treatment-pdq#_217)]  (National Cancer Institute)  
Also in Spanish [[https://www.cancer.gov/espanol/tipos/leucemia/paciente/tratamiento-lla-adultos-pdq#\\_217](https://www.cancer.gov/espanol/tipos/leucemia/paciente/tratamiento-lla-adultos-pdq#_217)]
- Treatment of Recurrent Adult Acute Lymphoblastic Leukemia [[https://www.cancer.gov/types/leukemia/patient/adult-all-treatment-pdq#\\_221](https://www.cancer.gov/types/leukemia/patient/adult-all-treatment-pdq#_221)]  (National Cancer Institute)  
Also in Spanish [[https://www.cancer.gov/espanol/tipos/leucemia/paciente/tratamiento-lla-adultos-pdq#\\_221](https://www.cancer.gov/espanol/tipos/leucemia/paciente/tratamiento-lla-adultos-pdq#_221)]
- Treatment of Untreated Adult Acute Lymphoblastic Leukemia [[https://www.cancer.gov/types/leukemia/patient/adult-all-treatment-pdq#\\_213](https://www.cancer.gov/types/leukemia/patient/adult-all-treatment-pdq#_213)]  (National Cancer Institute)  
Also in Spanish [[https://www.cancer.gov/espanol/tipos/leucemia/paciente/tratamiento-lla-adultos-pdq#\\_213](https://www.cancer.gov/espanol/tipos/leucemia/paciente/tratamiento-lla-adultos-pdq#_213)]
- Treatment Option Overview (Adult Acute Lymphoblastic Leukemia) [[https://www.cancer.gov/types/leukemia/patient/adult-all-treatment-pdq#\\_34](https://www.cancer.gov/types/leukemia/patient/adult-all-treatment-pdq#_34)]  (National Cancer Institute)  
Also in Spanish [[https://www.cancer.gov/espanol/tipos/leucemia/paciente/tratamiento-lla-adultos-pdq#\\_86](https://www.cancer.gov/espanol/tipos/leucemia/paciente/tratamiento-lla-adultos-pdq#_86)]


## Related Issues

- Electromagnetic Fields and Cancer [<https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet>]  (National Cancer Institute)  
Also in Spanish [<https://www.cancer.gov/espanol/cancer/causas-prevencion/riesgo/radiacion/hoja-informativa-campos-electromagneticos>]

## Statistics and Research

- Advances in Leukemia Research [<https://www.cancer.gov/types/leukemia/research>]  (National Cancer Institute)
- Cancer Statistics: Acute Lymphocytic Leukemia (ALL) [<https://seer.cancer.gov/statfacts/html/aly1.html>]  (National Cancer Institute)
- Key Statistics for Acute Lymphocytic Leukemia (ALL) [<https://www.cancer.org/cancer/types/acute-lymphocytic-leukemia/about/key-statistics.html>] (American Cancer Society)  
Also in Spanish [<https://www.cancer.org/es/cancer/tipos/leucemia-linfocitica-aguda/acerca/estadisticas-clave.html>]
- What's New in Adult Acute Lymphocytic Leukemia (ALL) Research? [<https://www.cancer.org/cancer/types/acute-lymphocytic-leukemia/about/new-research.html>] (American Cancer Society)  
Also in Spanish [<https://www.cancer.org/es/cancer/tipos/leucemia-linfocitica-aguda/acerca/nuevas-investigaciones.html>]

## Clinical Trials

- ClinicalTrials.gov: Leukemia, Lymphoid [<https://clinicaltrials.gov/search?cond=%22Leukemia,+Lymphoid%22&aggFilters=status:not%20rec>]  (National Institutes of Health)
- Types of Treatment: Clinical Trials [<https://www.lls.org/treatment/types-treatment/clinical-trials>] (Leukemia & Lymphoma Society)

## Journal Articles

References and abstracts from MEDLINE/PubMed (National Library of Medicine)


- Article: Unusual Clinical Presentation of B-Cell Prolymphocytic Leukemia Cases as Splenic Marginal... [<https://www.ncbi.nlm.nih.gov/pubmed/40750426>]
- Article: Clinical Manifestations and Ophthalmic Outcomes of Leukemic Retinopathy and Optic Neuropathy... [<https://www.ncbi.nlm.nih.gov/pubmed/40747974>]
- Article: Cross-Sectional Study: Associations of A20 and Cezanne with Leukocyte Accumulation in... [<https://www.ncbi.nlm.nih.gov/pubmed/40731796>]

Acute Lymphocytic Leukemia -- see more articles [<https://pubmed.ncbi.nlm.nih.gov/?term=%22Leukemia%2C+Lymphoid%22%5Bmajr%5D+AND+adult+%5Bmh%5D+AND+humans%5Bmh%5D+AND+english%5Bla%5D+AND+%22last+2+Years%22+%5Bedat%5D+NOT+%28letter%5Bpt%5D+OR+case+reports%5Bpt%5D+OR+editorial%5Bpt%5D+OR+comment%5Bpt%5D%29>]

## Find an Expert

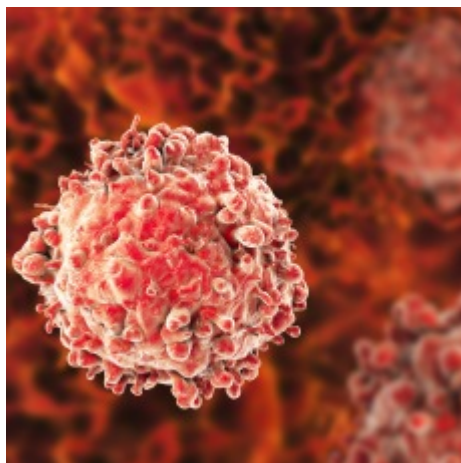
- American Cancer Society [<https://www.cancer.org/>]
- Choosing a Cancer Doctor [<https://www.cancer.org/cancer/managing-cancer/finding-care/where-to-find-cancer-care/choosing-a-cancer-doctor.html>] (American Cancer Society)  
Also in Spanish [<https://www.cancer.org/es/cancer/como-sobrellevar-el-cancer/encontrar-tratamiento/como-elegir-un-medico-y-un-hospital/como-seleccionar-a-un-medico.html>]
- Leukemia & Lymphoma Society [<https://www.lls.org/>]  
Also in Spanish [<https://www.lls.org/node/1690491>]
- National Cancer Institute [<https://www.cancer.gov/>]   
Also in Spanish [<https://www.cancer.gov/espanol>]
- NCI - Designated Cancer Centers [<https://www.cancer.gov/research/infrastructure/cancer-centers>]  
 (National Cancer Institute)  
Also in Spanish [<https://www.cancer.gov/espanol/investigacion/infraestructura/centros-oncologicos>]

## Children

- Childhood Leukemia: MedlinePlus Health Topic [<https://medlineplus.gov/childhoodleukemia.html>]  
 (National Library of Medicine)  
Also in Spanish [<https://medlineplus.gov/spanish/childhoodleukemia.html>]

## Patient Handouts

- Acute lymphocytic leukemia (ALL) [<https://medlineplus.gov/ency/article/000541.htm>] (Medical Encyclopedia)  
Also in Spanish [<https://medlineplus.gov/spanish/ency/article/000541.htm>]
- After chemotherapy - discharge [<https://medlineplus.gov/ency/patientinstructions/000012.htm>] (Medical Encyclopedia)  
Also in Spanish [<https://medlineplus.gov/spanish/ency/patientinstructions/000012.htm>]
- Bone marrow transplant [<https://medlineplus.gov/ency/article/003009.htm>] (Medical Encyclopedia)  
Also in Spanish [<https://medlineplus.gov/spanish/ency/article/003009.htm>]
- Bone marrow transplant - discharge [<https://medlineplus.gov/ency/patientinstructions/000010.htm>] (Medical Encyclopedia)  
Also in Spanish [<https://medlineplus.gov/spanish/ency/patientinstructions/000010.htm>]



## MEDICAL ENCYCLOPEDIA

Acute lymphocytic leukemia (ALL) [<https://medlineplus.gov/ency/article/000541.htm>]

After chemotherapy - discharge [<https://medlineplus.gov/ency/patientinstructions/000012.htm>]

B and T cell screen [<https://medlineplus.gov/ency/article/003329.htm>]

Bone marrow biopsy [<https://medlineplus.gov/ency/article/003934.htm>]

Bone marrow transplant [<https://medlineplus.gov/ency/article/003009.htm>]

Bone marrow transplant - discharge [<https://medlineplus.gov/ency/patientinstructions/000010.htm>]

Bone-marrow transplant - series [[https://medlineplus.gov/ency/presentations/100112\\_1.htm](https://medlineplus.gov/ency/presentations/100112_1.htm)]

Cryoglobulins [<https://medlineplus.gov/ency/article/003555.htm>]

Fibrinopeptide A blood test [<https://medlineplus.gov/ency/article/003373.htm>]

T-cell count [<https://medlineplus.gov/ency/article/003516.htm>]

## Related Health Topics

Acute Myeloid Leukemia [<https://medlineplus.gov/acute-myeloid-leukemia.html>]

Childhood Leukemia [<https://medlineplus.gov/childhood-leukemia.html>]

Chronic Lymphocytic Leukemia [<https://medlineplus.gov/chronic-lymphocytic-leukemia.html>]

Chronic Myeloid Leukemia [<https://medlineplus.gov/chronic-myeloid-leukemia.html>]

Leukemia [<https://medlineplus.gov/leukemia.html>]

## National Institutes of Health

The primary NIH organization for research on *Acute Lymphocytic Leukemia* is the National Cancer Institute [<http://www.cancer.gov/>]

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