Illustrations

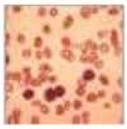

Bone marrow aspiration


Acute lymphocytic leukemia - photomicrograph


Acute myelocytic leukemia - microscopic view


Acute myelomonocytic leukemia - microscopic view


Auer rods


Chronic lymphocytic leukemia - microscopic view


Chronic myelocytic leukemia - microscopic view


Chronic myelocytic leukemia


Chronic myelocytic leukemia


Cryoglobulinemia - of the fingers


Antibodies

Alternative names *Return to top*

ALL; Acute childhood leukemia; Cancer - acute childhood leukemia (ALL)

Definition *Return to top*

Acute lymphocytic leukemia is a progressive, malignant disease characterized by large numbers of immature white blood cells that resemble lymphoblasts. These cells can be found in the blood, the bone marrow, the lymph nodes, the spleen, and other organs.

Causes, incidence, and risk factors *Return to top*

Acute lymphocytic leukemia (ALL) is responsible for 80% of the acute leukemias of childhood, with the peak incidence occurring between ages 3 and 7. ALL also occurs in adults, where it comprises 20% of all adult leukemias.

In acute leukemia, the malignant cell loses its ability to mature and specialize (differentiate) its function. These cells multiply rapidly and replace the normal cells. Bone marrow failure occurs as malignant cells replace normal bone marrow elements. The person becomes susceptible to bleeding and infection because the normal blood cells are reduced in number.

Most cases seem to have no apparent cause. However, radiation, some toxins such as benzene, and some chemotherapy agents are thought to contribute to the induction of leukemia. Abnormalities in chromosomes may also play a role in the development of acute leukemia.

Risk factors for acute leukemia include Down syndrome, a sibling with leukemia, and exposure to radiation, chemicals, and drugs. The incidence is 6 out of 100,000 people.

Symptoms *Return to top*

- Prolonged or excessive bleeding, bruising easily
- Bleeding gums
- Nosebleeds
- Bleeding into the skin
- Menstrual periods, abnormal
- Skin rash or lesion
    - Pinpoint red spots (petechiae)
    - Bruises (ecchymoses)
- Paleness
- Fatigue
- Infection
- Sternal tenderness
- Bone pain or tenderness
    - Breastbone (sternum)
- Joint pain
    - Hip pain
    - Knee pain
    - Ankle pain
    - Foot pain over small joints of the foot
    - Shoulder pain
    - Elbow pain
    - Wrist pain
    - Hand pain over small joints of the hand
- Lymphadenopathy (enlarged glands)
- Unintentional weight loss
- Fever
- Gums, swollen
- Shortness of breath aggravated by exercise
- Sensations of feeling the heart beat (palpitations) with an irregular pattern

Signs and tests *Return to top*

Physical examination shows enlarged liver and spleen, bruising (ecchymosis) and evidence of bleeding (petechiae, purpura, and so on).

- The WBC count is abnormal.
- A CBC shows anemia and low platelet count.
- A bone marrow aspiration shows an increased number of cells (hypercellularity) and an increase in lymphoblasts.

ALL may also alter the results of the following tests:

- T (thymus derived) lymphocyte count
- Cell surface antigen studies (B-cell, leukemia/lymphoma panel)
- White blood cell differential

Classification of ALL now depends on a number of specific sophisticated tests, such as immunophenotyping, karyotyping, and terminal deoxynucleotidyltransferase (TdT) activity. The combined results of these tests allows pinpoint molecular diagnosis, which helps guide the treatment decisions, and clarify the likely prognosis.

For instance, the cells of some leukemias contain chromosomal abnormalities. Those with the Philadelphia chromosome or with the t(4;11) translocation would tend to have a poor prognosis, thus intensive treatment and an early bone marrow transplant might be recommended preemptively. Other genes (such as the TEL/AML1 rearrangement) can indicate a very favorable prognosis.

Treatment *Return to top*

The goal of treatment is remission of the cancer. A remission is achieved when the peripheral blood counts and the bone marrow are normal.

Acute lymphocytic leukemia is treated with a combination of anti-cancer drugs (chemotherapy). A hospitalization of 3 to 6 weeks may be necessary for initial (induction) chemotherapy, however, subsequent chemotherapy sessions may be administered on an outpatient basis. Additionally, isolation procedures may be necessary if the lymphocyte count is very low to prevent exposure to infectious agents.

Chemotherapy typically consists of a combination of 3 to 8 medications which may include: prednisone, vincristine, methotrexate, 6-mercaptopurine, and cyclophosphamide. It may also be necessary to administer blood products (e.g., packed red blood cells, platelets) to correct the anemia and low platelet count. Antibiotic therapy may be required to treat any secondary infections that develop.

After remission is achieved, chemotherapy or radiation therapy is administered in the spinal column to treat any leukemic cells that may have invaded the spinal fluid.

Subsequent therapy is directed at preventing relapse and consists of maintenance chemotherapy for up to one year . A bone marrow transplant after high-dose chemotherapy is a treatment option for cases that relapse or do not respond to other treatments.

Support Groups *Return to top*

The stress of illness can often be helped by joining a support group where members share common experiences and problems. See cancer - support group and leukemia - support group.

Expectations (prognosis) *Return to top*

The probable outcome for children is better than for adults, with an 80% cure rate. Eighty percent of adults achieve complete remission, with 30% to 50% being cured. Without treatment, the life expectancy is about 3 months.

Complications *Return to top*

- DIC (disseminated intravascular coagulation)
- Relapse of ALL
- Severe infection