

Leukemia

Leukemia is a group of related diseases resulting in rapid growth of abnormal cells in the bone marrow, where different types of blood cells are made. The various leukemias are the most common cancers in children. Examination of a bone marrow sample is needed to make the diagnosis and to find out exactly what type of leukemia your child has. With modern treatments, many types of leukemia can be cured.

What is leukemia?

Leukemia is a group of diseases in which the body's bone marrow makes too many of an abnormal type of white blood cell. The bone marrow is where many types of cells are made, including red blood cells (which have hemoglobin to carry oxygen), platelets (which help stop bleeding), and white blood cells. The white blood cells are important to the immune system because they help to fight infections.

In leukemia, one abnormal type of white blood cells is produced more rapidly. This interferes with the bone marrow's ability to make other cells, including red blood cells, platelets, and normal white blood cells that fight infection. The most common form of childhood leukemia is acute lymphoblastic leukemia (ALL). The symptoms of leukemia may seem relatively mild at first, but the disease can progress rapidly. Eventually, leukemia lessens your child's ability to fight off infections.

It's devastating to hear that a child has any form of cancer, and treatment for leukemia will be a difficult time for your family. A specialist in cancer treatment (oncologist) will perform further tests and recommend the best treatment for your child. Your child's treatment team will probably also include other health care professionals, such as nurses and a psychologist. Your child will receive chemotherapy and other treatments, like radiation, if needed. Depending on factors such as the type of leukemia, the age of the patient, and the number of leukemia cells in the blood, most children with leukemia are cured.

What does it look like?

The symptoms of leukemia vary, depending on the type of leukemia. The early symptoms are often relatively mild. Symptoms can develop rapidly, although sometimes they occur gradually over several months:

- Weight loss.
- Fatigue (low energy).
- Low-grade fever.
- Bone or joint pain.

- Pale appearance, usually caused by anemia, that is (low numbers of red blood cells or hemoglobin levels).
- Easy bruising or bleeding caused by low levels of platelets in the blood.
- Infections, such as sores in the mouth and sometimes more serious infections such as pneumonia.

Many other symptoms are possible, depending on the type of leukemia and how long it has been present.

What are some possible complications of leukemia?

- Problems with bleeding or infections.
- Like most cancers, leukemia can be fatal without effective treatment. Even if initial treatment is successful, there is a risk that the leukemia will come back.
- Treatments for leukemia have many possible side effects.

What puts your child at risk of leukemia?

Many risk factors for leukemia in children have been identified, including:

- Exposure to radiation.
- Exposure to various drugs.
- Genetics—in twins, if one twin develops leukemia, the other will be at higher risk.
- Various genetic diseases, including Down syndrome.
- Occurs most frequently in children ages 2 to 6 years and is slightly more common in boys than girls.

How is leukemia diagnosed and treated?

Often simple blood tests show typical abnormalities of leukemia and problems with your child's bone marrow. However, to diagnose leukemia, the doctor needs to obtain and examine a sample of your child's bone marrow. This is done through a relatively minor surgical procedure.

Once your child has been diagnosed with leukemia, his or her care is managed by a specialist, such as an oncologist (cancer specialist). Doctors and nurses with various types of skills and experience also may be involved in your child's treatment.

Additional tests are needed to find out exactly what kind of leukemia your child has. These tests are very important for making decisions about your child's treatment. The main types of leukemia in children are:

- *Acute lymphoblastic leukemia (ALL)*. More than three fourths of childhood leukemias are ALL. ALL responds very well to chemotherapy. Over 80% of children with ALL are still alive after 5 years.
- *Acute myelogenous leukemia (AML)*. This is the second most common type of childhood leukemia. About 10% of children with leukemia have AML. It also responds well to treatment.
- *Less common types of leukemia* include chronic myelogenous leukemia (CML) and juvenile chronic myelogenous leukemia (JCML). Together, CML and JCML account for 3% to 5% of childhood leukemias.
- Up to 9% of children with leukemia have some other type that does not meet any of these criteria.

Depending on what type of leukemia your child has, along with other factors, the oncologist and other members of the treatment team will design a treatment program that is best for your child. The right kind of treatment has a major impact on the outcome of children with leukemia.

Leukemias are generally treated with *chemotherapy*. Many children with ALL are treated as part of national or international studies of leukemia treatment. Over the years, these studies have led to major advances in leukemia treatment. Usually, treatment is given in three stages:

- *Remission induction*. In this stage, the goal is to eliminate all leukemia cells from your child's bone marrow.
- *Central nervous system therapy*. In this stage, your child will receive additional chemotherapy, with the goal of keeping the cancer from coming back. This type of treatment greatly reduces the risk that leukemia will reappear in your child's brain or spinal cord.
- *Maintenance therapy*. In the final stage, treatment may continue for a few years. Maintenance therapy is also designed to keep the cancer from coming back.

Chemotherapy consists of drugs that are very effective in killing cancer cells. They can also have a lot of side effects, including reduced immune function, nausea and vomiting, liver and gastrointestinal problems, skin irritation, and hair loss. The side effects usually go away after treatment.

- More serious side effects of chemotherapy are possible. Your child will be monitored carefully during treatment to minimize these toxic effects.
- Bone marrow transplantation is sometimes part of treatment for leukemia, especially for children with AML or CML. The results are best when your child has a sibling whose bone marrow is a good "match" for your child's.

With modern treatment, the chances of eliminating ALL and other leukemias are good. Only your cancer specialist can provide precise estimates. Bone marrow transplantation may offer the best chances of cure for children with AML or CML.

Even if the leukemia is eliminated, there is a chance it could come back (relapse). Your child will need long-term follow-up and testing to detect relapsed leukemia. If your child does have a relapse, further treatment can still be effective.

Having a child diagnosed with any form of cancer is a devastating event for your family. The health care team will provide both medical and psychological support for your child and family.

When should I call your office?

Call our office or your cancer specialist if you have any questions about leukemia or about your child's treatment.