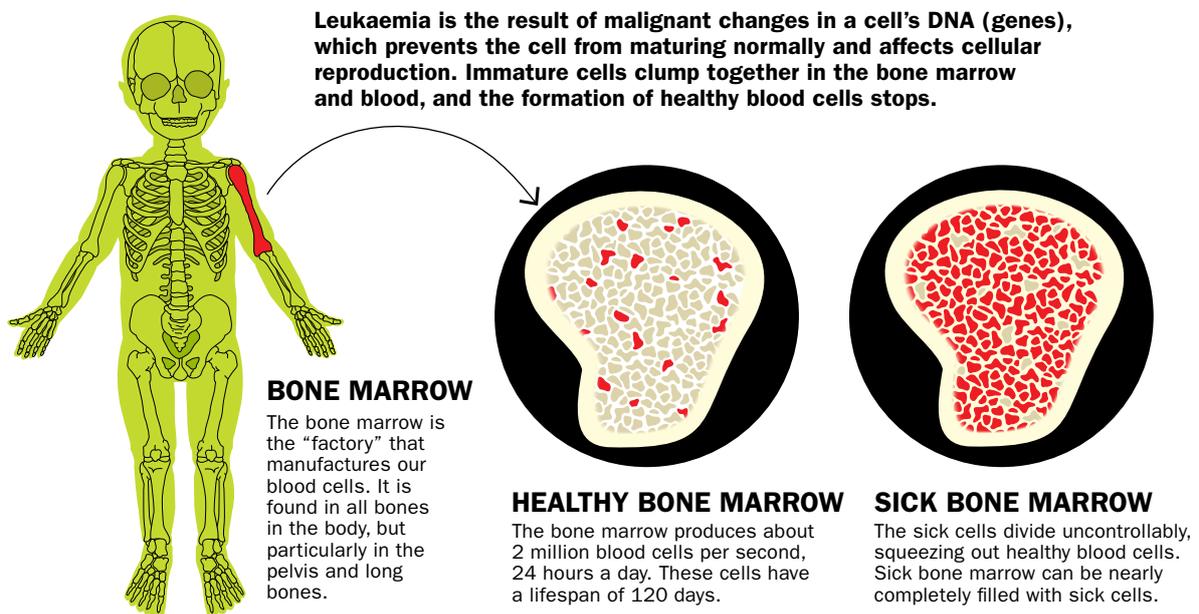


Leukaemia is characterised by uncontrolled growth of early blood-forming cells in the bone marrow. This uncontrolled growth is caused by a flaw in the genes that control the cells' growth and normal lifespan. Such flaws are not caused by congenital defects in the DNA, but are thought to occur randomly during normal cell division. The leukaemia cells squeeze out healthy blood cells and eventually make their way into the bloodstream and into other organs in the body. There are many different types of leukaemia, but the two primary types are acute lymphoblastic leukaemia (ALL) and acute myeloid leukaemia (AML).



## ACUTE LYMPHOBLASTIC LEUKAEMIA (ALL)

Acute lymphoblastic leukaemia (ALL) is the most common form of leukaemia, making up about 90% of all cases. It is called lymphoblastic because the leukaemia cells most closely resemble the body's normal lymphocytes. The primary function of healthy lymphocytes is to combat infections in the body, in part by producing antibodies.

### SYMPTOMS

Pallor, tiredness, bone pain, easier bruising, and greater sensitivity to infection, indicated by repeated infections, can be signs of leukaemia. One characteristic of the disease is that the child's health continually deteriorates.

### TREATMENT

ALL is normally treated with chemotherapy for two and a half years. In the beginning, treatment is intense and most of the medicines are given intravenously. Later, particularly in the last year, the patient receives a milder treatment with oral tablets. All forms of ALL are treated in the same way in the first four weeks. Doctors then do a risk categorisation based on how the child has responded to the treatment and what genetic anomalies are found in the leukaemia cells, to determine how intense the continued treatment should be. The child is classified as a low, medium or high-risk patient and treated accordingly. Treatment for high-

risk patients may include stem cell transplants.

A stem cell transplant allows for more intense radiation or chemotherapy treatment. First, the patient's own bone marrow is completely eliminated through chemotherapy, sometimes combined with radiation. Then new stem cells from a healthy donor are transplanted into the patient. The new bone marrow's immunological response can attack any remaining leukaemia cells. The donor stem cells often come from a sibling or a volunteer who has joined a donor register.

**COMPLICATIONS**

Most chemotherapy agents also affect healthy bone marrow cells, which means that the number of various kinds of blood cells is low during certain periods. This makes all leukaemia patients extra susceptible to infections, and they usually require hospital care if they develop a fever. However, it is important to note that nearly all children with leukaemia can still partic-

ipate in regular social activities and go to school if they have the energy to do so.

Some chemotherapy agents can affect other organs, such as the kidneys and liver. During the treatment, these organs are closely monitored in order to avoid lasting damage. Some chemotherapy agents can also affect the heart. However, children who receive conventional ALL treatment without stem cell transplants

run a relatively low risk of having serious complications later in life.

**PROGNOSIS**

The prognosis for ALL has improved significantly in recent years thanks to improved diagnostics, risk categorisation and more and more effective treatment. Today about 85% of children who develop ALL survive.

**ACUTE MYELOID LEUKAEMIA (AML)**

Acute myeloid leukaemia, AML, is also a disease of blood cells in the bone marrow, but the sick cells are more like other kinds of blood cells than lymphocytes. AML is considerably more unusual than acute lymphoblastic leukaemia (ALL). About 10% of childhood leukaemia cases are AML.

**SYMPTOMS**

The first symptoms of AML are indistinguishable from those of ALL, and are caused by a decreased production of blood cells. This means that the child may become anaemic – tired and pale, with a greater susceptibility to infection and bleeding.

**TREATMENT**

AML has a shorter treatment period than ALL, but the therapy is more intense. For most patients, the treatment is six months and consists of five cycles of chemo lasting 5–12 days. Risk categorisation is also conducted for AML after the first two treatments. The categorisation is based on how the disease is responding to treatment, and whether certain genetic anomalies are found in the leukaemia cells. After this risk categorisation, most children

receive standard therapy, which is a total of five cycles of chemo at about four weeks' interval. About 15% of childhood AML patients are high-risk patients in need of a stem cell transplant after three or four treatments.

A stem cell transplant allows for more intense chemotherapy treatment. First, the patient's own bone marrow is completely eliminated through chemotherapy. Then new stem cells from a healthy donor are transplanted into the patient. The new bone marrow's immunological response can attack any remaining leukaemia cells. The donor stem cells often come from a sibling or a volunteer who has joined a donor register.

**COMPLICATIONS**

Most chemotherapy agents also affect healthy bone marrow cells, which means that the number of various kinds of blood cells is low after every treatment. With AML, the treatment is so intense that most children develop several serious infections, especially after the first treatment. As with ALL, most children with AML should be allowed to participate in regular social activities if they have the

energy; however, the treatment is so intense that they require extensive hospital care even between treatments.

Some chemotherapy agents can affect other organs, such as the kidneys and liver. During the treatment, these organs are closely monitored in order to avoid lasting damage. Some chemotherapy agents can also affect the heart, so the heart is monitored very closely during AML treatment. However, children who receive conventional AML treatment without stem cell transplants run a relatively low risk of having serious complications later in life.

**PROGNOSIS**

The prognosis for AML is poorer than for ALL, but the majority of children recover these days. The prognosis has improved significantly in recent years thanks to improved diagnostics, risk categorisation and more and more effective treatment. About 70% of children who develop AML survive.

Fact-checked by Jonas Abrahamsson, lecturer and head of paediatric oncology at the Queen Silvia Children's Hospital, in January 2015.