Understanding Leukaemia

leukaemia & blood cancer new zealand

our mission is to care, our vision is to cure

Leukaemia is the general name given to a group of cancers that develop in the bone marrow and affect blood cells.

Bone marrow and blood cell development

Bone marrow is the spongy tissue that fills the cavities inside most bones. Blood cell production (called haematopoiesis) takes place in the bone marrow.

All blood cells start life as a "primitive" stem cell, which then grows and divides into an early immature cell – either a myeloid stem cell or a lymphoid stem cell. These cells then multiply and mature further to produce all the different varieties of blood cells (red cells, white cells and platelets) which are released into the circulating blood.

Leukaemia

Leukaemia (literally 'white blood cells' in Greek) originates in immature blood cells which have undergone a malignant change. These abnormal (malignant) cells do not grow and divide as they are supposed to, meaning they are unable to function properly. They also multiply in an uncontrolled way and may crowd the bone marrow, interfering with normal blood cell production. This results in low numbers of red cells, platelets and healthy white cells. Therefore, the most common symptoms of leukaemia are caused by a shortage of healthy blood cells (also known as bone marrow failure). In acute leukaemia, abnormal blast cells eventually spill out of the bone marrow into the blood stream and can gather in various organs including the spleen and liver.

Signs and symptoms

The most common symptoms are those of bone marrow failure:

- Anaemia (low numbers of red cells) – pale skin, tiredness, weakness, shortness of breath, dizziness.
- Neutropenia (low numbers of a type of white blood cell called a neutrophil) – high risk of developing frequent and sometimes severe infections.
- Thrombocytopenia (low levels of platelets) – bleeding or bruising for no apparent reason, skin rash of red or purple flat pinhead sized spots called petechiae (pe-tee-key-eye).

Less common symptoms:

- Enlarged spleen which might cause nausea, discomfort and pain.
- Pain in bones of pelvis and legs (due to bone marrow expanding with the overproduction of immature cells).
- Swollen lymph nodes which might be painless.
- Some people with acute leukaemia may have a tumor mass which could cause chest pain or central nervous system involvement which may cause headaches, nausea and vomiting.
- Some people with chronic leukaemia may have fevers, weight loss and sweating at night.

Different types of leukaemia

There are four main different types of leukaemia classified by the type of blood cell which is affected and the speed in which it develops:

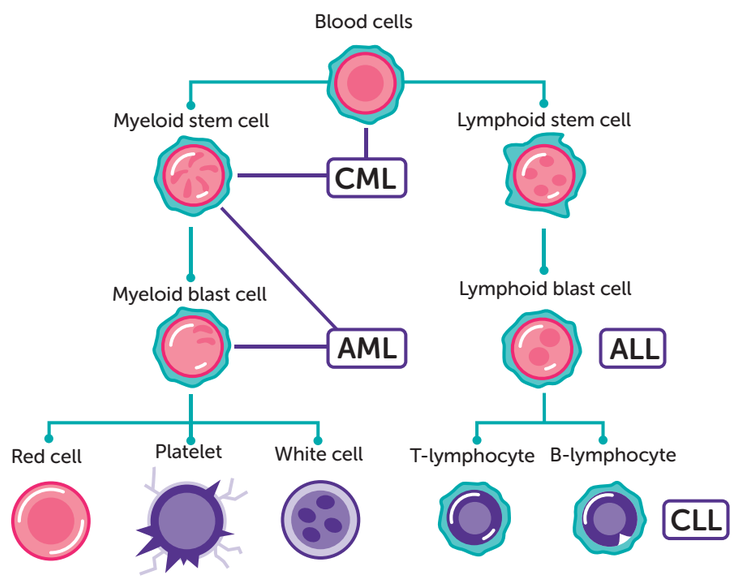
- **Acute myeloid leukaemia (AML)**
- **Acute lymphoblastic leukaemia (ALL)**
- **Chronic myeloid leukaemia (CML)**
- **Chronic lymphocytic leukaemia (CLL)**

There are also subtypes based on the appearance of the leukaemic cells under microscopes (e.g. AML can be classified into 8 different subtypes) and certain acquired genetic changes in the leukaemic cells (e.g. presence of chromosome abnormalities).

Please refer to individual booklets for more detailed information on the different types of leukaemia.

Acute leukaemia – Characterised by an uncontrolled production of abnormal very immature blood cells. It develops and progresses very quickly. People with acute leukaemia report feeling unwell for only a short period of time before they are diagnosed (days or weeks).

Chronic leukaemia – Characterised by an accumulation of abnormal cells which are more mature than in acute leukaemia. Onset is gradual and progression is generally slow (months or years). Many people may have no or few symptoms when they are diagnosed and may be diagnosed incidentally during a blood test.



This indicates the different cells where abnormalities occur causing the different leukaemias

Leukaemia can either start in the **myeloid** cell line (which normally produce neutrophils, red cells and platelets) or the **lymphoid** cell line (which normally develop into types of white blood cells called B-lymphocytes and T-lymphocytes).

Most people with CML and some people with ALL have a specific genetic abnormality in their leukaemic cells known as the Philadelphia chromosome. This creates continuous signals to the bone marrow to make too many white blood cells.

Treatment for leukaemia

Treatment to cure or control leukaemia depends on several factors, including the exact subtype of leukaemia, age at diagnosis and general health. Treatment for acute leukaemia needs to begin as soon as a diagnosis is made; however, treatment for CLL or CML may not start until the patient has symptoms.

Chemotherapy – Drugs which kill cells, especially ones that multiply quickly like cancer cells. Often a combination of chemotherapy drugs will be given which act together in different ways to destroy the leukaemic cells.

Stem cell transplant – For some people, very high doses of chemotherapy or radiotherapy are needed. As a side effect of these treatments, normal bone marrow and blood stem cells are destroyed and need to be replaced with stem cells from a donor.

The need for a transplant will depend on many factors, including the type of leukaemia, patient's age and general health, and availability of a suitable stem cell donor.

Monoclonal antibodies – Rituximab and Obinutuzumab lock on to proteins found on the surface of leukaemic cells in CLL. The immune system then recognises them as foreign and destroys them.

Tyrosine kinase inhibitors (TKIs) – Imatinib blocks the activity of a tyrosine kinase enzyme in leukaemias which have the Philadelphia chromosome e.g. CML or ALL. This prevents the growth and development of leukaemic cells. Dasatinib and Nilotinib are more active second generation TKIs and may be used for people whose leukaemia doesn't respond to Imatinib.

Radiotherapy – May be used to shrink very enlarged lymph nodes or tumors.

Active monitoring – People diagnosed with CLL who have no symptoms may not require treatment straight away. 'Active monitoring' includes regular check-ups and blood tests.

For more information, contact Leukaemia and Blood Cancer New Zealand on 0800 15 10 15 or visit www.leukaemia.org.nz
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