Medicine for Managers

Dr Paul Lambden BSc MB BS BDS FDSRCS MRCS LRCP DRCOG MHSM

Leukaemia

Leukaemia is a cancer of the blood, or more accurately of the bone marrow, and results in the production of large numbers of abnormal white blood cells. The disease was first identified 1845 by Rudolf Virchow, the German Pathologist born in Pomerania in 1821. He named the blood changes *leukämie* derived from the Greek words *leukos* (white) and *aima* (blood)

Blood cells are manufactured in the bone marrow which is mostly to be found in the central cavities within the long bones and which forms about 4% of body weight. It is the white blood cells which become diseased in leukaemia. Broadly there are two types of white cell, *myeloid cells* (neutrophils, basophils, eosinophils and macrophages) which fight infection from bacteria, fungi and parasites, as well as removing dead cells, and *lymphocytes* which principally produce antibodies.

In leukaemia, the white blood cells develop an abnormality which causes new cells to grow and divide chaotically and excessively. As the normal white blood cells die, they are replaced by the mutant diseased cells in the bone marrow and usually also in the circulating blood. Although many white cells are produced, they do not mature and are unable to carry out their normal infection fighting functions. The abnormal cells survive well beyond the normal lifespan of a white cell. As they accumulate they interfere with all bone marrow functions and also disrupt other vital organ functions. The body's defence mechanism is therefore progressively compromised. Apart from the white cell failure, red blood cell production declines causing anaemia and reduced oxygen carrying capacity and platelets do not form resulting in bruising and bleeding.

The cause of leukaemia is not fully understood but a variety of factors are implicated. The disease is the result of genetic mutation and, for example, in chronic myeloid leukaemia (see below) nine out of ten people have an abnormal chromosome (*Philadelphia chromosome*) in their blood cells. This mutation is neither inherited nor passed on to children. Mutations may occur without known cause or as the result of exposure to carcinogens or radiation. Some viruses and some

chemicals such as benzene are associated with the disease. Hair dyes and the ubiquitous tobacco are also associated with some forms of leukaemia and it rarely results from the use of chemotherapy or radiotherapy for other cancers.

The symptoms of the disease may develop rapidly or insidiously. They include

- Anaemia, leading to tiredness and general feelings of ill-health. Other effects which may include breathlessness, pallor and oedema.
- Bleeding tendency, especially from the gums or into the bowel or bladder. Clotting is poor and purple patches may develop on skin.
- Increased susceptibility to infections
- Abdominal pain
- Low grade persistent fever, chills and night-sweats.
- Loss of appetite and headaches.

In the more advanced stages the symptoms are more severe and dramatic including a high temperature, confusion and seizures.

Diagnosis of leukaemia is usually made by a full blood count which demonstrates high numbers of abnormal white blood cells. Further investigation includes bone marrow examination, general physical assessment and scans. Rarely, the blood count will fail to diagnose the disease because the cellular leukaemic changes are confined to the bone marrow or because the disease is in its very early stages.

More information is available at:

Leukaemia & Lymphoma Research

39-40 Eagle Street

London WC1R 4TH

0207 504 2200

and

Cancer Research UK

407 St John Street

London EC1V 4AD

0207 242 0200

There are a number of types of leukaemia but there are four main forms depending on whether the onset is rapid (acute) or slow (chronic) and whether the disease affects the lymphocytes (*lymphocytic*) or the other white and red cells (*myelogenous*).

Acute lymphocytic leukaemia (ALL) is the form most common in children and also in adults over age 65. Survival rates at five years are up to 90% in children and about 50% in adults. Marrow transplant may be used to reduce the risk of relapse.

Chronic lymphocytic leukaemia (CLL) almost exclusively affects adults, more commonly men. Some low grade forms do not benefit from treatment whilst chemotherapy and steroids are used in others. This form of disease is, however,

probably incurable. About three quarters of treated patients survive five years. Marrow transplant may be considered for younger patients.

Acute Myelogenous Leukaemia (AML) is more common in adults and males. Treatment is by chemotherapy with five-year survival rates of 40-50%.

Chronic myelogenous leukaemia (CML) generally affects adults. It is treated with *Gleevec* (imatinib) which is the standard treatment and which is effective. It is taken orally and the patient can stay at home. The drug allows survival rates of at least 90% at five years so the disease is a chronic manageable condition. In more advanced cases, bone marrow transplant may be undertaken.

There have been steady improvements in the management of leukaemia with successive generations of cytotoxic drugs. Gene therapy may hold the key for the future. This once incurable disease is now very treatable for most patients. Research proceeds apace and further successes will undoubtedly continue to occur.

paullambden@compuserve.com