Topic Page: leukemia

Definition: **leukaemia** from *The Penguin Dictionary of Science*

➤Cancer of the white blood cell precursors in the bone marrow. There are different types depending on the specific lineage of cells affected and the ability of the leukaemic cells to differentiate, affecting the rate of disease progression.

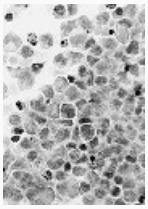

Image from: **Human cells with acute myelocytic leukemia (AML)...** in *Encyclopedia of Global Health*

Summary Article: **leukemia**
From *The Columbia Encyclopedia*

(lōkē'mēə), cancerous disorder of the blood-forming tissues (bone marrow, lymphatics, liver, spleen) characterized by excessive production of immature or mature leukocytes (white blood cells; see blood) and consequently a crowding-out of red blood cells and platelets. It was first named by Rudolf Virchow in 1887.

See also cancer.

Incidence and Cause

Leukemia is seen in animals, such as cats, guinea pigs, and cattle, as well as in humans. In humans it can occur at any age, but most types are more prevalent in older people. Possible causes include exposure to certain chemicals (e.g., benzene), chromosomal abnormalities such as Down syndrome, exposure to ionizing radiation, certain drugs (e.g., alkylating agents used in cancer treatment), and infection with retroviruses such as HTLV-I, a relative of the AIDS virus. All of these agents are suspected of causing mutations or other disruptions that interfere with the normal regulation of cell growth and division in leukocytes.

Types

Leukemias are classified as either lymphocytic or myeloid, depending on the type of leukocyte affected. In addition, leukemias are classified as either acute, referring to a rapidly progressing disease that involves immature leukocytes, or chronic, referring to a slower proliferation involving mature white cells. In acute leukemias, immature nonfunctioning leukocytes called blast cells proliferate.

The myeloid leukemias affect white blood cells (myelocytes) that give rise to granulocytes (phagocytic white blood cells that mount an inflammatory immune response). They include chronic myeloid leukemia (CML) and acute myeloid leukemia (AML), also called acute nonlymphocytic leukemia (ANLL). The lymphocytic leukemias affect the white blood cells that give rise to various types of lymphocytes. They include acute lymphocytic leukemia (ALL); chronic lymphocytic leukemia (CLL), also called chronic granulocytic leukemia; and hairy cell leukemia (HCL), a chronic leukemia named for the cells' tiny hairlike projections. The lymphocytic leukemias are sometimes referred to as B cell leukemias or T cell leukemias depending upon whether they arise in antibody-producing B cells (HCL, CLL, and some cases of ALL) or in the T cell lymphocytes involved in cell-mediated immunity (some cases of ALL). (See immunity for a further explanation of the cells of the immune system.) Each of these types may be further classified into subtypes. Most childhood leukemias are of the acute lymphocytic type; acute myeloid leukemia is the most common type of adult leukemia.

Symptoms

Many of the symptoms of acute leukemia can be attributed to anemia, which results from the attrition of red blood cells as they are crowded out by the leukemic cells. Frequent infections result from a dearth of functioning white blood cells. Bone tenderness may also be present. Hemorrhaging may develop because blood-clotting elements are scarce. Blasts may congregate in the lymph nodes, spleen, and liver, causing enlargement and pain, or they may invade the central nervous system, causing dizziness, headache, or fever. If untreated, death can supervene rapidly in acute leukemia.

Patients with chronic leukemias often have no symptoms and may be hard to diagnose, but less virulent versions of the symptoms seen in the acute leukemias may be present. Death from chronic leukemia is usually from infection.

Treatment

The diagnosis of leukemia is confirmed by finding a disproportionate number of leukocytes in tissue obtained from a bone marrow biopsy. The course of treatment is based upon the type of cell affected, the progression of the disease, and the age of the patient. Some slowly progressing forms may require no treatment. Improved treatments have increased survival from some types of leukemia considerably.

Treatment may include chemotherapy with anticancer drugs, radiation therapy, blood and plasma transfusions, and bone marrow transplantation. In bone marrow transplantation, healthy bone marrow (either donated by a closely matched donor or treated marrow from the patient) is infused into the patient after the patient has undergone a course of marrow-destroying very high dose chemotherapy. Recent studies have indicated that blood from a newborn infant's umbilical cord and placenta (called cord blood) can be used effectively instead of marrow transplants in some leukemias. Biological therapy (sometimes called immunotherapy) is also used. Biological therapies include monoclonal antibodies; interferons; maturation drugs, such as all-trans retinoic acid; and tyrosine kinase inhibtors, such as imantinib mesylate (also known as STI-571 and Gleevec). These therapies may enhance the body's natural reaction to leukemia by bolstering the immune response, may inhibit the gene that drives cell proliferation, or may encourage maturation of immature leukemic cells or reproduction of needed healthy blood elements.

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