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Benzene and Solvents—Not the Only Cause of Leukemias and Aplastic Anemia

Studies have proven benzene and solvents cause several serious health problems, including acute myelogenous leukemia, acute myeloid leukemia, acute lymphocytic leukemia, chronic myelogenous leukemia and aplastic anemia.

Still, many other factors can come into play in the development of each disease. The following sections focus on other possible causes of these fatal diseases.

Other Causes of Acute Myelogenous Leukemia (AML)

Most cases of acute myelogenous leukemia (AML) have no apparent cause. However, radiation and some chemotherapy drugs (including etoposide and drugs known as alkylating agents) are thought to cause some kinds of leukemia, including AML. Genetic abnormalities may also play a role in the development of this condition.

Risk factors include:

- exposure to radiation and chemicals
- immunosuppression following organ transplantation
- blood disorders such as:
 - Myeloproliferative diseases such as polycythemia vera or essential thrombocythemia
 - Myelodysplasia (refractory anemia)

The DNA mutations that cause leukemia are usually acquired, not inherited, but researchers and doctors do not understand exactly how. In some cases, damage to DNA is the result of exposure to cancer-causing chemicals, including previous chemotherapy for other cancers. There is also a chance of AML progressing from other blood diseases and chronic leukemias, such as chronic myelogenous leukemia, myelodysplasia or other disorders in which the bone marrow produces too much of certain types of blood cells (myeloproliferative disorders).

Other Causes of Acute Myeloid Leukemia

Some people with certain types of cancer have inherited DNA mutations from a parent. These changes increase risk for the disease. Acute myeloid leukemia is very rarely caused by one of these inherited mutations. Certain carcinogens (cancer-causing agents) have been blamed for causing acute myeloid leukemia--including benzene, tobacco smoke, and ionizing radiation. The most important risk factor for acute myeloid leukemia is advancing age.

Acute myeloid leukemia can develop in individuals who have received certain types of chemotherapy to treat other cancers. When this occurs, the leukemia is said to be a secondary acute myeloid leukemia. A pre-leukemic disorder termed myelodysplasia,

common in older individuals, is also an important risk factor for acute myeloid leukemia.

Other Causes of Acute Lymphocytic Leukemia

Between 1973 and 1990, the number of acute lymphocytic leukemia cancer cases in children under 15 rose by 27%. The causes of the disease are not known, but experts believe that a combination of genetic and environmental factors create the cancer.

Few definite factors have been associated with an increased risk of developing acute lymphocytic leukemia. Exposure to high doses of irradiation, as carefully studied in the Japanese survivors of atomic bomb detonations, is one such factor. Unlike other forms of leukemia, acute lymphocytic leukemia occurs at different rates in different locations. There are higher leukemia rates in more developed countries and in higher socioeconomic groups.

Acute lymphocytic leukemia occurs most often in the first decade of life, increasing in frequency again in older individuals.

Other Causes of Chronic Myelogenous Leukemia (CML)

In almost everyone with chronic myelogenous leukemia, the genetic material (chromosomes) in the leukemia cells has an abnormal feature called the Philadelphia chromosome.

The Philadelphia chromosome is an acquired mutation — that is, a person is not born with it and cannot pass it on to their children. Exactly why the Philadelphia chromosome forms is unknown in most cases, although exposure to ionizing radiations (such as during the atomic bomb explosions in Japan) has been shown to cause chronic myelogenous leukemia.

Other Causes of Aplastic Anemia

Aplastic anemia has multiple causes. Some of these causes are idiopathic, meaning they occur sporadically for no known reason. Other causes are secondary, resulting from a previous illness or disorder. Acquired causes, however, may include the following:

- history of specific infectious diseases such as infectious hepatitis
- history of taking certain medications, such as antibiotics and anticonvulsants
- exposure to certain toxins such as heavy metals
- exposure to radiation
- history of an autoimmune disease
- inherited condition