

How to Use this Factsheet

This risk factor summary was developed to serve as a general fact sheet. It is an overview and should not be considered exhaustive. For more information on other possible risk factors and health effects being researched, please see the References section.

A risk factor is anything that increases a person's chance of developing cancer. Some risk factors can be controlled while others cannot. Risk factors can include *hereditary conditions, medical conditions or treatments, infections, lifestyle factors, or environmental exposures*. Although risk factors can influence the development of cancer, most do not directly cause cancer. An individual's risk for developing cancer may change over time due to many factors, and it is likely that multiple risk factors influence the development of most cancers. Knowing the risk factors that apply to specific concerns and discussing them with your health care provider can help to make more informed lifestyle and health care decisions.

For cancer types with environmentally-related risk factors, an important factor in evaluating cancer risk is the route of exposure. This is particularly relevant when considering exposures to chemicals in the environment. For example, a particular chemical may have the potential to cause cancer if it is inhaled, but that same chemical may not increase the risk of cancer through skin contact. In addition, the dose and duration of time one might be exposed to an environmental agent is important in considering whether an adverse health effect could occur.

Gene-environment interactions are another important area of cancer research. An individual's risk of developing cancer may depend on a complex interaction between their genetic makeup and exposure to an environmental agent (for example, a virus or a chemical contaminant). This may explain why some individuals have a fairly low risk of developing cancer as a result of an environmental factor or exposure, while others may be more vulnerable.

Key Statistics

The American Cancer Society estimates that approximately 54,270 individuals will be diagnosed with leukemia in the United States in 2015: 30,900 males and 23,370 females. Of these individuals, an estimated 20,830 will be diagnosed with acute myeloid leukemia (AML).^{1,3,8} In Massachusetts, leukemia accounted for approximately 2.5% of all cancers diagnosed between 2007-2011.¹⁰

AML is generally a disease of older people and is rare before the age of 45. The average age at diagnosis of a patient with AML is about 66 years. This type of leukemia is more common among males than among females.³

Types of Leukemia

The term "cancer" is used to describe a variety of diseases associated with abnormal cell and tissue growth. Cancers are classified by the location in the body where the disease originated (the primary site) and the tissue or cell type of the cancer (histology).

Leukemia is a cancer of the bone marrow and blood. The types of leukemia are grouped according to how quickly the disease develops and progresses and what type of white blood cell is affected. Leukemia can arise in lymphoid cells (white blood cells called lymphocytes) or myeloid cells (red blood cells, platelet-making cells, or white blood cells other than lymphocytes). Leukemia that affects lymphoid cells is called lymphocytic leukemia. Leukemia that affects myeloid cells is called myeloid or myelogenous leukemia. Leukemia can be acute or chronic. Acute forms of leukemia progress more rapidly than chronic forms of leukemia, leading to different approaches to diagnosis and treatment.³

Leukemia is generally divided into four major subtypes: acute lymphocytic leukemia (ALL), acute myeloid leukemia (AML), chronic lymphocytic leukemia (CLL), and chronic myeloid leukemia (CML).³ There are also a few rare types, such as hairy cell leukemia.⁵ In U.S. adults, the most common types are CLL and AML.^{1,11} AML is expected to account for approximately 38% of all leukemia diagnoses in 2015.¹

Established Risk Factors

Environmental Exposures

Exposure to high-level ionizing radiation (e.g., by survivors of atomic bomb blasts or nuclear reactor accidents) is a known environmental risk factor associated with the development of AML, usually within 6 to 8 years after exposure.^{3,8}

Lifestyle Factors

The only proven lifestyle risk factor for AML is cigarette smoking.³ Cigarette smoking may increase the risk of developing AML by 20-50%.¹² If you would like information about quitting smoking contact the Massachusetts DPH Tobacco Cessation and Prevention Program at 1-800-Quit-Now or 1-800-784-8669.

Possible Risk Factors

Hereditary Conditions

There are some inherited syndromes with genetic changes that seem to raise the risk of AML. These include ^{3,8}:

- Down syndrome
- Bloom's syndrome
- Fanconi anemia
- Ataxia-telangiectasia

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- Blackfan-Diamond syndrome
- Li-Fraumeni
- Klinefelters' syndrome
- Wiskott-Aldrich syndrome

Medical Conditions

People with certain blood disorders seem to be at increased risk for developing AML. These include chronic myeloproliferative disorders such as polycythemia vera, essential thrombocytopenia, and idiopathic myelofibrosis.³ In addition, some patients who have a myelodysplastic syndrome (preleukemic condition) or who have been diagnosed with CML in the past may develop AML.⁶

Environmental Exposures

Long-term occupational exposure to benzene and exposure to certain chemotherapy drugs, especially alkylating and platinum agents, have been associated with an increased risk of developing AML among both children and adults. The risk of developing AML after chemotherapy with these drugs peaks up to 8 years after treatment. Radiation therapy for other cancers may also increase the risk of AML.³

The possible risks of leukemia from exposure to lower levels of ionizing radiation, such as from x-rays, or CT scans, are not well defined. Fetal exposure to radiation may increase the risk of leukemia, but the extent of the risk is unclear.^{3, 6} Routine diagnostic x-rays, such as dental or chest x-rays, use very low doses of radiation, with their benefits likely outweighing their risks. Nevertheless, the American College of Radiology recommends that doctors be mindful when ordering diagnostic imaging procedures, so as to reduce their patients' exposure to radiation to the extent possible.⁷ Individuals with questions about x-ray tests should speak with their doctor.

Weak or Unknown Risk Factors

Other factors that have been studied for a possible link to AML include exposure to electromagnetic fields (such as living near power lines), workplace exposure to diesel, gasoline, and certain other chemicals and solvents as well as exposure to herbicides and hair dye. To date, none of these factors has been linked conclusively to AML, but research in these areas is ongoing.^{3, 8}

Childhood Leukemia

Leukemia is the most common type of childhood cancer, accounting for about 31% of all cancers diagnosed in children under 15.^{1, 2} The majority (84%) of these cases are of the ALL type.² AML is more commonly diagnosed among adults than children, with an average age at diagnosis of 66 years.^{1, 3} However, AML can occur in children (usually during the first two years of life and in the teenage years).^{4, 9}

Doctors and researchers do not know what causes most childhood cancers. Evidence suggests that some cases of AML may be the result of certain genetic factors or

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environmental exposures; for example, children who have Down syndrome have an increased risk of AML during the first 4 years of life.⁹ However, the reasons for this increased risk are not well understood. Having an identical twin with AML may increase risk, especially if leukemia develops in the first year of life.⁴

For More Information / References

Much of the information contained in this summary has been taken directly from the following sources. This material is provided for informational purposes only and should not be considered as medical advice. Persons with questions regarding a specific medical problem or condition should consult their physician.

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