

### 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 those 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.<sup>1</sup> Of these individuals, an estimated 5,980 will be diagnosed with chronic myeloid leukemia (CML).<sup>1, 3</sup> In Massachusetts, leukemia accounted for approximately 2.5% of all cancers diagnosed between 2007-2011.<sup>7</sup>

While this disease can occur at any age, the risk of CML increases with age and occurs the most in adults over the age of 60. The average age at diagnosis is 64 years. CML is rare in children and teens.<sup>3, 5</sup> This disease is slightly more common in males than females, although the reasons for this are not known.<sup>3</sup>

### 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 (white blood cells called lymphocytes) or myeloid cells (red blood cells, platelet-making cells, or white blood cells other than lymphocytes).<sup>3, 5, 8</sup> 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.<sup>3, 5, 8</sup>

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). There are also a few rare types, such as hairy cell leukemia. In U.S. adults, the most common types are CLL and AML. CML accounts for about 10% of all leukemias.<sup>5</sup>

The cancer cells of almost all people with CML have a genetic abnormality called the Philadelphia chromosome. This abnormality occurs by chance after birth when a string of genetic material called a chromosome breaks off during cell division and attaches to another chromosome. The Philadelphia chromosome is not inheritable.<sup>2, 6</sup>

### Established Risk Factors

#### *Environmental Exposures*

Exposure to high-level ionizing radiation (such as being a survivor of an atomic bomb blast or nuclear reactor accident) is the only known environmental risk factor for CML.<sup>2, 5, 6, 9</sup> It is not clear if radiation therapy or chemotherapy treatment given for other types of cancer or disease increases the risk of developing CML later in life. The risk of developing CML or another leukemia after treatment may depend on how much radiation reached the bone marrow, how large the radiation dose was, and how often the bone marrow was exposed.<sup>4</sup> Individuals with questions about radiotherapy should speak with their doctor.

### Possible Risk Factors

Research is ongoing with regard to other possible risk factors, but at present, little is known about what causes CML.

### Other Risk Factors That Have Been Investigated

The risk of getting CML does not seem to be affected by smoking, diet, exposure to chemicals, or infections, nor does CML seem to run in families.<sup>9</sup>

### CML in Children

Leukemia is the most common type of childhood cancer, accounting for about 31% of all cancers diagnosed in children under 15 years old.<sup>5</sup> The majority (84%) of these diagnoses are ALL.<sup>2</sup> While CML can occur at any age, CML is rare in children and adolescents.<sup>5</sup>

### 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.*

American Cancer Society (ACS). <http://www.cancer.org>

1. ACS. 2015. Cancer Facts & Figures 2015.
2. ACS. 2014. Detailed Guide: Childhood Leukemia.
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5. ASCO. 2014. Childhood Cancer.
6. ASCO. 2014. Leukemia – Chronic Myeloid – CML.

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7. MCR. 2014. Cancer Incidence and Mortality in Massachusetts 2007-2011: Statewide Report. Available at: <http://www.mass.gov/eohhs/docs/dph/cancer/state/registry-statewide-report-07-11.pdf>.

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