

Non-Hodgkin Lymphoma Risk Factor Information

This document gives a general overview of risk factors. The document covers:

- About Cancer and Risk Factors
- About Non-Hodgkin Lymphoma
- Types of Non-Hodgkin Lymphoma
- Known Risk Factors
- Possible Risk Factors
- Other Risk Factors That Have Been Investigated
- References / More Information

About Cancer and Risk Factors

Cancer is not just one disease.

Cancer is a group of over 100 different diseases. Cancer occurs when abnormal cells grow out of control and crowd out the normal cells. It can start anywhere in the body and can spread (“metastasize”) to other parts of the body. Cancer types are named for the original location in the body and the type of cell or tissue. Different types of cancer have different causes and risk factors.

Cancer can take a long time to develop.

The cause of cancer is sometimes related to events that happened many years ago. Most cancer types are thought to take anywhere from 10 to over 50 years to develop. A few types, such as leukemia or lymphoma, are thought to take less than 10 years.

A risk factor is anything that increases your chance of getting cancer.

Some risk factors can be controlled while others cannot. Risk factors can include:

- Hereditary conditions (e.g., genes passed down from parents)
- Medical conditions or treatments (e.g., a previous cancer diagnosis)
- Infections (e.g., human papilloma virus)
- Lifestyle factors (e.g., smoking cigarettes)
- Environmental exposures (e.g., certain air pollutants)

Most risk factors do not directly cause cancer.

A risk factor influences the development of cancer but usually does not directly cause cancer. Instead, a combination of risk factors likely drives cancer development. For example, genetic factors can make individuals more likely to get cancer when they are exposed to a cancer-causing chemical.

Environmental risk factors depend on how, how much, and how long you are exposed.

Your risk from exposure to certain chemicals or radiation depends on the type, extent, and duration of exposure. For example, inhaling a certain chemical may increase your risk of getting cancer. However, touching the same chemical may not. In addition, some substances may increase your risk only if you are exposed to high amounts over a long time.

It is difficult to identify the exact causes of cancer.

- Many cancers can develop due to random chance.
- Multiple risk factors can act in combination.
- Risk factors can change over time.
- Cancer might not develop or get diagnosed for a long time after an initiating event (such as exposure or random cell mutation).

Knowing your risk factors can help you make more informed choices.

Discuss your risk factors with your health care provider to make more informed decisions on lifestyle and health care.

About Non-Hodgkin Lymphoma (NHL)

Lymphoma is a cancer that starts in white blood cells (lymphocytes).

Lymphocytes are a type of white blood cell in the lymph system. The lymph system is part of the immune system that helps fight infection and some diseases. NHL is a group of many different types of lymphoma except Hodgkin lymphoma. Because lymph tissue is found in many parts of the body, NHL can occur almost anywhere.¹ Common sites include lymph nodes as well as the spleen, liver, and bone marrow.^{5,10}

NHL is one of the most common cancers in the United States.

The American Cancer Society estimates that 80,470 individuals will be diagnosed with NHL in the United States in 2022.^{1,2} In Massachusetts, NHL accounted for about 4% of all cancers diagnosed between 2013 and 2017.⁷

Most diagnoses of NHL happen in older adults.

NHL can occur at any age. Although it is one of the more common cancer types among children, teens, and young adults in the United States, more than half of individuals diagnosed with NHL are age 65 or older.^{1,5}

The incidence of NHL has increased over time in the United States.

Nationally, incidence rates for NHL have nearly doubled since the 1970s.¹¹ Some of the increase may be attributed to AIDS-related NHL, but reasons for the rise are largely unknown.¹⁰⁰ The aging of the population will likely contribute to a continued increase in NHL diagnoses.¹

Types of Non-Hodgkin Lymphoma

About 85% of all NHL diagnoses in the United States are B-cell lymphomas.

- Diffuse large B-cell lymphoma (DLBCL) is the most common type of NHL in the United States and occurs mostly in older people.
- Small lymphocytic lymphoma is B-cell lymphoma closely related to chronic lymphocytic leukemia. Many doctors consider them different versions of the same disease. The only difference is where the cancer cells are found. In CLL, most of the cancer cells are in the blood and bone marrow. In SLL, the cancer cells are mainly in the lymph nodes and spleen.¹
- Other B-cell lymphomas include follicular lymphoma, mantle cell lymphoma, and marginal zone lymphomas.
- T-cell lymphomas make up less than 15% of NHL diagnoses in the United States.
- Additional rarer types of NHL also exist.¹

The most common types of NHL in children are different from those in adults.

Three main types of NHL account for nearly all childhood diagnoses in the United States:

- Burkitt lymphoma (also called small non-cleaved cell lymphoma) makes up about 40% of childhood NHL and occurs most often in boys, usually between the ages of 5 and 14.
- Lymphoblastic lymphoma (LBL) makes up about 20-30% of childhood NHL with boys about twice as likely as girls.
- Large cell lymphoma (LCL), which includes large B-cell lymphoma and anaplastic large cell lymphoma, makes up about 25-30%.^{3,6}

Known Risk Factors

Although NHL is associated with several risk factors, most individuals diagnosed with NHL have few or no known risk factors. This is complicated by the fact that NHL is a diverse group of cancers. Each subtype of NHL may have different risk factors associated with its development.

Medical Conditions

Weakened immune system:

Individuals with weakened immune systems have a higher risk of NHL. This includes individuals taking immunosuppressant drugs after an organ transplant and people with inherited immunodeficiency syndromes such as ataxia-telangiectasia (AT), Wiskott-Aldrich syndrome, Bloom syndrome, severe combined immunodeficiency syndrome (SCID), common variable immunodeficiency, and X-linked lymphoproliferative syndrome.^{1,3}

Certain autoimmune diseases:

An autoimmune disease is when an overactive immune system mistakenly attacks the body's own tissues. Some autoimmune diseases have been linked with an increased risk of NHL, including rheumatoid arthritis, systemic lupus erythematosus (SLE, or lupus), Sjogren disease, and celiac disease.¹

Infections

Infection with HIV, HTLV-1, EBV, or HHV-8:

Several viruses have been shown to play a role in the development of NHL.

- Infection with human immunodeficiency virus (HIV) can weaken the immune system and increase the risk of some types of NHL.
- Infection with human T-cell lymphoma/lymphoma virus (HTLV-1) increases the risk of certain types of T-cell NHL. This is rare in the United States. Most occur in Japan and the Caribbean.
- Infection with the Epstein-Barr virus (EBV) is an important risk factor for NHL in some areas of Africa. In developed countries such as the United States, EBV is more often associated with NHL in patients also infected with HIV.
- Human herpes virus 8 (HHV-8) can increase the risk of a rare type of lymphoma, most often seen in people infected with HIV.^{1,5,10}

Hereditary Conditions

Family history of NHL:

Individuals with a sibling, parent, or child with NHL have an increased risk of developing NHL.³

Lifestyle Factors

Breast implants:

Although rare, some women with breast implants develop a certain type of NHL (anaplastic large cell lymphoma) in their breast. This may be more likely for implants with textured, not smooth, surfaces.^{1,5}

Environmental Exposures

Ionizing radiation:

Exposure to high-level ionizing radiation (e.g., survivors of atomic bombs or nuclear reactor accidents) is associated with a higher risk of developing NHL.¹

Previous radiation treatment for another cancer:

Radiation therapy as treatment for other cancers raises a person's risk of developing NHL. This risk is greater for patients treated with both radiation therapy and chemotherapy.¹

Possible Risk Factors

Medical Conditions

Chemotherapy drugs:

Some chemotherapy drugs used to treat other cancers may increase the risk of developing NHL many years later. It is not clear if this due to the disease itself or the treatment that suppresses the immune system.¹

Bacillus Calmette-Guerin (BCG) vaccination:

Some studies have found a link between BCG vaccination (for tuberculosis disease) and an increased risk of NHL. However, research has also shown that other vaccinations (including smallpox, cholera, yellow fever, influenza, measles, tetanus, and polio) are linked with a decreased risk of NHL.⁵

Infections

Infections that cause chronic immune stimulation:

Some long-term infections may increase an individual's risk of NHL by forcing their immune system to be constantly active.

- *Helicobacter pylori*, a type of bacteria known to cause stomach ulcers, has been linked to mucosa-associated lymphoid tissue (MALT) lymphoma of the stomach.
- Other bacterial infections, such as *Chlamydothila psittaci* and *Campylobacter jejuni*, have been linked to certain types of lymphoma.
- Long-term infection with the hepatitis C virus (HCV) seems to be a risk factor for certain types of lymphoma, such as splenic marginal zone lymphoma.¹

Lifestyle Factors

Dietary factors and being overweight or obese:

Some studies have suggested that being overweight or obese may increase the risk of NHL. Other studies suggest that a diet high in fat and meats may increase the risk while a diet high in vegetables may lower the risk.^{1,10}

Environmental Exposures

Certain chemicals such as benzene:

Some studies have suggested that chemicals such as benzene and certain herbicides and insecticides may increase the risk of NHL. Research into these possible links is still underway.¹

Other Risk Factors That Have Been Investigated

Lifestyle Factors

Smoking:

Some studies show that smoking may increase the risk of certain types of NHL.¹⁰⁰

Hair color products:

Several studies examined whether people who use hair color products have an increased risk of NHL. Some studies have shown an association while others have not.^{4,100}

References / More Information

This information sheet should not be considered exhaustive. For more information on other possible risk factors and health effects being researched, please see the resources below. Much of the information contained in this summary has been taken directly from these sources. This material is provided for informational purposes only and should not be considered as medical advice. Consult your physician if you have questions regarding a specific medical problem or condition.

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