What Causes Lymphoma?

The causes of lymphoma are not well known. DNA mutations cause lymphoma to develop but what triggers these mutations is largely unknown. Family history does not provide much of a clue; except in the case of some rare forms, lymphoma does not appear to be linked to genetic inheritance.

However, as lymphoma incidence rises and research accelerates, several risk factors for lymphoma have been established. We outline some of them below. Please keep in mind that there are volumes of published research on the twenty to thirty known forms of lymphoma, and much remains to be learned. This page identifies some of the better-known risk factors for lymphoma and should serve as a launching point for further investigation.

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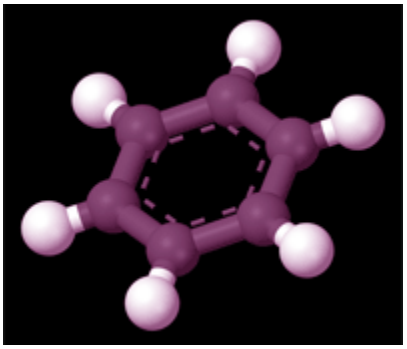
Environmental Risk Factors



It will probably not to surprise you to learn that exposure to certain chemicals and radiation has been linked to lymphoma.

Benzene molecule

Solvents (Benzene)

Chemical solvents such as acetone, alcohol (various alcohols, not just ethyl alcohol), toluene, xylene, turpentine, and benzene, are highly toxic and linked to lymphoma. Benzene exposure in particular, already a known cause of leukemia, is now linked to lymphoma and is the subject of much research and many lawsuits. ***(Possible from the work that solvents/ chemical exposure at his shop? If your body is not***

given what it needs to combate the influx of harmful chemicals, that the immune system is not able to ward off the cancer trigger.)

A meta-analysis of 22 benzene exposure studies by the UC Berkeley School of Public Health concluded that, "The finding of elevated relative risks in studies of both benzene exposure and refinery work provides further evidence that benzene exposure causes NHL." Benzene, a solvent manufactured from petroleum, is found in gasoline, cigarette smoke, and in many solvents such as . Benzene exposure is also an occupational risk for oil industry jobs, particularly refining jobs, and plastics manufacturing.

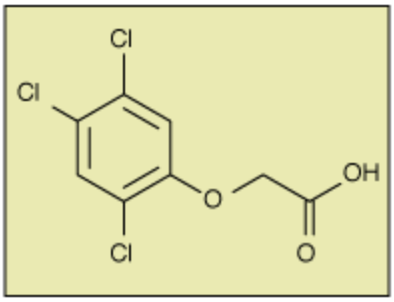
Click here to sign up for Nexcura's Free NHL Treatment Profiler. This tool will assist you in understanding which questions to ask your physician, your treatment options and possible side effects.

Herbicides and Pesticides

Chemicals used for defoliation and pest control have been linked to lymphoma and are a significant risk factor. These chemicals are an occupational hazard for farmers and agricultural workers in particular. Populations in agricultural areas are also at significant risk from airborne exposure via crop dusting, and from groundwater exposure via contaminated water supplies. Herbicides and pesticides are also a potential threat to the general population who may ingest them through the food supply.

2,4,5-T molecule

Agent Orange



"Agent Orange," named after the orange-striped drums used for shipping, refers to any of the phenoxy herbicides used for defoliation during the Vietnam War. Herbicides can enter the body not only from direct contact, but also through food and soil contamination and inhalation. Both soldiers and the Vietnamese population endured significant herbicide exposure. One herbicide in particular, 2,4,5-trichlorophenoxyacetic acid [2,4,5-T], was particularly toxic because it contained dioxins. Dioxins remain in the environment–particularly the soil–for years and are linked to many cancers.

While it has not been irrefutably proven that exposure to Agent Orange causes cancer, the evidence is strong enough to put both Hodgkin's and non-Hodgkin's lymphoma on the U.S. Department of Veterans Affairs list of "Current Conditions Considered by VA Presumptive to AO Exposure."

Hair Dye

There has been a lot of press over the years linking hair dye to lymphoma and other cancers. Although there has been some inaccurate reporting on this issue, it is true that some link has been established, particularly in the case of hair dyes manufactured before 1980. A 2008 study of over 10,000 people published in the American Journal of Epidemiology (4,461 NHL patients and 5,799 controls) concluded the following:

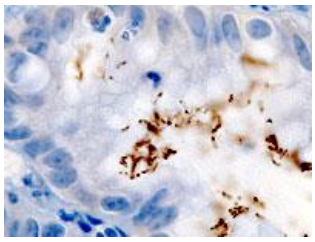
"In summary, the results from this large InterLymph-based pooled analysis indicate that personal use of hair dye may play a role in the risk of NHL, particularly for follicular lymphoma and CLL/SLL. Our study also indicates that although the risk associated with personal hair-dye use was observed mainly among women who started using hair dyes before 1980, the risk was not limited to those women. Future studies are needed to examine the risk of NHL by time period of hair-dye use and by genetic susceptibility."

Genetic Risk Factors

The genetic links to lymphoma are complicated and uncertain. Direct inheritance does not seem to be a factor. Even in the rare cases in which lymphoma occurs in family clusters it is not clear whether genetics or environmental exposure–or a combination of the two–is the determining factor.

Inherited Immune Deficiencies

Lymphoma and genetics are most closely associated with inherited immune disorders. Lupus, rheumatoid arthritis, celiac disease and Sjögren's syndrome all appear to increase a person's chances of developing lymphoma.



Histopathology of h. pylori infection

Immune System Disorders

Lymphoma is essentially an immune system disease and positive correlations exist between many immune deficiencies and various lymphomas.

Epstein-Barr Virus

Epstein Barr virus [EBV], a member of the herpes virus family, is extremely common and can result in infectious mononucleosis in young adults. In most cases EBV infection and "mono" are not serious conditions. However, in patients with compromised immune systems in which T-cells do not destroy infected B-cells, EBV-infected cells may become cancerous. The strongest correlation between lymphoma and EBV pertains to Burkitt's lymphoma.

Helicobacter Pylori

H. Pylori is a bacteria found in populations worldwide. It can result in minor stomach inflammation, ulcers, and can lead to stomach cancer. H. Pylori is also linked to MALT lymphoma, a rare type of B-cell tumor.

Monoclonal Antibody Therapy: Rituxan

Rituxan targets B-cells (Roche)

Rituxan (generic: rituximab) is a monoclonal antibody used in the treatment of indolent and follicular B-cell Non-Hodgkin's Lymphomas (NHL). It is administered to patients via IV drip.

Rituxan works by attaching to the CD20 antigen–a type of cell "marker"–found on B-cells. This signals the body's immune system to activate. Specialized "killer cells" like macrophages then attack and remove the marked cells, thus removing the tumors.

The monoclonal antibody can be used alone or in combination with other drugs. For patients with diffuse large B-cell lymphomas, Rituxan is commonly administered with the CHOP chemotherapy regimen. For patients with follicular lymphomas, it is often used in combination with the CVP chemotherapy regimen.

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In cases where cancer cells are resistant to Rituxan treatment, it may be used in conjunction with Zevalin. Zevalin also attaches to the CD20 antigen, but it emits a small amount of radiation, thus killing the affected B-cells.

Side Effects

Join the online Non-Hodgkin's and Hodgkin's Lymphoma Support Groups for free and talk to others who are facing the same challenges you are.

Patients may have adverse or severe reactions from Rituxan. For this reason, they should be closely monitored during drug administration, especially during the first dose. Also, live virus vaccinations should not be administered while a patient is being treated with Rituxan.

The most common side effects are infusion reactions, like fever, chills, and fatigue. Infection can also occur as a result of lymphopenia (the depletion of B-cells), which weakens the immune system. Some patients may suffer from more severe reactions than others.

Less common, but more severe symptoms include

- Bowel Obstruction and Perforation: Minor to severe discomfort may be experienced after the administration of Rituxan. Patients should inform their doctor if this occurs.
- Arrhythmias: Minor to severe heart problems can arise from the use of Rituxan.
- Hepatitis B Reactivation: A patient previously infected with Hepatitis B may suffer from reactivation of the disease. This can lead to liver failure if left untreated.
- Tumor Lysis Syndrome: This phenomenon occurs when cancerous cells are broken down, releasing harmful toxins into the blood. Renal damage or failure can occur when the kidneys try to filter out those toxins.
- Severe Mucocutaneous Reactions: These skin reactions usually occur near the body's orifices, like the lips. Reactions vary by patient, and can involve a minor skin lesion or more severe eruption.
- Progressive Multifocal Leukoencephalopathy (PML): This rare and extremely severe disease is causes by the JC virus. It affects the brain and can prove fatal.
- Symptoms can usually be reversed if treated early. Talk to your doctor immediately if you suffer from any symptoms while on Rituxan treatments.