



# Cancer Clusters

## Answers to Frequently Asked Questions

### What is cancer?

Cancer is a group of diseases characterized by the uncontrolled growth and spread of abnormal cells. In the human body, normal cells grow, divide and die in an orderly process. Cancer cells outlive normal cells and continue to grow and make new abnormal cells.

Cancer cells will often clump together and form tumors. These tumors can invade and destroy normal cells and tissues. Tumors can be malignant (cancerous) or benign (non-cancerous). Some cancers such as leukemia do not form tumors but invade the blood and blood-forming organs. Cancer cells can travel (metastasize) through the blood or lymph system to other areas of the body where they can settle and form new tumors.

### What are the key facts about cancer?

Cancer is the second-leading cause of death in both the United States and in Ohio. According to the National Cancer Institute, 40 percent of all men and 33 percent of all women in the United States have a lifetime risk of developing cancer. Other important cancer facts:

- **Cancer is not a rare disease.** Although some forms of cancer are rare, cancer is much more common than most people realize.
- **Cancer is not one disease, but many.** There are more than a hundred different kinds of cancer, many of which have different, and often unknown, causes and risk factors.
- **Cancer is mostly a disease of middle and older age.** Cancer may strike at any age; however, 87 percent of cancers in Ohio were diagnosed in people 50 years and older in 2011.
- **Cancer has many causes.** Cancer causes vary by cancer type, and the primary causes of many cancers have yet to be identified.
- **Cancer can take a long time to develop.** After an exposure to a potential carcinogen (cancer-causing agent), there can be a "latency period" lasting years or even decades before cancer develops, making it difficult to identify when a person was exposed to the carcinogen.

### What are cancer risk factors?

A risk factor is anything that increases a person's chance of getting a disease. Some cancer risk factors such as tobacco use, drinking a lot of alcohol, having a poor diet, lack of physical activity, unprotected exposure to the sun and occupational (work) exposures can be changed, while other risk factors such as a person's age, sex and family medical history (genetics) cannot be changed.

A person with a cancer risk factor is more likely to develop the disease at some point in his or her life. However, having one or more risk factors does not always mean a person will get cancer. Some people with one or more risk factors never develop the disease, while other people who develop cancer may have no apparent risk factors. Even when a person who has a risk factor is diagnosed with cancer, there is no way to prove that the risk factor actually caused the cancer.

Cancer most often results from a combination of risk factors rather than one single factor. The risk of developing most types of cancer can be reduced by changes in a person's lifestyle. By quitting smoking, eating healthier foods and being physically active, a person can reduce his or her risk of developing cancer.

### What is a cancer cluster?

According to the Centers for Disease Control and Prevention (CDC), National Cancer Institute (NCI) and Ohio Department of Health (ODH),

*"A cancer cluster is a greater than expected number of cancer cases that occurs within a group of people in a geographic area over a defined period of time."*

Perceived higher numbers of cancer cases are sometimes called "cancer clusters" by concerned communities. Cancer clusters may be suspected when people learn about family members, friends, neighbors or co-workers that have been diagnosed with cancer. Upon further evaluation, many times these concerns are not true cancer clusters, but are the result of the unfortunate reality that cancer is common in communities throughout our nation.

## What causes cancer clusters?

Identifying the cause of a cancer cluster has proven to be extremely difficult because the exact cause(s) of many cancers are unknown. Over the last several decades, very few cluster investigations resulted in the identification of a single external cause or hazard. In fact, cancer clusters most often occur due to the following:

- Shared behaviors and lifestyle factors such as high rates of tobacco use;
- Lack of access to preventive health care;
- Increased rates of screening (which may identify previously undiagnosed cases);
- Low socioeconomic status; and
- Chance.

The role of the environment in cancer clusters depends on the definition. Most people associate the environment with air, water and soil. However, the environment can also be defined as surrounding things, conditions or influences, or social and cultural forces that shape the life of a person or population. Thus, to say that a particular cancer was caused by the environment does not necessarily mean that it was caused by a cancer-causing chemical in the air, water or soil.

## What about carcinogens?

A carcinogen is a substance or agent known to cause cancer. In the 13<sup>th</sup> *Report on Carcinogens*, the National Toxicology Program of the U.S. Department of Health and Human Services identified 56 substances “known to be human carcinogens.” The report also lists 187 substances that are “reasonably anticipated to be human carcinogens.” For a list of substances included in the report, visit <http://ntp.niehs.nih.gov/pubhealth/roc/roc13/index.html>.

However, cancer can take years, or even decades, to develop. Whether a carcinogen will cause cancer depends on the following:

- **Type of exposure:** Did a person breathe it, touch it, drink it or eat it? Each substance causes cancer in a different way.
- **Sensitivity to exposure:** Each person’s body is different and will react differently.
- **Duration of exposure:** How long was the person exposed?
- **Amount of exposure:** How much of the substance was the person exposed to?

## How can public health officials address community cancer concerns?

Knowing its cancer burden can help a community plan and conduct cancer prevention and control activities. Ohio’s city and county health departments, university-based researchers, other health agencies and persons dedicated to cancer prevention and control may use cancer data from the Ohio Cancer Incidence Surveillance System (OCISS) to identify the rate of cancer in a community, the types of cancer found in that community and high-risk populations for targeted education and outreach efforts.

Health officials often use a protocol when they conduct a cancer cluster investigation, such as the *Ohio Community Cancer Concerns Response Protocol*, to help determine the need for further action. Further action may be considered if the concern involves one type of cancer or related cancers; unusual types of cancer in a particular population; an unusual geographic or time distribution; and/or a known exposure pathway to a cancer-causing agent. For more information, please visit the websites below.

## Resources:

- ODH, Bureau of Healthy Ohio Cancer Programs: <http://www.healthy.ohio.gov/cancer/cancprgms.aspx>
- ODH, OCISS: [http://www.healthy.ohio.gov/cancer/ocisshs/ci\\_surv1.aspx](http://www.healthy.ohio.gov/cancer/ocisshs/ci_surv1.aspx)
- ODH, Community Cancer Concerns: <http://www.healthy.ohio.gov/en/cancer/cancercon/Community%20Cancer%20Concerns.aspx>
- Cancer Clusters Communications Toolkit. A Collaboration of the CDC and the National Public Health Information Coalition. Available at: <http://www.nphic.org/toolkits/cancer-cluster>
- Morbidity and Mortality Weekly Report (MMWR). Investigating Suspected Cancer Clusters and Responding to Community Concerns: Guidelines from CDC and the Council of State and Territorial Epidemiologists. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6208a1.htm>
- American Cancer Society: <http://www.cancer.org>
- NCI: <http://www.cancer.gov>





# Chemicals and Cancer

## Answers to Frequently Asked Questions

### Where are chemicals in our environment found?

More than 100,000 chemicals are used by Americans, and about 1,000 new chemicals are introduced each year. These chemicals are found in everyday items such as foods, personal products, packaging, prescription drugs, and household and lawn care products. While some chemicals can be harmful, not all contact with chemicals is dangerous to your health.

Chemical substances and radioactive materials enter the environment from a source. Examples of outdoor sources include:

- Industrial facilities, e.g., factories and chemical plants
- Landfills
- Hazardous waste sites

Some examples of household sources include:

- Paints and paint strippers
- Household cleaners
- Cigarette smoke

### How can I be exposed to a chemical?

In order for you to be exposed to a chemical contaminant, you must come into direct contact with the contaminant through a completed exposure pathway. An exposure pathway is the route a substance takes from its source to its end point, and how people come into contact with it. An exposure pathway is termed complete if it has each of these five components: a source of contamination, an environmental transport mechanism (such as movement through groundwater), a point of exposure (such as a private well), a route of exposure (eating, drinking, breathing or touching), and an exposed population.

State and federal environmental regulatory agencies such as the Ohio Environmental Protection Agency (OEPA) or the U.S. EPA may be contacted for information if environmental contamination is of concern. Your local health department can answer questions regarding health concerns in your community. Also, the Agency for Toxic Substances and Disease Registry, a federal public health agency, can evaluate the public health impact posed by hazardous waste sites and releases of hazardous materials to the environment.

### Can exposure to chemicals cause cancer?

Certain chemicals, including benzene, beryllium, asbestos, vinyl chloride and arsenic, are known human carcinogens, meaning they have been found to cause cancer in humans.

Some chemicals are known to cause cancer in animals, but they have not been proven to cause cancer in humans. These chemicals are reasonably anticipated to cause cancer in humans and are sometimes called possible human carcinogens. Chloroform, DDT and polychlorinated biphenyls (PCBs) are examples of possible human carcinogens.

Your risk of developing cancer from exposure to a chemical depends on the following:

- The kind of chemical you were exposed to
- How much contact you had with the chemical
- How long the contact lasted
- How often you were exposed
- When you were exposed
- How you were exposed
- Your general health

The time in your life when you are exposed to a chemical is important because a small exposure in the womb, for example, may be more serious than a small exposure as an adult. The genes that you inherit from your parents also play a role.

*Coming into contact with a carcinogen does not mean you will get cancer. It depends on what you were exposed to, how often you were exposed and how much you were exposed to, among other factors.*

Determining if a chemical exposure is associated with cancer is difficult, due to unknown levels of exposure, exposures to more than one chemical and cancer's long latency period.

Some factors that increase your risk of developing cancer include behaviors such as smoking, heavy alcohol consumption, on-the-job exposure to chemicals, radiation, sun exposure and some viruses and bacteria. When all these risks are considered together, the role of chemical exposures in causing cancer is small and, as of now, not very clear.

## What substances are known to cause cancer?

A carcinogen is a substance or agent known to cause cancer. Several agencies have determined the cancer-causing potential of different substances. The National Toxicology Program (NTP) lists 56 substances “known to be human carcinogens” in its *Report on Carcinogens* (13<sup>th</sup> Edition, 2014). The report also lists 187 substances that are “reasonably anticipated to be human carcinogens.” The International Agency for Research on Cancer (IARC), part of the World Health Organization, has the most widely used system for classifying carcinogens.

### Cancers Associated with Various Chemicals \*

Cancer Site	Examples of chemicals or exposures
Bladder	Arsenic and inorganic arsenic compounds Benzidine Tobacco smoke <i>ortho</i> -Toluidine
Blood (Leukemia, Lymphoma)	Benzene Ionizing radiation 1,3-Butadiene
Brain	Ionizing radiation
Colon	Alcohol Tobacco smoke
Kidney	Arsenic Cadmium and cadmium compounds Trichloroethylene (TCE)
Liver	Alcohol TCE Vinyl chloride
Lung	Arsenic and inorganic arsenic compounds Asbestos (all forms) Beryllium and beryllium compounds Cadmium and cadmium compounds Chromium (hexavalent) compounds Coke oven emissions Radon-222 and its decay products Tobacco smoke
Oral Cavity & Pharynx	Alcohol Betel nut use Tobacco use (smoking and smokeless)
Skin	Arsenic and inorganic arsenic compounds Coal tars Overexposure to the sun Ultraviolet radiation from tanning booths

Sources: 1.) International Agency for Research on Cancer; 2.) National Toxicology Program, *Report on Carcinogens*, 13<sup>th</sup> Edition; U.S. Department of Health and Human Services, 2014.

## How can I avoid harmful exposures?

Though we do not fully understand why one person gets cancer and another doesn't, we do know that there are some steps you can take that may reduce your risk:

- Don't use tobacco and avoid secondhand smoke.
- Protect yourself from the sun's rays, especially if you burn easily. Use sunscreen and wear protective clothing.
- Be aware of the chemicals in the products you buy for your home. Wear a mask, gloves or other protective clothing to reduce your exposure to household chemicals.
- Store household chemicals such as cleaners, paints/finishes, degreasers and strippers safely and prevent chemicals from spilling, leaking and coming into contact with children and pets.
- Use chemicals in well-ventilated rooms or outside.
- Check your home for high levels of radon.
- Be aware of chemicals you are exposed to on the job.
- Wear personal protective equipment as required.

### Resources:

American Cancer Society  
[www.cancer.org](http://www.cancer.org)

Agency for Toxic Substances and Disease Registry  
[www.atsdr.cdc.gov](http://www.atsdr.cdc.gov)

International Agency for Research on Cancer  
[www.iarc.fr](http://www.iarc.fr)

National Toxicology Program  
[www.ntp.niehs.nih.gov](http://www.ntp.niehs.nih.gov)

Ohio Department of Health  
Cancer Programs  
[www.healthy.ohio.gov/cancer/cancprgms.aspx](http://www.healthy.ohio.gov/cancer/cancprgms.aspx)

\* Note: Due to limited space, the table presented here lists a select number of chemicals or exposures known to cause cancer. For a full listing of known and possible carcinogens, see the NTP and IARC resources provided.



A cancer risk factor is anything that increases a person’s risk of developing cancer. Non-modifiable cancer risk factors include genetics (e.g., genetic mutations), family history, age, gender, race and ethnicity. Modifiable cancer risk factors include health behaviors and lifestyle factors (e.g., tobacco and alcohol use, obesity). Environmental risk factors for cancer such as radiation, infectious agents and workplace exposures may be non-modifiable or modifiable. The causes of cancer vary greatly by site/type of cancer, and many risk factors have yet to be identified. It is often not just one factor that increases a person’s risk of developing cancer; rather, cancer most often results from a complex interaction of multiple factors.

The most effective way to prevent cancer is to control or change known, modifiable risk factors. The National Cancer Institute reports that 30 percent of all cancer deaths are caused by cigarette smoking. In addition, the American Cancer Society estimates that one-third of cancer deaths are linked to poor diet, physical inactivity, and overweight and obesity. Avoidance of chemicals and other substances in the environment may also reduce the risk of developing cancer. Non-modifiable, modifiable and environmental risk factors by cancer site/type are presented in the following table.

Site/Type	Non-Modifiable Risk Factors	Modifiable and Environmental Risk Factors
<b>Brain &amp; Other Central Nervous System (CNS)</b>	<p><b>Gene mutations:</b> Rare genetic mutations such as those causing neurofibromatosis, tuberous sclerosis, Li-Fraumeni syndrome and Von Hippel-Lindau (VHL) disease increase risk.</p> <p><b>Family history:</b> A family history of brain and other CNS cancer increases risk.</p>	<p><b>Ionizing radiation:</b> Radiation to the head, e.g., for treatment of ringworm or another cancer, increases risk.</p>
<b>Bladder</b>	<p><b>Personal history:</b> People who have had bladder cancer have an increased risk of getting the disease again.</p> <p><b>Family history:</b> People with family members who have had bladder cancer have a slightly increased risk.</p>	<p><b>Smoking:</b> Tobacco smoking causes most cases of bladder cancer. People who smoke for many years have a higher risk than nonsmokers or those who smoke for a short time.</p> <p><b>Certain cancer treatments:</b> People with cancer who have been treated with certain drugs (such as cyclophosphamide) may be at increased risk. Also, people who have had radiation therapy to the abdomen or pelvis may be at increased risk.</p> <p><b>Chemicals in the workplace:</b> Some people have a higher risk of bladder cancer because of cancer-causing chemicals in their workplace. Workers in the dye, rubber, chemical, metal, textile and leather industries may be at higher risk. In addition, hairdressers, machinists, printers, painters and truck drivers may have increased risk.</p> <p><b>Arsenic:</b> Arsenic is a poison that increases the risk of bladder cancer. In some areas of the world, arsenic may be found at high levels in drinking water. However, the United States has safety measures limiting the arsenic level in public drinking water.</p>

Site/Type	Non-Modifiable Risk Factors	Modifiable and Environmental Risk Factors
<b>Breast</b>	<p><b>Age:</b> 95 percent of breast cancers occur in women over age 40.</p> <p><b>Sex:</b> Breast cancer is 100 times more common among women than men.</p> <p><b>Race:</b> White women are slightly more likely to develop breast cancer than are black women, but black women are more likely to die of this cancer, probably because their tumors tend to be more aggressive.</p> <p><b>Ethnicity:</b> Ashkenazi Jews are at increased risk.</p> <p><b>Genetics:</b> A woman's lifetime risk of developing breast cancer is greatly increased if she inherits a harmful mutation in the BRCA1 gene or the BRCA2 gene. Men with these mutations also have increased risk.</p> <p><b>Personal history:</b> Women with a personal history of breast cancer, ductal carcinoma in situ (DCIS), lobular carcinoma in situ (LCIS), benign breast disease or high breast tissue density are at greater risk.</p> <p><b>Family history:</b> Risk increases if a first-degree relative (mother, sister or daughter) has had breast cancer.</p> <p><b>Long menstrual history:</b> Women who started menstruating before age 12 or who went through menopause after age 55 have higher risk.</p>	<p><b>Combination hormone replacement therapy:</b> Long-term use of combination hormone replacement therapy (estrogen-progestin) is associated with increased risk.</p> <p><b>Ionizing radiation:</b> Radiation therapy to the chest for the treatment of cancer increases the risk of breast cancer, starting 10 years after treatment. The risk of breast cancer depends on the dose of radiation and the age at which it is given. The risk is highest if radiation treatment was used during puberty, when breasts are forming.</p> <p><b>Obesity:</b> Obesity increases risk, especially in post-menopausal women.</p> <p><b>Alcohol:</b> Drinking alcohol increases risk. The level of risk rises as the amount of alcohol consumed increases.</p> <p><b>Late pregnancy or never being pregnant:</b> Risk is higher in women who become pregnant for the first time after age 35 or who never become pregnant.</p> <p><b>Diethylstilbestrol (DES):</b> Women who were given DES during pregnancy have slightly increased risk, and their daughters may also have increased risk.</p> <p><b>Night-shift work:</b> Several studies have suggested that women who work at night—for example, nurses on a night shift—may have an increased risk.</p>
<b>Cervix</b>	<p><b>Age:</b> Cervical cancer tends to occur in midlife. Half of women who develop this cancer are ages 35–55, and more than 15 percent are diagnosed at age 65 and older. Cervical cancer rarely develops in women younger than age 20.</p> <p><b>Race/ethnicity:</b> Incidence rates in Hispanic women and American Indian/Alaskan Native women are higher than in women from other racial/ethnic groups. Despite recent declines, mortality rates in black women remain higher than women of any other racial/ethnic group in the United States.</p>	<p><b>Human papillomavirus (HPV) infection:</b> The most common cause of cervical cancer is infection of the cervix with HPV. HPV infections that cause cervical cancer are spread mainly through sexual contact. Women who become sexually active at a young age and who have many sexual partners are at a greater risk of HPV infection and developing cervical cancer.</p> <p><b>Smoking:</b> Among women infected with HPV, those who smoke have twice the risk compared with nonsmokers.</p> <p><b>Multiple pregnancies:</b> Women who have had seven or more full-term pregnancies may have increased risk.</p> <p><b>Oral contraceptive use:</b> Taking birth control pills for five or more years increases risk; Taking them for 10 years or longer increases risk approximately four times compared with those who do not.</p> <p><b>DES:</b> Women whose mothers were given DES during pregnancy have slightly increased risk.</p>

Site/Type	Non-Modifiable Risk Factors	Modifiable and Environmental Risk Factors
<b>Colon &amp; Rectum</b>	<p><b>Age:</b> Most cases of colon and rectum cancer are diagnosed after age 50.</p> <p><b>Sex:</b> Men have higher incidence rates of colon and rectum cancer than women.</p> <p><b>Race:</b> Black men have the highest colon and rectum cancer incidence and mortality rates.</p> <p><b>Ethnicity:</b> Ashkenazi Jews are at increased risk.</p> <p><b>Personal history:</b> Having had colon and rectum cancer, intestinal polyps, ulcerative colitis, Crohn's disease or chronic inflammatory bowel disease increases risk.</p> <p><b>Family history:</b> Having a parent, brother, sister or child with colon and rectum cancer doubles a person's risk.</p> <p><b>Genetics:</b> The risk of colon and rectum cancer is increased when certain gene changes linked to familial adenomatous polyposis (FAP) or hereditary nonpolyposis colon cancer (HNPCC, also known as Lynch Syndrome) are inherited.</p>	<p><b>Alcohol:</b> Drinking three or more alcoholic beverages per day increases risk. Drinking alcohol is also linked to the risk of forming large colon and rectum adenomas (benign tumors).</p> <p><b>Smoking:</b> Cigarette smoking is linked to an increased risk of colon and rectum cancer and death from colon and rectum cancer. Smoking cigarettes is also linked to an increased risk of forming colon and rectum adenomas. Cigarette smokers who have had surgery to remove colon and rectum adenomas are at an increased risk for the adenomas to recur.</p> <p><b>Obesity:</b> Obesity is linked to an increased risk of colon and rectum cancer and death from colon and rectum cancer.</p>
<b>Esophagus</b>	<p><b>Personal history:</b> People who have had certain other cancers such as lung cancer, mouth cancer and throat cancer have a high risk of getting squamous cell carcinoma of the esophagus. This may be because all of these cancers can be caused by smoking.</p>	<p><b>Tobacco:</b> The use of tobacco products, including cigarettes, cigars, pipes and chewing tobacco, is a major risk factor for esophageal cancer.</p> <p><b>Alcohol:</b> Drinking alcohol increases risk. Combining smoking and drinking alcohol increases the risk of esophageal cancer much more than using either alone.</p> <p><b>Overweight or obesity:</b> People who are overweight or obese have a higher risk of adenocarcinoma of the esophagus.</p> <p><b>Reflux or Barrett's esophagus:</b> Long-term irritation of the lining of the esophagus, as happens with reflux and Barrett's esophagus, may increase risk.</p>
<b>Hodgkin Lymphoma</b>	<p><b>Age:</b> Hodgkin lymphoma is most common in early adulthood (ages 15–40, especially in a person's 20s) and in late adulthood (after age 55).</p> <p><b>Sex:</b> Hodgkin lymphoma occurs slightly more often in males than in females.</p> <p><b>Geography:</b> Hodgkin lymphoma is most common in the United States, Canada and northern Europe, and is least common in Asian countries.</p> <p><b>Family history:</b> Brothers and sisters of young people with this disease have a higher risk.</p>	<p><b>Epstein-Barr virus infection/mononucleosis:</b> People who have had infectious mononucleosis (sometimes called mono for short), an infection caused by the Epstein-Barr virus (EBV), have increased risk.</p> <p><b>Human immunodeficiency virus (HIV) infection:</b> People infected with HIV have increased risk.</p>

Site/Type	Non-Modifiable Risk Factors	Modifiable and Environmental Risk Factors
<b>Kidney &amp; Renal Pelvis</b>	<p><b>Family history:</b> People with a family member who has had kidney cancer have a slightly increased risk of the disease.</p> <p><b>Von Hippel-Lindau (VHL) syndrome:</b> VHL is a rare disease that runs in some families. It's caused by changes in the VHL <i>gene</i>. People with a changed VHL gene have increased risk.</p>	<p><b>Smoking:</b> People who smoke have a higher risk than nonsmokers. The risk is higher for those who smoke more cigarettes or smoke for a longer time.</p> <p><b>Obesity:</b> Being obese increases risk.</p> <p><b>High blood pressure:</b> Having high blood pressure may increase risk.</p> <p><b>Occupational exposures:</b> Many studies suggest that workplace exposure to certain substances increases the risk for kidney cancer. Some of these substances are cadmium, some herbicides and organic solvents, particularly trichloroethylene.</p>
<b>Larynx</b>	<p><b>Age:</b> More than half of all people diagnosed with laryngeal cancer are age 65 or older.</p> <p><b>Sex:</b> Cancer of the larynx is about four times more common in men than women.</p> <p><b>Race:</b> Cancer of the larynx is more common among African Americans and whites than among Asians and Latinos.</p>	<p><b>Smoking:</b> Smoking tobacco causes most laryngeal cancers. Heavy smokers who have smoked tobacco for a long time are most at risk for laryngeal cancer.</p> <p><b>Alcohol:</b> People who are heavy drinkers are more likely to develop laryngeal cancer than people who don't drink alcohol. The risk increases with the amount of alcohol that a person drinks.</p> <p><b>Occupational exposures:</b> Long and intense exposures to wood dust, paint fumes and certain chemicals used in the metalworking, petroleum, plastics and textile industries can increase risk. Some studies have found a possible link between asbestos exposure and laryngeal cancer.</p>
<b>Leukemia</b>	<p><b>Age:</b> Acute lymphocytic leukemia (ALL) is most commonly diagnosed among children; whereas, acute myeloid leukemia (AML), chronic lymphocytic leukemia (CLL), and chronic myeloid leukemia (CML) occur mainly in adults.</p> <p><b>Sex:</b> Leukemia is more common among men than women.</p> <p><b>Race:</b> Whites have higher rates of leukemia than African Americans.</p> <p><b>Family history:</b> First-degree relatives of CLL patients have increased risk of CLL.</p> <p><b>Inherited syndromes:</b> Certain inherited conditions such as Down syndrome, Klinefelter syndrome, Fanconi's anemia, Wiskott-Aldrich syndrome, Bloom's syndrome, Li-Fraumeni syndrome and ataxia telangiectasia increase risk.</p> <p><b>Myelodysplastic syndrome:</b> This blood disease increases risk of AML.</p>	<p><b>Ionizing radiation:</b> Exposure to large amounts of ionizing radiation (e.g., from an atomic bomb explosion, nuclear reactor accident or medical treatments that use radiation) increases risk of AML, ALL and CML.</p> <p><b>Benzene:</b> Long-term exposure to high levels of benzene increases risk of AML and possibly ALL.</p> <p><b>Chemotherapy:</b> Certain chemotherapy drugs used to treat other cancers increase risk of AML and ALL.</p> <p><b>Cigarette smoking:</b> Carcinogens in cigarette smoke, particularly benzene, increase risk of AML.</p> <p><b>Human T-cell lymphotropic virus (HTLV-1) infection:</b> Infection with HTLV-1 increases risk of a rare type of leukemia known as adult T-cell leukemia.</p> <p><b>Chemical exposures:</b> Certain chemical exposures such as long-term exposure to high levels of benzene increase risk of AML and ALL. Benzene is a solvent used in the rubber industry, oil refineries, chemical plants, shoe manufacturing and gasoline-related industries, and is also present in cigarette smoke, some glues, cleaning products, detergents, art supplies and paint strippers.</p>



Site/Type	Non-Modifiable Risk Factors	Modifiable and Environmental Risk Factors
<p><b>Liver &amp; Intrahepatic Bile Duct</b></p>	<p><b>Iron storage disease:</b> Liver cancer may develop among people with a disease that causes the body to store too much iron in the liver and other organs.</p>	<p><b>Heavy alcohol use:</b> Having more than two drinks of alcohol each day for many years increases risk.</p> <p><b>Obesity and diabetes:</b> Studies have shown that obesity and diabetes may be important risk factors for liver cancer.</p> <p><b>Infection with hepatitis B virus (HBV) or hepatitis C virus (HCV):</b> Liver cancer can develop after many years of infection with either of these viruses. Around the world, infections with HBV or HCV are the main cause of liver cancer.</p> <p><b>Aflatoxin:</b> Liver cancer can be caused by aflatoxin, a harmful substance made by certain types of mold. Aflatoxin can form on peanuts, corn and other nuts and grains.</p> <p><b>Vinyl chloride:</b> Exposure to this chemical increases the risk of angiosarcoma of the liver.</p>
<p><b>Lung &amp; Bronchus</b></p>	<p><b>Age:</b> About two out of three people diagnosed with lung and bronchus cancer are older than age 65.</p> <p><b>Sex:</b> Lung and bronchus cancer is more common among men compared with women.</p> <p><b>Personal history:</b> Having had lung and bronchus cancer before increases risk.</p> <p><b>Family history:</b> Having parents or siblings who have had lung cancer may increase risk.</p>	<p><b>Smoking:</b> Tobacco (cigarette, cigar and pipe) smoking is the most important risk factor for lung cancer. Tobacco smoking causes about nine out of 10 cases of lung cancer in men and about eight out of 10 cases of lung cancer in women. Studies have shown that smoking low tar or low nicotine cigarettes does not lower the risk of lung cancer. Studies also show that the risk of lung cancer from smoking cigarettes increases with the number of cigarettes smoked per day and the number of years smoked. People who smoke have about 20 times the risk of lung cancer compared with those who do not smoke.</p> <p><b>Secondhand smoke:</b> Being exposed to secondhand tobacco smoke increases risk.</p> <p><b>Beta carotene supplements in heavy smokers:</b> Taking beta carotene supplements (pills) increases the risk of lung cancer, especially in people who smoke one or more packs a day. This risk is higher in smokers who have at least one alcoholic drink every day.</p> <p><b>Occupational or environmental exposures:</b> Exposure to substances such as radon, asbestos, arsenic, radioactive ores (e.g., uranium), silica, beryllium, cadmium, vinyl chloride, chromium compounds, nickel chromates, coal products, mustard gas, chloromethyl ethers and diesel exhaust increases risk.</p> <p><b>Air pollution:</b> Living in areas with higher levels of air pollution increases risk.</p>

Site/Type	Non-Modifiable Risk Factors	Modifiable and Environmental Risk Factors
<b>Melanoma of the Skin</b>	<p><b>Age:</b> Melanoma is more common in older people; however, it is one of the most common cancers in people younger than age 30.</p> <p><b>Sex:</b> Men are more likely to develop this cancer than women.</p> <p><b>Race:</b> Risk of melanoma is more than 10 times higher for whites than for African Americans.</p> <p><b>Dysplastic moles:</b> Having these abnormal moles increases risk.</p> <p><b>Fair skin:</b> Melanoma occurs more frequently in people who have fair skin that burns or freckles easily, red or blond hair, or blue, green or other light-colored eyes.</p> <p><b>More than 50 ordinary moles:</b> Having many moles increases risk.</p> <p><b>Personal history of melanoma or skin cancer:</b> People who have had melanoma or non-melanoma skin cancer (basal cell carcinoma or squamous cell carcinoma) are at increased risk of melanoma.</p> <p><b>Family history:</b> Having two or more close relatives who have had melanoma increases risk.</p> <p><b>Weakened immune system:</b> People whose immune systems are weakened by certain cancers, by drugs given following organ transplantation or by HIV are at increased risk.</p>	<p><b>Sun and ultraviolet (UV) radiation:</b> UV radiation from both the sun and artificial sources such as sunlamps and tanning booths increases risk.</p> <p><b>Severe, blistering sunburns:</b> People who have had at least one severe, blistering sunburn as a child or teenager are at increased risk of melanoma. Sunburns in adulthood also increase risk.</p>
<b>Multiple Myeloma</b>	<p><b>Age:</b> The risk of multiple myeloma increases as people age. Less than 1 percent of cases are diagnosed in people younger than age 35. Most people diagnosed with this cancer are at least 65 years old.</p> <p><b>Sex:</b> Men are slightly more likely to develop multiple myeloma than women.</p> <p><b>Race:</b> Multiple myeloma is more than twice as common in African Americans compared with white Americans. The reason is not known.</p> <p><b>Family history:</b> Multiple myeloma seems to run in some families. Someone who has a sibling or parent with myeloma is four times more likely to get it than would be expected. Most patients have no affected relatives, so this accounts for only a small number of cases.</p> <p><b>Having other plasma cell diseases:</b> Many people with monoclonal gammopathy of undetermined significance (MGUS) or solitary plasmacytoma will eventually develop multiple myeloma.</p>	<p><b>Radiation:</b> People who were exposed to radiation from an atomic bomb blast have a higher risk of multiple myeloma. Exposure to lower levels of radiation may also increase risk. This accounts for a very small number of cases.</p>
<b>Non-Hodgkin Lymphoma (NHL)</b>	<p><b>Age:</b> Risk increases with advancing age.</p> <p><b>Sex:</b> Lymphoma is more common in men than women.</p> <p><b>Race:</b> Whites are more likely to develop NHL than African Americans or Asians.</p> <p><b>Weakened immune system:</b> HIV infection, inherited immunodeficiency syndromes and drugs given following organ transplants to suppress immunity increase risk. Some autoimmune diseases (e.g., rheumatoid arthritis, lupus) have been linked with an increased risk of NHL.</p>	<p><b>Infections:</b> Infection with HTLV-1, HIV, <i>Helicobacter pylori</i>, hepatitis C virus or Epstein-Barr virus increases risk.</p> <p><b>Chemical exposures:</b> Some studies have suggested that chemicals such as benzene and certain herbicides and insecticides (weed- and insect-killing substances) may be linked with an increased risk of NHL.</p>

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<b>Oral Cavity &amp; Pharynx</b>	<p><b>Age:</b> Most patients with these cancers are older than age 55. People with oral cancers linked to HPV infection tend to be younger.</p> <p><b>Sex:</b> Men are more than twice as likely to develop this cancer type compared with females, likely due to higher tobacco and alcohol use.</p> <p><b>Personal history:</b> People who have had oral cavity and pharynx cancer are at increased risk of developing another.</p>	<p><b>Tobacco use:</b> Most patients with this cancer type use tobacco (cigarette, cigar, pipe or smokeless tobacco), and risk increases with the amount and duration of use.</p> <p><b>Alcohol:</b> Drinking alcohol increases risk, especially if combined with tobacco use.</p> <p><b>Sun exposure:</b> Lip cancer is more common among those who have prolonged exposure to sunlight.</p> <p><b>HPV infection:</b> Being infected with a certain type of HPV virus, especially HPV type 16, increases the risk of oral cancer.</p> <p><b>Betel nut use:</b> Betel nut is a type of palm seed wrapped with a betel leaf and sometimes mixed with spices, sweeteners and tobacco. Chewing betel nut, which is most common in Asia, causes oral cancer.</p>
<b>Ovary</b>	<p><b>Age:</b> The risk of developing ovarian cancer increases with age. Ovarian cancer is rare in women younger than age 40. Most ovarian cancers develop after menopause.</p> <p><b>Obesity:</b> Obese women (those with a body mass index of 30 or higher) have increased risk.</p> <p><b>Reproductive history:</b> Women who had their first full-term pregnancy after age 35 or who never carry a pregnancy to term have a higher risk of ovarian cancer.</p> <p><b>Inherited genetic mutations:</b> A small portion of ovarian cancers occur in women with inherited gene mutations linked to an increased risk of ovarian cancer. These include mutations in the BRCA1 and BRCA2 genes.</p>	<p><b>Oral contraceptives:</b> Women who have used oral contraceptives have decreased risk.</p>
<b>Pancreas</b>	<p><b>Diabetes:</b> People with diabetes are more likely to develop pancreatic cancer.</p> <p><b>Family history:</b> Having a mother, father, sister or brother with pancreatic cancer increases the risk of developing the disease.</p> <p><b>Inflammation of the pancreas:</b> Pancreatitis is a painful inflammation of the pancreas. Having pancreatitis for a long time may increase risk.</p>	<p><b>Smoking:</b> Smoking tobacco is the most important risk factor for pancreatic cancer. People who smoke tobacco are more likely than nonsmokers to develop this disease. Heavy smokers are most at risk.</p> <p><b>Obesity:</b> People who are overweight or obese are slightly more likely than other people to develop pancreatic cancer.</p>
<b>Prostate</b>	<p><b>Age:</b> About two-thirds of prostate cancers are diagnosed in men over age 65.</p> <p><b>Race:</b> Black men are more likely than white men to be diagnosed with this cancer.</p> <p><b>Family history:</b> A man whose father, brother or son has had prostate cancer has a higher-than-average risk.</p> <p><b>Genetic changes:</b> Several inherited gene changes seem to raise prostate cancer risk. Mutations in BRCA1 or BRCA2 genes may also increase prostate cancer risk in some men.</p> <p><b>Prostate changes:</b> Men with abnormal prostate cells, called high-grade prostatic intraepithelial neoplasia, may have increased risk.</p>	<p><b>Vitamin E:</b> The Selenium and Vitamin E Cancer Prevention Trial (SELECT) found that vitamin E taken alone increased the risk of prostate cancer. The risk continued even after the men stopped taking vitamin E.</p> <p><b>Folic acid:</b> A 10-year study showed that the risk of prostate cancer was increased in men who took one milligram supplements of folic acid. However, the risk of prostate cancer was lower in men who had enough folate in their diets.</p> <p><b>Dairy and calcium:</b> A diet high in dairy foods and calcium may cause a small increase in the risk of prostate cancer.</p>

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Stomach	<p><b>Long-term inflammation of the stomach:</b> People who have conditions associated with long-term stomach inflammation (such as the blood disease pernicious anemia) are at increased risk of stomach cancer. Also, people who have had part of their stomach removed may have long-term stomach inflammation and increased risk of stomach cancer many years after their surgery.</p> <p><b>Family history:</b> Close relatives (parents, brothers, sisters or children) of a person with a history of stomach cancer are slightly more likely to develop the disease themselves. If many close relatives have a history of stomach cancer, the risk is even greater.</p>	<p><b>Smoking:</b> Smokers are more likely than nonsmokers to develop stomach cancer. Heavy smokers are most at risk.</p> <p><b>Poor diet:</b> Studies suggest that people who eat a diet high in foods that are smoked, salted or pickled have an increased risk for stomach cancer. People who eat a diet high in fresh fruits and vegetables may have a lower risk of this disease.</p> <p><b>Lack of physical activity:</b> A lack of physical activity may increase risk.</p> <p><b>Obesity:</b> People who are obese may have an increased risk of cancer developing in the upper part of the stomach.</p> <p><b><i>Helicobacter pylori</i> (<i>H. pylori</i>) infection:</b> <i>H. pylori</i> is a bacterium that commonly infects the inner lining (the mucosa) of the stomach. Infection with <i>H. pylori</i> can cause stomach inflammation and peptic ulcers. It also increases the risk of stomach cancer, but only a small number of infected people develop stomach cancer.</p>
Testis	<p><b>Age:</b> About half of testicular cancers occur in men between the ages of 20 and 34.</p> <p><b>Race:</b> Risk is higher among whites than African Americans and Asian/Pacific Islanders.</p> <p><b>Family history:</b> A man whose father or brother has had testicular cancer has increased risk.</p> <p><b>Cryptorchidism:</b> This condition in which the testicles do not descend into the scrotum before birth increases risk.</p> <p><b>Personal history:</b> A man who has developed cancer in one testicle has increased risk of developing cancer in the other.</p>	
Thyroid	<p><b>Sex:</b> For unclear reasons, thyroid cancers and other diseases of the thyroid occur about three times more often in women than in men.</p> <p><b>Age:</b> The risk peaks earlier for women (who are most often in their 40s or 50s when diagnosed) than for men (who are usually in their 60s or 70s).</p> <p><b>Hereditary conditions and family history:</b> Several inherited conditions and family history have been linked to different types of thyroid cancer.</p>	<p><b>Diet low in iodine:</b> Follicular thyroid cancers are more common in areas of the world where people's diets are low in iodine. In the United States, most people get enough iodine in their diet because it is added to table salt and other foods. A diet low in iodine may also increase the risk of papillary thyroid cancer if the person also is exposed to radioactivity.</p> <p><b>Ionizing radiation:</b> Exposure to radiation is a proven risk factor for thyroid cancer. Sources of such radiation include certain medical treatments and radiation fallout from power plant accidents or nuclear weapons. Head or neck radiation treatments in childhood are also a risk factor for thyroid cancer.</p>

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<b>Uterine Corpus and Uterine, Not Otherwise Specified</b>	<p><b>Age:</b> Most cases are diagnosed in women older than age 50.</p> <p><b>Race:</b> White women are more likely than black women to develop this cancer.</p> <p><b>Long menstrual history:</b> Women are at increased risk of uterine (endometrial) cancer if they had their first menstrual period before age 12 and/or went through menopause after age 55.</p> <p><b>Family history:</b> Women with family members who have had uterine cancer or an inherited form of colorectal cancer known as Lynch syndrome are at increased risk.</p> <p><b>Abnormal overgrowth of the endometrium:</b> An abnormal increase in the number of cells in the lining of the uterus (endometrial hyperplasia) increases risk.</p>	<p><b>Reproductive history:</b> Women are at increased risk of uterine cancer if they have never had children.</p> <p><b>Obesity:</b> Being overweight or obese is associated with increased risk.</p> <p><b>Hormone therapy:</b> The risk of uterine cancer is higher among women who used estrogen alone (without progesterone) for menopausal hormone therapy for many years. Addition of progesterone to estrogen therapy negates this risk.</p> <p><b>Tamoxifen:</b> Women who took the drug tamoxifen to prevent or treat breast cancer are at increased risk of uterine cancer.</p>

Sources: National Cancer Institute website, [www.cancer.gov](http://www.cancer.gov); American Cancer Society website, [www.cancer.org](http://www.cancer.org).



