

# Table of Known Carcinogens

1/17/2022

The table below provides some information about the scientific community's understanding of substances that are known to cause cancer. The table includes, in a condensed way, a list of substances known to cause cancer in humans based on the National Toxicology Program's (NTP's) 15<sup>th</sup> Report on Carcinogens found on the U.S. Department of Health and Human Services (HHS) webpage - [15th Report on Carcinogens](https://ntp.niehs.nih.gov/whatwestudy/assessments/cancer/roc/index.html) (<https://ntp.niehs.nih.gov/whatwestudy/assessments/cancer/roc/index.html>).

The International Agency for Research on Cancer (IARC) also creates a similar list of substances known to cause cancer. NTP and IARC only list substances that their organization has evaluated. For more information on IARC's list, visit their webpage at [Agents Classified by the IARC Monographs, Volumes 1–132](https://monographs.iarc.who.int/agents-classified-by-the-iarc/) (<https://monographs.iarc.who.int/agents-classified-by-the-iarc/>).

Both NTP and IARC also provide a list of substances classified as “reasonably anticipated to cause cancer in humans” or “probably carcinogenic to humans.” These substances most often have more limited evidence of a cause-and-effect relationship between exposure and cancer in humans and/or sufficient evidence of cancer in experimental animals.

The American Cancer Society also provides a list of known and probable human carcinogens from NTP and IARC found on their webpage titled [Known and Probable Human Carcinogens](https://www.cancer.org/healthy/cancer-causes/general-info/known-and-probable-human-carcinogens.html) (<https://www.cancer.org/healthy/cancer-causes/general-info/known-and-probable-human-carcinogens.html>). They include a list of bullets of helpful information to know about the lists.

As NTP notes, identification of carcinogens is a key step in cancer prevention. This table is provided to help people understand some of the known causes of cancer so they can potentially take action to reduce current exposures.

## About this list

- The list has substances that can cause cancer but does not have information on how likely it is that something will cause cancer in any person. For example, there is strong evidence that exposure to both tobacco (smoking) and dioxins (eating processed meat) can cause cancer, however, smoking is much more likely to cause cancer than eating processed meat.
- A carcinogen does not always cause cancer in every person, every time there is any kind of exposure. Some may only be carcinogenic if a person is exposed in a certain way (for example, swallowing it as opposed to touching it). Some may only cause cancer in people who have a certain genetic makeup. Some of these substances may lead to cancer after only a very small exposure, while others might require intense exposure over many years.

TABLE OF KNOWN CARCINOGENS

- Even if a substance or exposure is known or suspected to cause cancer, this does not necessarily mean that it can or should be avoided. For example, sunlight is a major source of ultraviolet (UV) rays, which are a known cause of skin cancer, but it's not possible to completely avoid the sun. Another example is commonly used medicines, particularly drugs used to treat cancer. If you have questions about a medicine that appears on one of these lists, be sure to ask your doctor.

**Table of Known Carcinogens**

Substance	Main Sources of Exposure to Substance	Main Cancer Type(s) Associated with Exposure
Aflatoxins	Toxins from fungi in contaminated foods (grains, peanuts, tree nuts) and meat, eggs, milk, etc. from animals that consume contaminated feed. Workers may breathe contaminated crop dust.	liver
Alcoholic Beverages	Alcoholic beverage consumption	mouth, larynx, esophagus, liver, colorectum, and breast
4-Aminobiphenyl	May be used in laboratory applications. Former occupational exposure, use as a color additive. Found in tobacco smoke.	urinary-bladder
Arsenic and Arsenic Compounds	Primarily foods and drinking water. Soil and groundwater that contains arsenic can be naturally occurring, or it can be from use or improper disposal of arsenic compounds.	skin, lung, digestive tract, liver, urinary bladder, kidney, lymphatic, and hematopoietic systems
Asbestos (Crocidolite, Chrysotile, Amosite, Actinolite, Anthophyllite, Tremolite)	Airborne microscopic fibers released into the air from asbestos materials in buildings, including insulation, and vehicle brake linings. Workers may be exposed when working with or removing asbestos products.	lung, mesothelioma of the lung and abdominal cavity, larynx, ovary
Benzene	Breathing in tobacco smoke, gasoline vapors, auto exhaust. Workers may be exposed during production of benzene or use of substances containing it.	leukemia
Benzidine and Dyes Metabolized to Benzidine	May be used in laboratory applications. Former occupational exposure, use in the production of dyes.	bladder
Beryllium and Beryllium Compounds	Primarily inhalation of beryllium dusts or fumes during occupational exposure.	lung

TABLE OF KNOWN CARCINOGENS

Substance	Main Sources of Exposure to Substance	Main Cancer Type(s) Associated with Exposure
Bis(chloromethyl) Ether and Technical-Grade Chloromethyl Methyl Ether	Former occupational exposure, use as a chemical intermediate.	lung
1,3-Butadiene	Breathing in tobacco smoke, gasoline vapors, auto exhaust. Also emitted from petroleum refineries and from incomplete combustion of a variety of fuels. Workers may be exposed during production or by manufacturing synthetic rubber products.	lymphatic and hematopoietic systems (lymphosarcoma and reticulosarcoma, leukemia)
Cadmium and Cadmium Compounds	Primarily inhalation of cadmium dusts or fumes during occupational exposure. Found in tobacco smoke. Food is the major source of cadmium exposure for nonsmokers.	lung
Chromium VI Compounds	Occurs naturally in the earth's crust and is widely distributed in air, water, soil, and food. Workers and people who live near industrial facilities that use chromium VI compounds or near chromium waste disposal sites have the greatest potential for exposure.	lung, sinonasal cavity
Coal-Tar and Coal-Tar Pitches	Found in products used to treat psoriasis and eczema and in shampoos to treat dandruff. Workers may be exposed at foundries and during coke production, coal gasification, and aluminum production. Can be environmental contaminants.	skin, scrotal, lung, bladder, kidney, digestive tract
Coke Oven Emissions	Workers at coking plants and coal tar production plants, as well as people who live near these plants, may be exposed to coke-oven emissions in air.	lung, kidney
Dioxin (2,3,7,8-Tetrachlorodibenzo-p-dioxin)	Meat, fish, and dairy products; minor sources include incineration or other combustion processes. Occupational exposures include firefighting, paper bleaching, chemical production, etc.	increased risk of all cancers combined; lung, non-Hodgkin's lymphoma
Erionite	A naturally occurring fibrous mineral in the western U.S. that is no longer mined or marketed for commercial use.	mesothelioma, lung
Ethylene Oxide	Used in the production of chemicals, including ethylene glycol (antifreeze). Also used as a fumigant or sterilizing agent. People are exposed to ethylene oxide in the workplace, in the environment, in tobacco smoke, and through use of products that have been sterilized with the compound, including medical products, food, clothing, cosmetics, etc.	lymphoma and leukemia

TABLE OF KNOWN CARCINOGENS

Substance	Main Sources of Exposure to Substance	Main Cancer Type(s) Associated with Exposure
Formaldehyde	Combustion sources including auto exhaust, power plants, incinerators, refineries, forest fires, wood stoves, and tobacco products. Off gassing from construction, home-furnishing products, and consumer goods.	nasopharyngeal, sinonasal, lymphohematopietic
<b>Ionizing Radiation:</b> Radon, X-Radiation and Gamma Radiation, Neutrons, Thorium Dioxide"	Natural sources contribute over 80% of the general population's exposure to all types of ionizing radiation; radon gas and its decay products account for about two thirds of natural exposure. The remaining exposure to ionizing radiation is mainly from medical procedures and consumer products.	lung, leukemia, breast, thyroid
<b>Medical Drugs:</b> 1-(2-Chloroethyl)-3-(4-Methylcyclohexyl)-1-Nitrosourea, 1,4-Butanediol Dimethanesulfonate, Analgesic Mixtures Containing Phenacetin, Aristolochic Acid I and II, Azathioprine, Chlorambucil, Cyclophosphamide, Cyclosporin A, Diethylstilbestrol, Estrogens, Melphalan, Methoxsalen with Ultraviolet A Therapy, Steroidal, Tamoxifen, Thiotepa	This medical drug list includes currently and formerly used drugs for a variety of uses; many are for cancer treatment or for use as an immunosuppressant.	many different sites, leukemia is main cancer site for several drugs
Mineral Oils: Untreated and Mildly Treated	The general population potentially is exposed to mineral oils that occur naturally or are present as environmental contaminants. Workers in a variety of manufacturing facilities may be exposed.	scrotum, skin, others
Mustard Gas	Possible exposure to military personnel and people living near military installations where mustard gas is stockpiled and destroyed, or in the event of an accidental release or a chemical-warfare attack.	lung or other respiratory tract
2-Naphthylamine	Former occupational exposure; now banned. Found in tobacco smoke.	urinary bladder
Nickel Compounds	Primarily food, but also from nickel alloys and nickel-plated materials, such as coins, steel, and jewelry. Occupational exposure to nickel occurs mainly through inhalation of dust particles and fumes or through dermal contact.	lung and nasal cancer

TABLE OF KNOWN CARCINOGENS

Substance	Main Sources of Exposure to Substance	Main Cancer Type(s) Associated with Exposure
Silica, Crystalline (Respirable Size), Cristobalite, Quartz, Tridymite	An abundant natural material and can be an air contaminant, particularly in occupational settings or near quarries and sand and gravel operations. Also exposure from products such as abrasives, sandpaper, grouts, and concrete.	lung
Soots	Fireplaces, furnaces, engine exhaust, and particulate emissions from any combustion source. Occupational exposure may occur among chimney sweeps, heating-unit service personnel, brick masons, building demolition personnel, firefighters, and anyone who works where organic materials are burned.	scrotal and skin cancers, prostate, urinary-bladder, lymphatic, hematopoietic, esophageal, lung
Sulfuric Acid (Strong Inorganic Acid Mists Containing Sulfuric Acid)	Occupational exposure, particularly during chemical manufacture but also in other industries. Both natural and industrial sources contribute to sulfuric acid in the environment.	laryngeal, lung
Tobacco Smoking, Environmental Tobacco Smoke, Smokeless Tobacco	Tobacco contains more than 2,500 chemical constituents, many of which are known human carcinogens.	Smoking - lung, urinary bladder, renal pelvis, oral cavity, pharynx, larynx, esophagus, lip, pancreas, nasal cavity, stomach, colorectum, liver, kidney, ureter, cervix, ovary, myeloid leukemia. Secondhand smoke - hepatoblastoma and leukemia (ALL) in children, lung, nasal sinus. Smokeless - oral cavity, esophagus, pancreas
o-Toluidine	Occupational exposure; found in tobacco smoke, dental products (e.g., prilocaine), consumer products (e.g., hair dyes, dyestuff in clothing and cosmetics), food, and the environment.	urinary bladder cancer
Trichloroethylene	Occupational exposure as a degreaser or industrial solvent. Can be found in ambient air near industrial sources, as a contaminant in soil and groundwater, and in consumer products.	kidney
Ultraviolet Radiation - Solar Radiation, Broad Spectrum, Sunlamps and Sunbeds	Outdoor workers and others who have a lot of exposure to the sun or use tanning beds.	skin, melanoma and non-melanoma
Vinyl Chloride	Occupational exposure – it is used almost exclusively by the plastics industry to produce polyvinyl chloride (PVC) and copolymers. Potential exposure to people living near industrial emission sources. It can be a contaminant in drinking water for a very small percentage of the population.	hepatic angiosarcoma (blood vessels of the liver)
<b>Viruses and Bacteria:</b> Helicobacter pylori (chronic bacterial infection), Epstein-Barr	Mainly person-to-person contact, also some via intravenous drug use.	many different sites; notably Hepatitis B/C is liver and Human Papillomavirus is largely cervical

TABLE OF KNOWN CARCINOGENS

Substance	Main Sources of Exposure to Substance	Main Cancer Type(s) Associated with Exposure
Virus, Hepatitis B Virus, Hepatitis C Virus, Human Immunodeficiency Virus Type 1, Human Papillomaviruses, Human T-Cell Lymphotropic Virus Type 1, Kaposi Sarcoma-Associated Herpesvirus, Merkel Cell Polyomavirus"		
Wood Dust	Produced in woodworking industries as a by-product of the manufacture of wood products; exposure occurs when individuals use machinery or tools to cut or shape wood.	nasal cavity

Minnesota Department of Health | Site Assessment and Consultation Unit  
 625 Robert Street N. | PO Box 64975 | St. Paul, MN 55164-0975  
 Phone: 651-201-4897 or toll-free 1-800-657-3908  
[health.hazard@state.mn.us](mailto:health.hazard@state.mn.us) | [www.health.state.mn.us](http://www.health.state.mn.us)

To obtain this information in a different format, call: 651-201-4897.