

**Circle Of Life<sup>SM</sup>: Cancer Education and Wellness for American Indian and Alaska Native Communities**



**American Cancer Society Circle Of Life<sup>SM</sup>**  
*Cancer Education and Wellness for American Indian and Alaska Native Communities*

**Wellness Along the Cancer Journey:  
Healthy Habits and Cancer Screening**

Revised October 2015

**Chapter 5: Environment and Infectious Diseases**



## **Environment and Infectious Diseases**

### **Group Discussion**

- 1) A substance or exposure that can lead to cancer is called a carcinogen.
  - a) True
  - b) False
  
- 1) Certain types of Human Papilloma Virus (HPV) cause cervical cancer.
  - a) True
  - b) False

### **Substances or Exposures that Cause Cancer**

Along with smoking, diet, and sun exposure, the environment can include chemicals, radiation, and infectious diseases that may cause cancer. Substances and exposures that may lead to cancer are called carcinogens. Different carcinogens work in different ways to cause changes in the way a cell grows to become cancer. Some may cause cancer only after prolonged, high levels of exposure. For any one person, the cancer risk depends on many factors. This can include how they are exposed, how long and intense the exposure was, and the person's genetic makeup.

Whether or not a substance causes cancer (is carcinogenic) is tested by studying the patterns of exposure and the outcomes of cancer in different groups. Substances are placed into three main groups: known to be carcinogenic to humans, probably carcinogenic to humans, and not carcinogenic to humans. As mentioned in the tobacco section, there are thousands of different chemicals in cigarette smoke, and about 70 are known to cause cancer. Appendix D has a list of substances that are known to cause cancer. People can also go to the American Cancer Society's Web site – [www.cancer.org](http://www.cancer.org) – and look up “carcinogens” to learn more.

### **Chemicals**

Chemicals like benzene and arsenic have been linked to cancer. These and other chemicals are often identified using studies that look back in time at cancer cases and study their exposures to chemicals. Other studies are done using laboratory tests on animals. These studies show that the chemicals differ in the amount of harm they may cause to humans.

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### ***Radiation***

Radiation is the emission (sending out) of energy from any source. The light that comes from the sun is a source of radiation. So is the heat that is constantly coming off our bodies. When talking about radiation, however, most people think of only certain kinds of radiation -- such as those produced by radioactive materials or nuclear reactions. Most forms of radiation, such as light and heat, have not been linked to cancer. Only high-energy radiation has been proven to damage DNA, which can lead to cancer. High-energy radiation can break the bonds of molecules. High-energy radiation and some types of ultraviolet radiation are called "ionizing radiation". Ionizing radiation can pass through the cells of the body and cause mutations (changes) in the cell's DNA. These types of changes can lead to cancer.

### ***Medical Radiation***

Medical radiation is a type of ionizing radiation that is used for x-ray exams and other tests, as well as for radiation treatment. Ionizing radiation is used to treat some types of cancer and involves dosages many thousands of times higher than those used in x-ray exams. During radiation treatment, high doses of ionizing radiation are directed at the cancer. This results in the death of the cancer cells and some of the normal cells too. But it can also lead to changes in cells that survive the radiation. Over time, some of those cells can develop into another cancer (called a second primary cancer), although this does not happen often.

People who get a lot of CT (computed tomography) scans, especially as children, are likely to get a fair amount of radiation. This could put them at higher risk of cancer. Health care providers are trying to reduce the amount of radiation a CT scan uses. They're also substituting scans (like MRI or ultrasound) that don't use radiation when they can.

Overall, radiation alone does not appear to be very potent at causing second tumors. This is most likely due to the fact that it is often used in a small area, which means fewer normal cells are exposed to radiation. But treatment for Hodgkin disease, a type of lymphoma, often delivers low radiation doses to large amounts of normal tissue. People with Hodgkin disease who are treated with radiation are at an increased risk for having a second primary cancer.

When thinking about radiation exposure from radiation treatment, the benefits most often outweigh the risks. Still, some combinations of radiation and

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chemotherapy are more risky than others. More research is needed in this area so that optimal treatment can be given that helps keep down the risk of second primary cancers.

### **Consumer Products**

People are sometimes concerned about everyday things that might pose a cancer risk. Sometimes, a person hears a rumor about these things, in which can often take on a life of their own. We will address some of these questions here.

***Antiperspirants.*** There is no good scientific evidence to support claims that antiperspirants can increase a person's risk for breast cancer. There are no strong studies in the available medical literature that link breast cancer risk and antiperspirant use.

***Talc.*** It has been suggested that talcum powder may be cause cancer in the covering layer of the ovaries. Talc is thought to get there after being applied to the genital area, sanitary napkins, diaphragms, or condoms by moving through the vagina, uterus, and fallopian tubes to the ovary. Several studies have looked at the relationship between use of talcum powder and cancer of the ovary. Findings are mixed, with some studies reporting a slightly increased risk and some reporting no link.

***Hair Dye.*** Studies have looked at whether people who use hair dye and people who work with it have a higher risk of bladder cancer, leukemia, multiple myeloma, Hodgkin disease, non-Hodgkin lymphoma, lung cancer, breast cancer, oral cancer, and cervical cancer. These studies suggest very small increased risks for bladder cancer, leukemia, and certain types of non-Hodgkin lymphoma in those who work with hair dyes. Most of the evidence does not support a link to cancer risk in people who dye their hair. Some studies show a slight increase in risk in blood cancers in women who started dying their hair before 1980 and/or use darker colors. Other studies have not found an increase in risk. Taken together, these studies suggest that if there is a link, it is too weak to be thought of as a major public health concern.

***Cosmetics.*** Cosmetics include a wide range of products. Some of these can cause health problems for a few people, such as irritation of the skin or eyes, and allergic reactions. These types of problems are usually short-term and go away if use of the product is stopped. But whether cosmetics or certain ingredients in

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them cause more subtle or long-term health problems is still a matter of debate. Researchers are unsure because many products and ingredients, although unlikely to cause serious problems, have not been thoroughly tested. Even when ingredients in cosmetics have been tested, the results may not always be simple or clear cut. And, there is little information for the public on which ingredients are absorbed by the body and how much. Based on the current available data, there is little evidence to suggest that normal use of cosmetics increases cancer risk.

### **Infectious Diseases**

Certain viruses and even some bacteria have been linked to cancer. Viruses are very small organisms -- most cannot even be seen with an ordinary microscope. They are made up of a small group of genes (in the form of DNA or RNA) surrounded by a protein coat. Viruses enter a living cell and "hijack" the cell's machinery to make more viruses. By taking over the cell growth, the virus may push the cell toward becoming cancerous.

Bacteria can be found everywhere, including large numbers that live in and on our bodies. Some bacteria are harmful and cause diseases like strep throat or cavities. Other bacteria are helpful and aid in breaking down waste products. Special kinds are required to make cheese and yogurt. But some viruses and even a few types of bacteria are now known or suspected of being linked with cancer in humans.

### ***Human Papilloma Virus (HPV)***

HPVs are a group of over 100 related viruses that can cause warts on the skin, mouth, genital organs, and larynx. They are spread by contact (touch), including through sex. HPV infections are very common in people who are sexually active. There is no treatment for HPV other than removing or destroying cells that are known to be infected. Most genital HPV infections go away over time with the help of the body's immune system.

Certain types of HPV are also the main cause of cervical cancer, which is the second most common cancer among women worldwide. It is much rarer in the United States because of the Pap test. This test can detect pre-cancerous changes in cells in the cervix, which can then be treated, if needed. This treatment can prevent the development of cancer.

While nearly all women who develop cervical cancer have HPV infection, most women infected with HPV will not get cervical cancer. Even though health care providers can test women for HPV, there is no treatment for the HPV infection

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itself. If the HPV causes abnormal cells to start growing, these cells can be removed. Women with HPV infection may be checked for abnormal cells more often than those who don't have it.

HPVs also have a role in causing some cancers of the vagina, and vulva (the outside parts around the vagina) in women. They can also cause cancer of the mouth, throat, and anus in men and women. HPV can cause cancer of the penis in men. Again, while HPVs have been linked to these cancers, most people infected with HPV never develop cancer. Smoking and drinking, which are also linked with these cancers, may work together with HPV to increase cancer risk.

Vaccines against the types of HPV that cause cancer have been developed. These vaccines (Gardasil<sup>®</sup> and Cervarix<sup>®</sup>) have been shown to help protect against infection from the two HPV types that cause the most cervical cancer. These vaccines can be given to girls and boys between the ages of 9 to 18 years. The shots are usually given by age 12. HPV vaccines are safe and effective. It is important to vaccinate girls and boys before they start having sex in order for the vaccine to work best. See Appendix E for the American Cancer Society Guidelines for HPV vaccine to prevent cervical cancer.

### ***Epstein-Barr Virus (EBV)***

EBV is another virus. It is best known for causing infectious mononucleosis, also known as "mono" or the "kissing disease." Besides kissing, it can be passed from person to person by coughing, sneezing, and sharing drinking glasses or eating utensils. Most people in the United States are infected with EBV before the age of 20, although not everyone gets the symptoms of mono. As with other viruses in the herpes family, the virus remains in the body throughout life, but most people never have any serious problems.

EBV infects and stays in certain white blood cells in the body called B lymphocytes (also called B cells). Infection with EBV increases a person's risk of getting nasopharyngeal cancer (cancer in the area behind the nose) and certain types of fast-growing lymphomas such as Burkitt lymphoma. It may also be linked to Hodgkin disease and some cases of stomach cancer. All in all, very few people who have been infected with EBV will ever develop these cancers.

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***Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV)***

HBV and HCV cause viral hepatitis, a type of liver infection. Other viruses can also cause hepatitis (hepatitis A virus, for example). But only HBV and HCV can cause long term (chronic) infections that increase a person's risk of liver cancer. In the United States, about 30% of liver cancers are related to HBV or HCV infection. HBV and HCV are spread from person to person -- through sharing needles, unprotected sex, or childbirth.

Of the two viruses, infection with HBV is more likely to cause symptoms, such as a flu-like illness and a yellowing of the eyes and skin (jaundice). But most people fully recover from HBV infection within a few months. Only a few people carry the HBV long-term. These people have a higher risk for liver cancer.

HCV, on the other hand, is less likely to cause symptoms. But most people with HCV develop chronic infections, which are more likely to lead to liver damage or even cancer. There may be as many as 3.2 million people in the United States who have chronic HCV infection, but do not know they have it.

While there are few drugs that can treat hepatitis B and C, there is a vaccine to prevent HBV infection. In the United States, the vaccine is recommended for all children and for adults who are at risk, such as healthcare workers and injection drug users. There is no vaccine to prevent HCV at this time.

***Human Immunodeficiency Virus (HIV)***

HIV, the virus that causes AIDS (acquired immune deficiency syndrome) does not appear to cause cancers by itself. But HIV infection increases a person's risk of getting several types of cancer, mostly those linked to other viruses such as HPV and Human Herpes Virus-8 (HHV-8). HHV-8 causes Kaposi's Sarcoma -- a rare, slow-growing cancer that often appears as reddish-purple or blue-brown tumors just beneath the skin. It only affects people whose immune systems do not work well.

A person can get HIV through intimate contact with blood, vaginal secretions, semen, or breast milk from an HIV-infected person. Known routes of spreading HIV include:

- Unprotected sex (oral, vaginal, or anal) with an HIV-infected person.

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- Injections with needles or injection equipment that were used on an HIV-infected person.
- Prenatal and perinatal (during birth) exposure of infants whose mothers have HIV.
- Breast-feeding by mothers with HIV.
- Transfusion of blood products containing HIV (blood has been tested since 1985).
- Organ transplants from an HIV-infected person (donors are now tested for HIV).

HIV infects and destroys white blood cells known as helper T cells, which weakens the body's immune system. When the body is less able to fight off infections, other viruses such as HPV may be able to cause more damage to the cells. This damage may trigger cancer.

HIV infection has been linked to a higher risk of developing of Kaposi's sarcoma, cancer of the cervix, and certain kinds of lymphoma, especially non-Hodgkin lymphoma and central nervous system lymphoma. Anti-HIV drugs may be used to reduce the risk of Kaposi sarcoma and cervical cancer.

Other forms of cancer that are found more often in people with HIV infection include:

- Invasive anal cancer
- Hodgkin disease
- Lung cancer
- Cancer of the mouth and throat
- Cancer of the testicles
- Skin cancers, including basal cell, squamous cell, and even malignant melanomas

***Helicobacter Pylori (H.pylori)***

While stomach cancer is fairly rare in the United States, it is one of the more common types of cancer worldwide. Long-term infection of the stomach with H. pylori may lead to chronic inflammation and damage to the inner layer of the



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stomach, which can cause ulcers. Some of these changes could lead to cancer over time, especially cancer in the lower part of the stomach. H. pylori infection is also linked with some types of lymphoma of the stomach.

Most people who have H. pylori in their stomachs never develop cancer. Other factors also play a role in whether or not someone develops stomach cancer. For example, nitrites are substances commonly found in cured meats, some drinking water, and certain vegetables. They can be converted by H. pylori and other bacteria into compounds that have been found to cause stomach cancer in animals.

Antibiotics and other medicines can be used to treat H. pylori infections. It is not yet known if people with long term H. pylori infection of their stomach lining but no symptoms should be treated for this infection. Some health care providers believe that people with H. pylori who are at high risk of stomach cancer should be treated whether or not they have symptoms. These issues are still being studied.

***Chlamydia Trachomatis***

Chlamydia trachomatis is a common kind of bacteria that can infect the reproductive system. It is most often spread during sex, though it can also be passed to a newborn during childbirth.

Although some adults have symptoms, most women have no symptoms. This means that most women with chlamydia do not know they are infected unless special samples are taken during a pelvic exam. If chlamydia is found, the person and that person's sex partner(s) should be treated with antibiotics to prevent future problems. Chlamydia is very common in younger women who are sexually active. It may last for years in the body unless it is found and treated.

Some studies suggest that women whose blood test results show past or current chlamydia infection are at greater risk for cervical cancer than are women who have never had it. Studies have not shown that chlamydia by itself can cause cancer. But it may work with HPV in some way that promotes cancer growth. Women who had chlamydia along with HPV were more likely to still have HPV when they were re-tested later than the women who had only HPV and not chlamydia.

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Although further studies are needed to confirm these findings, there are many reasons to avoid this infection. Long-term chlamydia infection is known to be a cause of pelvic inflammation that can lead to infertility in women. Like other diseases that cause genital ulcers and inflammation, chlamydia can increase the risk of getting HIV during sex with an HIV-infected partner.

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**Activity**

Ancestral Visualization

Imagine all your direct ancestors standing on your left, in a line, starting with your father, your mother, your aunts, your uncles, grandfather, grandmother, great-grandfather, great-grandmother, etc.

Now imagine all your future direct descendants standing on your right, starting with your son or daughter, grandson, etc.

These two lines stretch out over the horizon. Imagine being able to hear whispers from your ancestors and being able to share messages with your descendants.

What would your ancestors say about how they cared for their environment (land, water, and air), themselves and their community?

What would you say to your nieces, nephews, children and grandchildren about how to do this?

Share these messages with people in your group.

Reference: [www.wilderdom.com](http://www.wilderdom.com)

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**Key Messages**

- Only a fairly small percentage of cancers is known to be caused by chemicals, air pollution, and job-related exposures. A person can do more to lower their risk of cancer by choosing healthy ways of living.
- Even if a substance or exposure is known or suspected to cause cancer, this does not mean that it can or should always be avoided. For instance, the benefits of medical radiation almost always outweigh the risks. But in general, exposure to cancer-causing agents should be kept to the smallest possible amounts.
- There are thousands of different chemicals in cigarette smoke, and about 70 of them are known to cause cancer.
- In the United States, only about 10% of cancers are related to infections. Getting available vaccines and using good hand washing can help to prevent some of the infections that have been linked with cancer.
- Be aware of the risk of infection for HIV and Hepatitis B and C.
- Long term monogamy by both partners in a couple is one way to prevent HIV and hepatitis B and C. For those not in such a relationship, safer sex (careful use of condoms from start to finish each time a person has sex) can greatly reduce risk. For people who use injection drugs, don't share needles or injection drug equipment.
- To prevent cervical and certain other types of cancer, vaccination against certain types of HPV is recommended for girls between the ages of 9 and 11. Boys can also get the vaccine to help prevent HPV-related cancers.