

A large, leafless tree silhouette is the central focus of the image, set against a light, overcast sky. The tree's branches are intricate and spread out, creating a complex web of dark lines. The overall tone is monochromatic and somewhat somber.

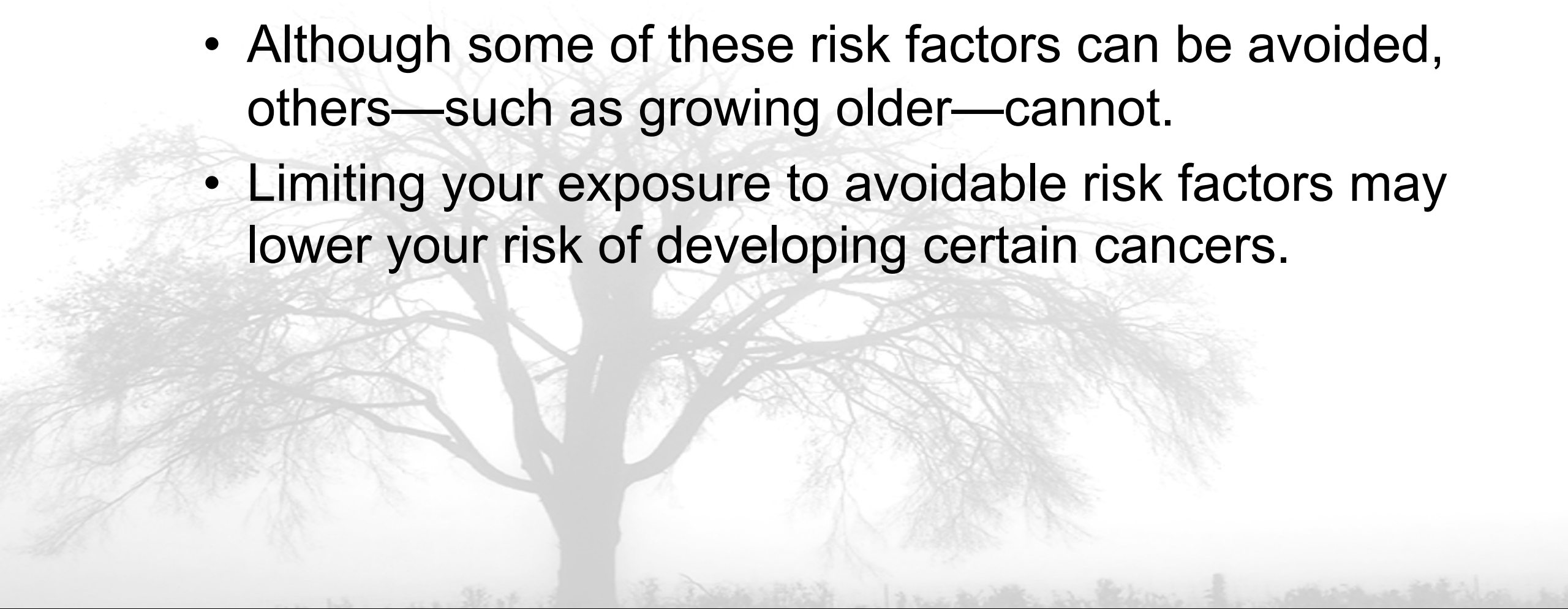
# Risk Factors For Cancer

Dr. Gary Mumaugh  
Bethel University

- It is usually not possible to know exactly why one person develops cancer and another doesn't.
- But research has shown that certain risk factors may increase a person's chances of developing cancer.
- There are also certain factors that are linked to a lower risk of cancer. These are sometimes called protective risk factors, or just protective factors.
- Most cancer risk (and protective) factors are initially identified in epidemiology studies.
  - In these studies, scientists look at large groups of people and compare those who develop cancer with those who don't.
  - Such studies, on their own, cannot prove that a behavior or substance causes cancer.

# Cancer Risk Factors

- Although some of these risk factors can be avoided, others—such as growing older—cannot.
- Limiting your exposure to avoidable risk factors may lower your risk of developing certain cancers.

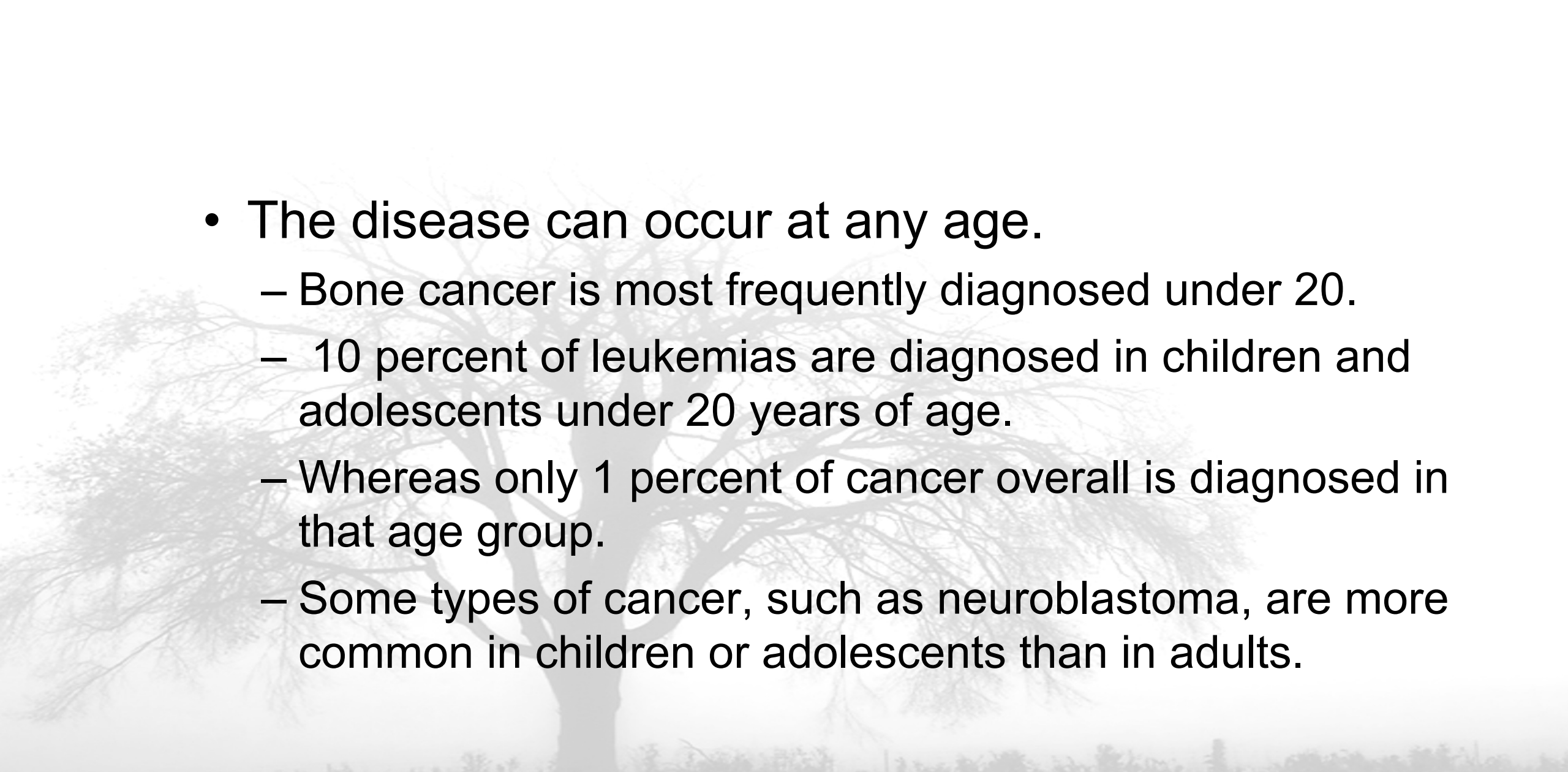


# Age

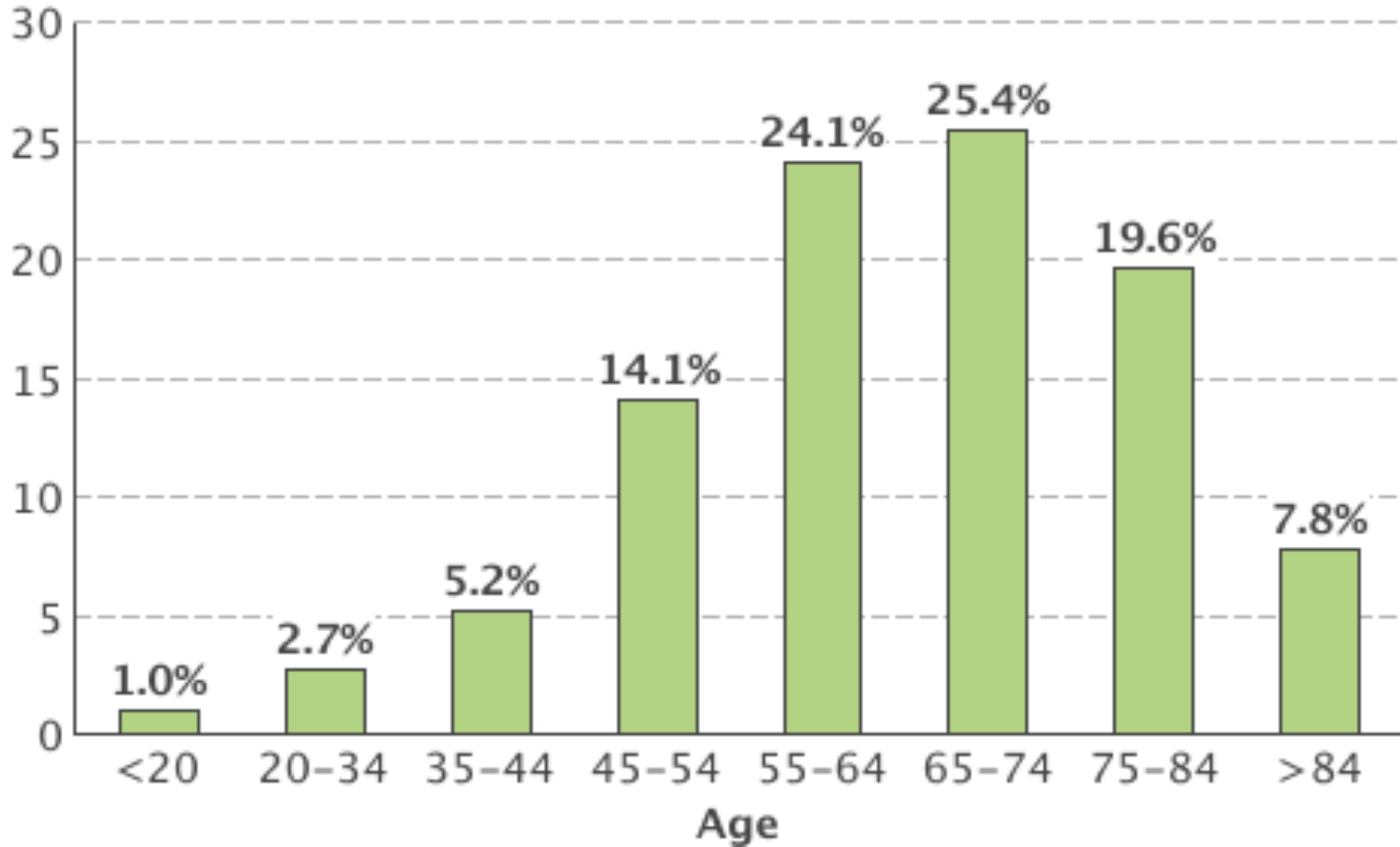
- Advancing age is the most important risk factor for cancer overall, and for many individual cancer types.
- The median age of a cancer diagnosis is 66 years.
  - Half of cancer cases occur in people below this age and half in people above this age. One-quarter of new cancer cases are diagnosed in people aged 65 to 74.



- A similar pattern is seen for many common cancers.
  - Breast cancer median age at diagnosis is 61.
  - Colorectal cancer median age is 68.
  - Lung cancer median age is 70.
  - Prostate cancer median age is 66.

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- The disease can occur at any age.
    - Bone cancer is most frequently diagnosed under 20.
    - 10 percent of leukemias are diagnosed in children and adolescents under 20 years of age.
    - Whereas only 1 percent of cancer overall is diagnosed in that age group.
    - Some types of cancer, such as neuroblastoma, are more common in children or adolescents than in adults.

Percent of New Cases

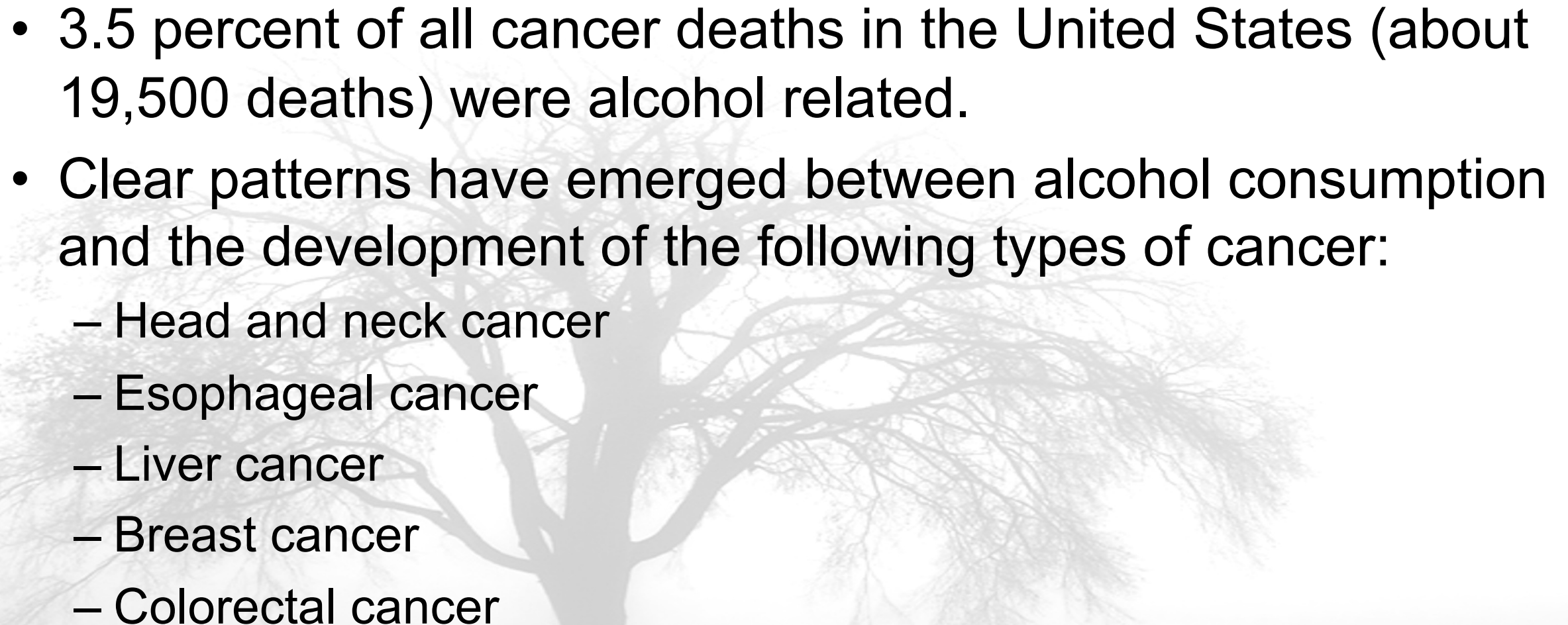






# Alcohol

- Alcohol can increase your risk of cancer of the mouth, throat, esophagus, larynx (voice box), liver, and breast.
- The more you drink, the higher your risk.
- The risk of cancer is much higher for those who drink alcohol and also use tobacco. (Multiplicative effect)
- It has been suggested that certain substances in red wine, such as resveratrol, have anticancer properties.
  - However, there is no evidence that drinking red wine reduces the risk of cancer.

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- 3.5 percent of all cancer deaths in the United States (about 19,500 deaths) were alcohol related.
  - Clear patterns have emerged between alcohol consumption and the development of the following types of cancer:
    - Head and neck cancer
    - Esophageal cancer
    - Liver cancer
    - Breast cancer
    - Colorectal cancer

# Alcohol and Head and Neck Cancer

- Alcohol consumption is a major risk factor for certain head and neck cancers, particularly cancers of the oral cavity (excluding the lips), pharynx(throat), and larynx (voice box)
- 50 or more grams of alcohol per day (approximately 3.5 or more drinks per day) have a two to three times greater risk of developing these cancers than nondrinkers.
- The risks are substantially higher among persons who consume this amount of alcohol and also use tobacco.

# Alcohol and Esophageal Cancer

- Alcohol consumption is a major risk factor for a particular type of esophageal cancer called esophageal squamous cell carcinoma.
- People who inherit a deficiency in an enzyme that metabolizes alcohol have been found to have substantially increased risks of alcohol-related esophageal squamous cell carcinoma.

# Alcohol and Liver Cancer

- Alcohol consumption is an independent risk factor for, and a primary cause of, liver cancer (hepatocellular carcinoma).
- Chronic infection with hepatitis B virus and hepatitis C virus are the other major causes of liver cancer.

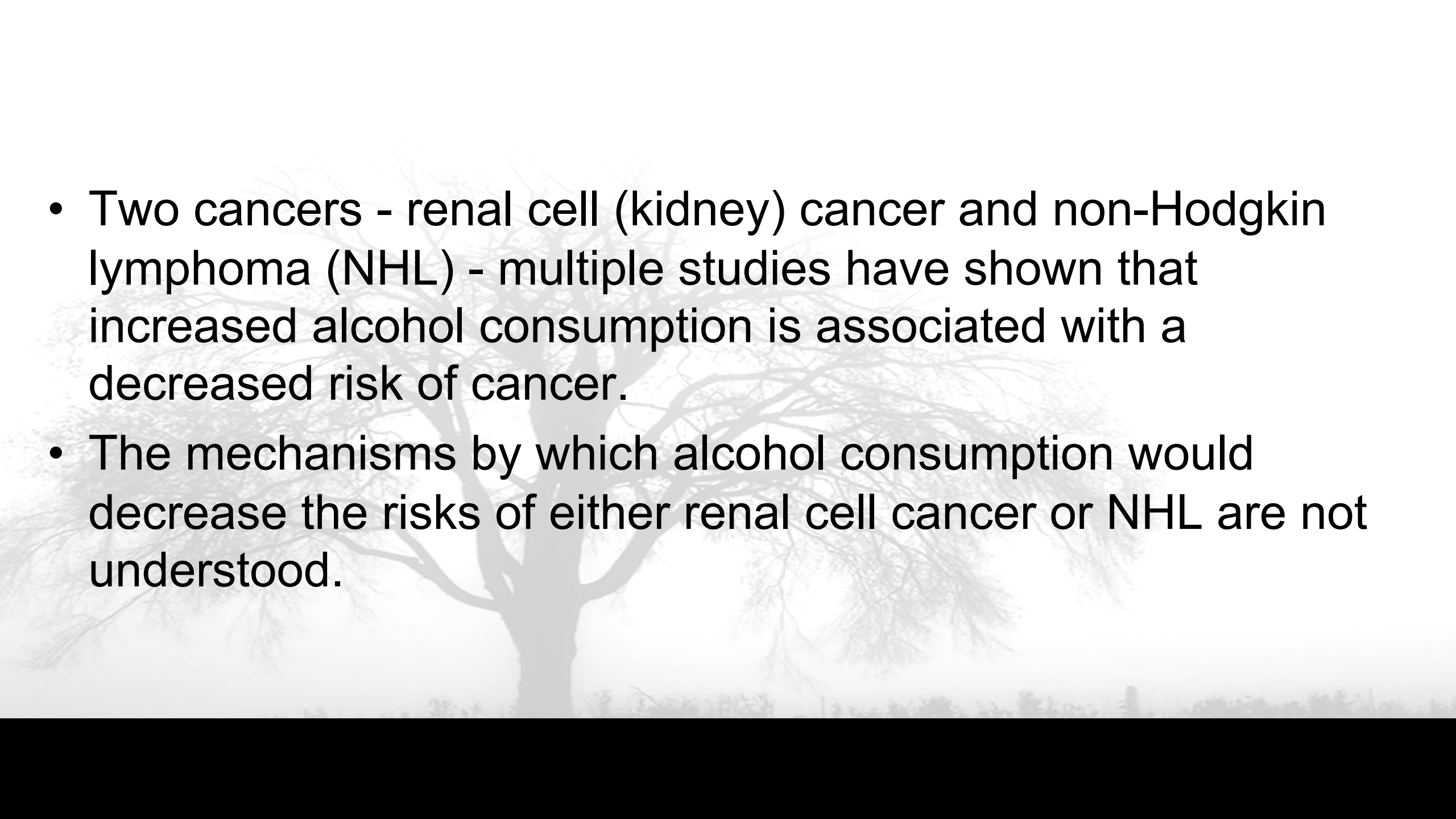


# Alcohol and Breast Cancer

- More than 100 epidemiologic studies have looked at the association between alcohol consumption and the risk of breast cancer in women.
- These studies have consistently found an increased risk of breast cancer associated with increasing alcohol intake.
- Women who drank more than 45 grams of alcohol per day (approximately three drinks) had 1.5 times the risk of developing breast cancer as nondrinkers.
- For every 10 grams of alcohol consumed per day (slightly less than one drink), researchers observed a 7% – 12% increase in the risk of breast cancer.

# Alcohol and Colorectal Cancer

- Alcohol consumption is associated with a modestly increased risk of cancers of the colon and rectum.
- People who regularly drank 50 or more grams of alcohol per day (approximately 3.5 drinks) had 1.5 times the risk of developing colorectal cancer as nondrinkers or occasional drinkers.
- For every 10 grams of alcohol consumed per day, there was a small (7 percent) increase in the risk of colorectal cancer.

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- Two cancers - renal cell (kidney) cancer and non-Hodgkin lymphoma (NHL) - multiple studies have shown that increased alcohol consumption is associated with a decreased risk of cancer.
  - The mechanisms by which alcohol consumption would decrease the risks of either renal cell cancer or NHL are not understood.



# How does alcohol increase the risk of cancer?

- Metabolizing (breaking down) ethanol in alcoholic drinks to acetaldehyde, which is a toxic chemical and a probable human carcinogen.
  - Acetaldehyde can damage both DNA and proteins.
- Generate oxidation, which can damage DNA, proteins, and lipids.

- Impairs the body's ability to break down and absorb a variety of nutrients that may be associated with cancer risk.
  - Vitamin A, Vitamin B complex (especially folate)
  - Vitamin C, Vitamin D, Vitamin E, Carotenoids
- Increasing blood levels of estrogen, a sex hormone linked to the risk of breast cancer.
- Alcoholic beverages may also contain a variety of carcinogenic contaminants that are introduced during fermentation and production.
  - Nitrosamines, asbestos fibers, phenols, and hydrocarbons.

# Cancer-Causing Substances in the Environment

- Cancer is caused by changes to certain genes that alter the way our cells function.
- Some DNA mutations are the result of environmental exposures.
  - These exposures may include substances, such as the chemicals in tobacco smoke, or radiation, such as ultraviolet rays from the sun.
  - It may be harder to avoid others, such as the air we breathe, the water we drink, the food we eat, or the materials we use to do our jobs.

- The substances listed below are among the most likely carcinogens to affect human health.
- Simply because a substance has been designated as a carcinogen, however, does not mean that the substance will necessarily cause cancer.
  - Aflatoxins, Aristolochic Acids, Arsenic, Asbestos, Benzene, Benzidine, Beryllium, Butadiene, Cadmium, Coal Tar and Pitch, Crystalline Silica, Erionite, Ethylene Oxide, Formaldehyde, Chromium Compounds, Mineral Oils, Nickel Compounds, Radon, Secondhand Tobacco Smoke, Soot, Sulfuric Acid, Thorium, Vinyl Chloride, Wood Dust.





He has his  
daddy's eyes  
and his  
momma's lungs.

Secondhand Smoke Kills.

# Cancer and Chronic Inflammation

- Over time, chronic inflammation can cause DNA damage and lead to cancer.
- For example, people with chronic inflammatory bowel diseases, such as ulcerative colitis and Crohn disease, have an increased risk of colon cancer.
- Anti-inflammatory medications, such as aspirin or non-steroidal anti-inflammatory drugs has not been found to reduce the risk of cancer.

# Cancer and Diet

- Studies of human populations have not yet shown definitively that any dietary component causes or protects against cancer.
- Scientists have studied many additives, nutrients, and other dietary components for possible associations with cancer risk.
  - These include alcohol, anti-oxidants, artificial sweeteners, calcium, charred meat, cruciferous vegetables, fluoride, garlic, tea, Vitamin D



- Artificial sweeteners

- Studies have been conducted on the safety of several artificial sweeteners, including saccharin, aspartame, acesulfame potassium, sucralose, neotame, and cyclamate.
- There is no clear evidence that the artificial sweeteners available commercially in the United States are associated with cancer risk in humans.

- Calcium

- Research results overall support a relationship between higher intakes of calcium and reduced risks of colorectal cancer, but the results of studies have not always been consistent.

- Tea

- Tea contains polyphenol compounds, which are antioxidants.
- Results of association between tea and cancer risk have been inconclusive.



- Charred meat

- Certain chemicals, called HCAs and PAHs, are formed when muscle meat, including beef, pork, fish, and poultry, is cooked using high-temperature methods.
- Exposure to high levels of HCAs and PAHs can cause cancer in animals; however, whether such exposure causes cancer in humans is unclear.

- Cruciferous vegetables

- Cruciferous vegetables contain chemicals known as glucosinolates, which break down into several compounds that are being studied for possible anticancer effects.
- Some of these compounds have shown anticancer effects in cells and animals, but the results of studies with humans have been less clear.

- Fluoride

- Fluoride in water helps to prevent and can even reverse tooth decay.
- Studies have shown no association between fluoridated water and cancer risk.

- Garlic

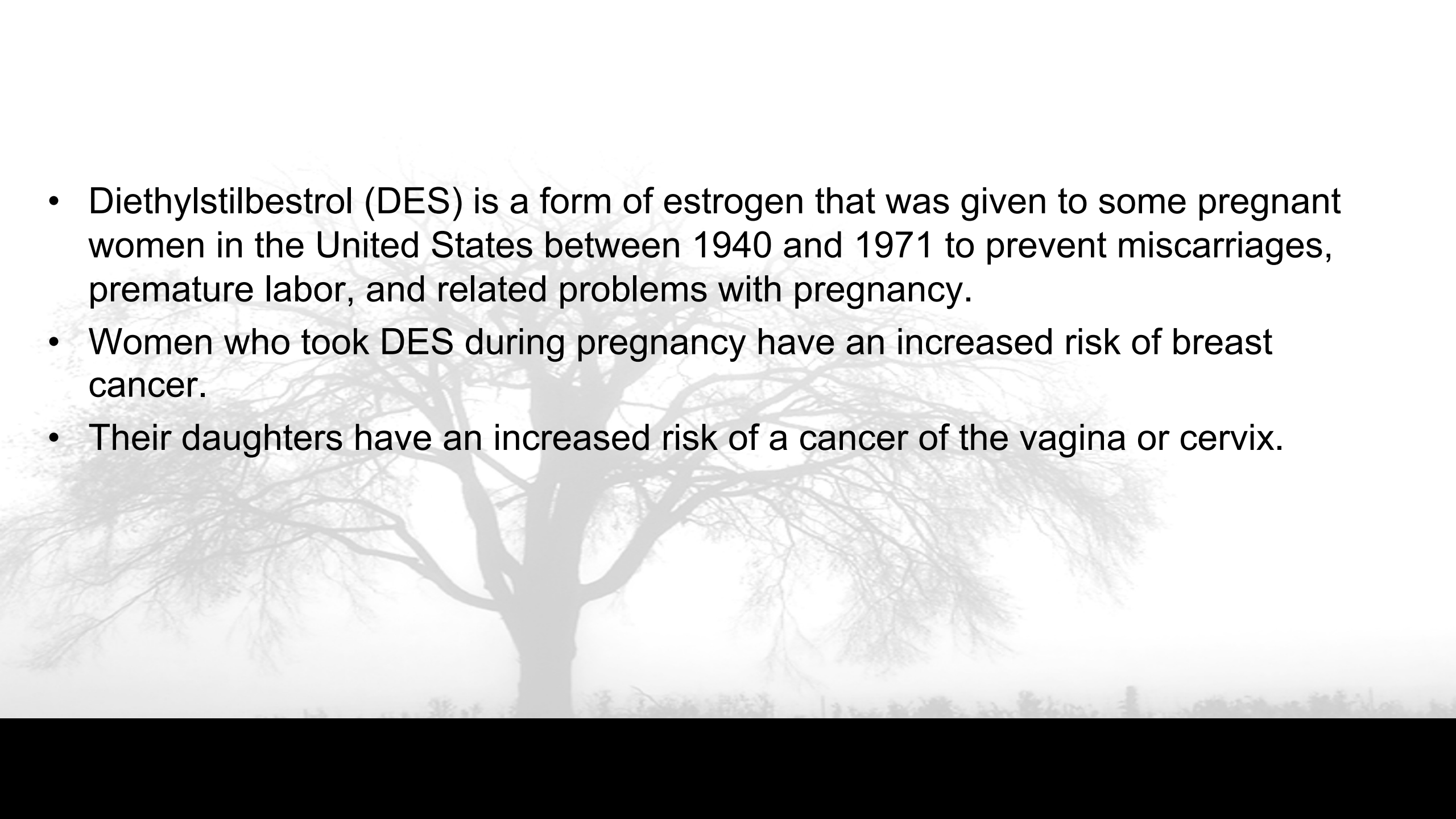
- Some studies have suggested that garlic consumption may reduce the risk of developing several types of cancer, especially cancers of the gastrointestinal tract.

- Vitamin D

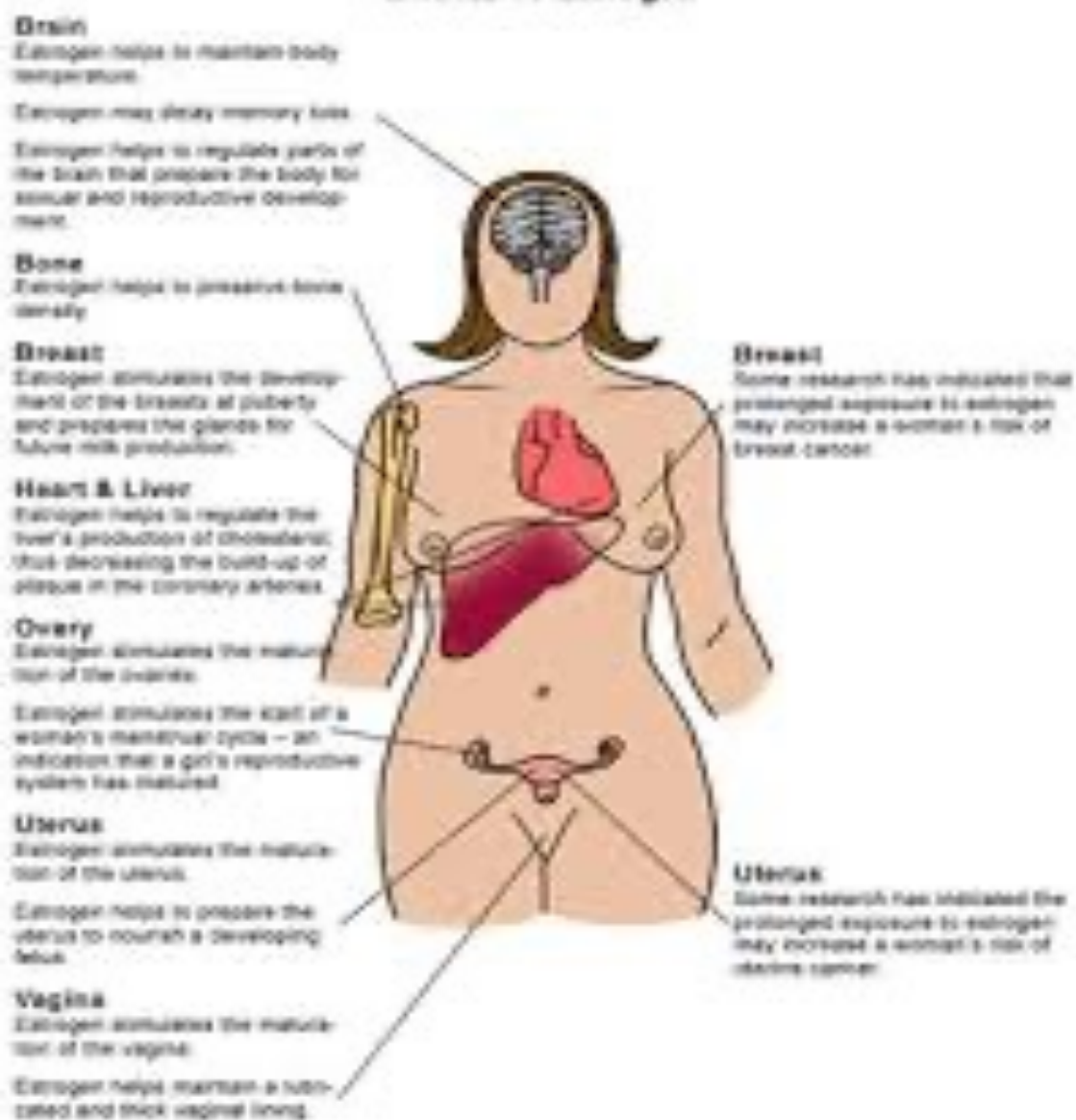
- Studies in humans have suggested that higher intakes of vitamin D the blood may be associated with a reduced risk of colorectal cancer,

# Hormones

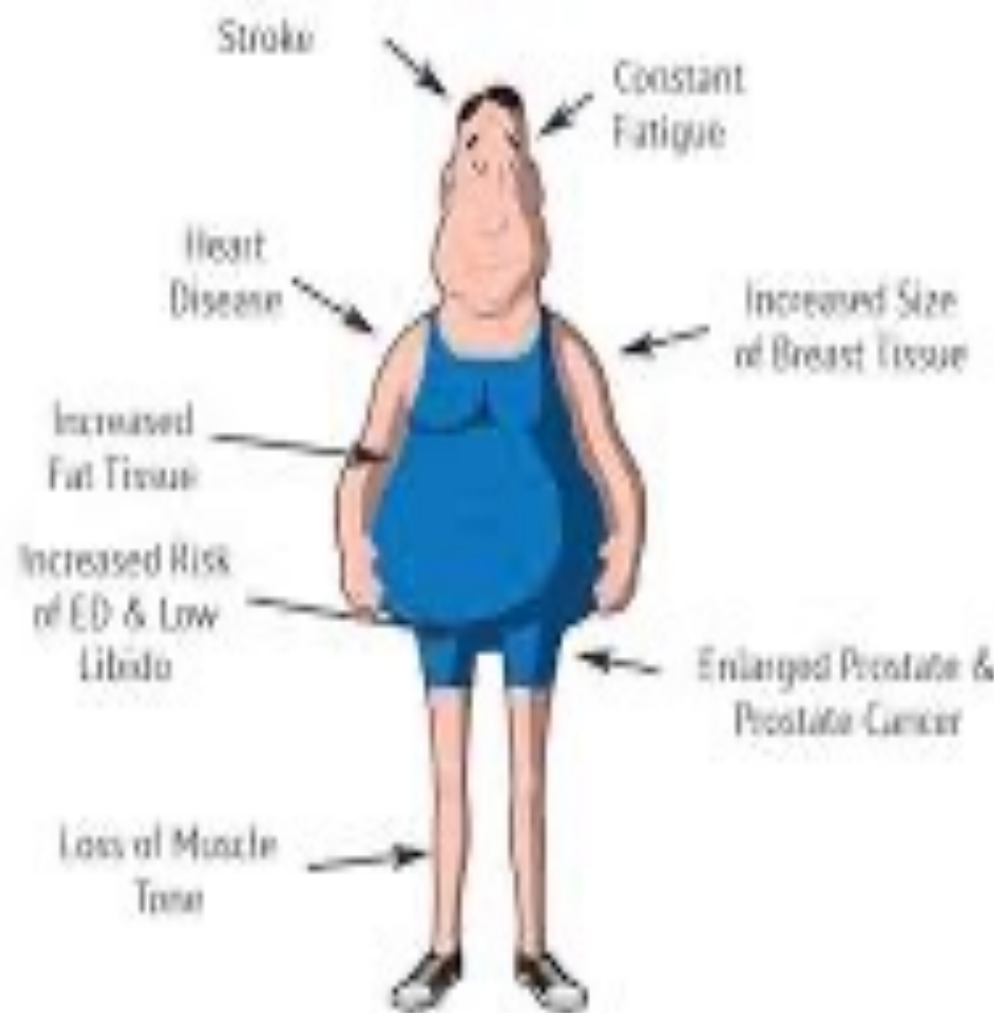
- Estrogens are known human carcinogens.
  - Although these hormones have essential physiological roles in both females and males, they have also been associated with an increased risk of certain cancers.
  - Taking combined menopausal hormone therapy (estrogen plus progestin, which is a synthetic version of the female hormone progesterone) can increase a woman's risk of breast cancer.
  - Menopausal hormone therapy with estrogen alone increases the risk of endometrial cancer and is used only in women who have had a hysterectomy.
  - Studies have also shown that a woman's risk of breast cancer is related to the estrogen and progesterone made by her ovaries

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- A large, leafless tree silhouette is centered in the background, spanning most of the width of the slide. The tree has a thick trunk and many thin, bare branches that spread out. The background is a light, hazy grey, and the bottom of the slide is a solid black bar.
- Diethylstilbestrol (DES) is a form of estrogen that was given to some pregnant women in the United States between 1940 and 1971 to prevent miscarriages, premature labor, and related problems with pregnancy.
  - Women who took DES during pregnancy have an increased risk of breast cancer.
  - Their daughters have an increased risk of a cancer of the vagina or cervix.

## Effects of Estrogen



## High Estrogen in Men



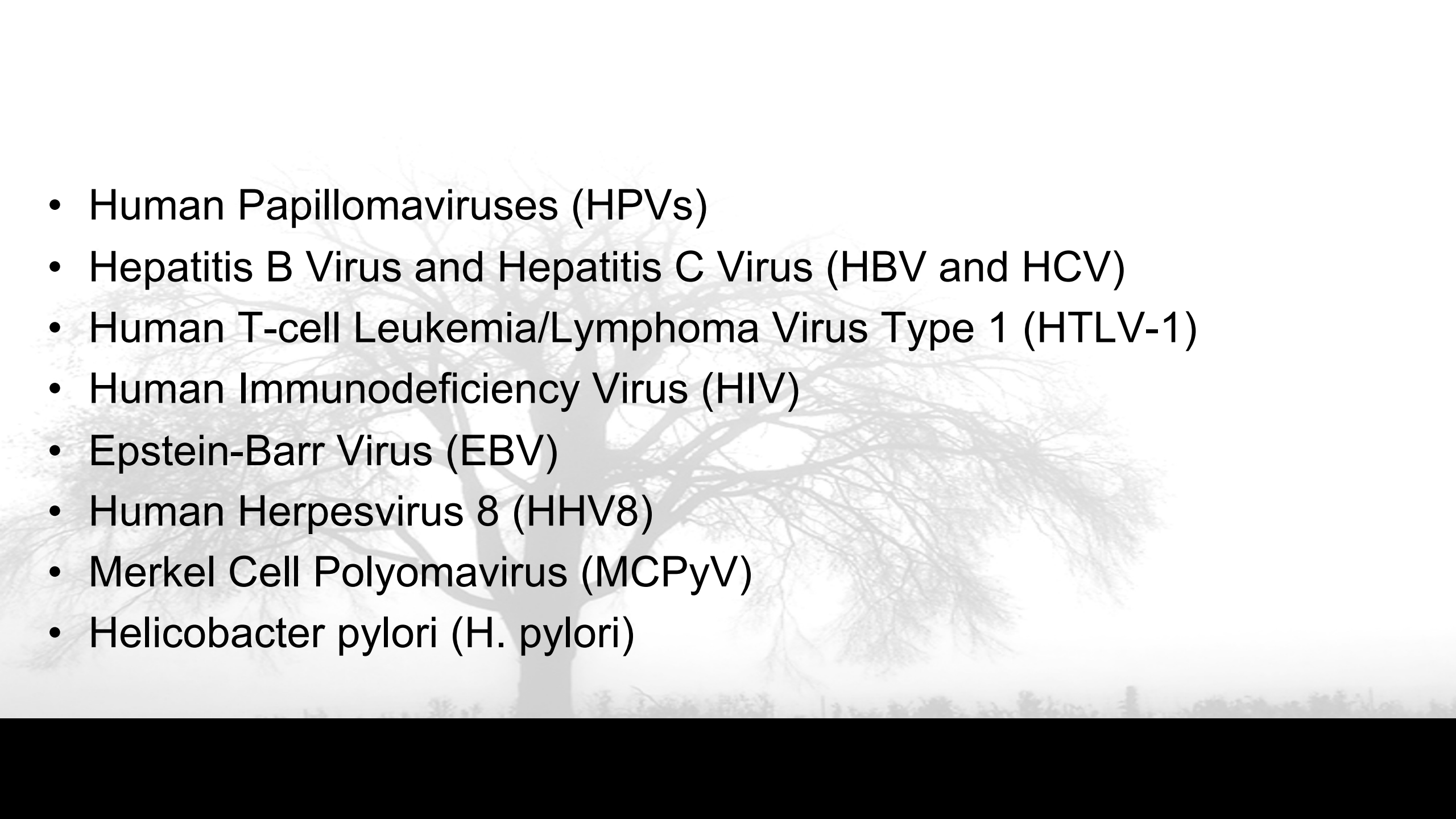
# Immunosuppression

- Organ transplant patients take medications to suppress the immune system so the body won't reject the organ.
- These "immunosuppressive" drugs make the immune system less able to detect and destroy cancer cells or fight off infections that cause cancer.
- Transplant recipients are at increased risk of a several cancers.
- Infection with HIV also weakens the immune system and increases the risk of certain cancers.



# Infectious Agents

- Viruses, bacteria, and parasites, can cause cancer in infected people or increase the risk that cancer will form.
  - Some viruses can disrupt normal controls on cell growth and proliferation.
  - They may also increase the chance that a person will be affected by other cancer risk factors, such as UV radiation or substances in tobacco smoke that cause cancer.
  - Some viruses, bacteria, and parasites also cause chronic inflammation, which may lead to cancer.
  - Most of the viruses that are linked to an increased risk of cancer can be passed from one person to another through blood and/or other body fluids.

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- Human Papillomaviruses (HPVs)
  - Hepatitis B Virus and Hepatitis C Virus (HBV and HCV)
  - Human T-cell Leukemia/Lymphoma Virus Type 1 (HTLV-1)
  - Human Immunodeficiency Virus (HIV)
  - Epstein-Barr Virus (EBV)
  - Human Herpesvirus 8 (HHV8)
  - Merkel Cell Polyomavirus (MCPyV)
  - Helicobacter pylori (H. pylori)

# Obesity

- Obesity may have an increased risk of several types of cancer
  - Cancers of the breast, colon, rectum, endometrium, esophagus, kidney, pancreas, and gallbladder.
  - Conversely, eating a healthy diet, being physically active, and keeping a healthy weight may help reduce risk of some cancers.
  - These healthy behaviors are also important to lessen the risk of other illnesses, such as heart disease, type II diabetes, and high blood pressure.



# Radiation

- Ionizing radiation, has enough energy to damage DNA and cause cancer.
  - Ionizing radiation includes radon, x-rays, gamma rays, and other forms of high-energy radiation.
  - Lower-energy, non-ionizing forms of radiation, such as visible light and the energy from cell phones and magnetic fields, do not damage DNA and have not been found to cause cancer.

# RADIATION EFFECTS

Measurements in millisieverts (mSv). Exposure is cumulative.

- **Potentially fatal radiation sickness. Much higher risk of cancer later in life.**

**10,000 mSv:** Fatal within days.

**5,000 mSv:** Would kill half of those exposed within one month.

**2,000 mSv:** Acute radiation sickness.

- **No immediate symptoms. Increased risk of serious illness later in life.**

**1,000 mSv:** 5% higher chance of cancer.

**400 mSv:** Highest hourly radiation recorded at Fukushima. Four hour exposure would cause radiation sickness.

**100 mSv:** Level at which higher risk of cancer is first noticeable

- **No symptoms. No detectable increased risk of cancer.**

**20 mSv:** Yearly limit for nuclear workers.

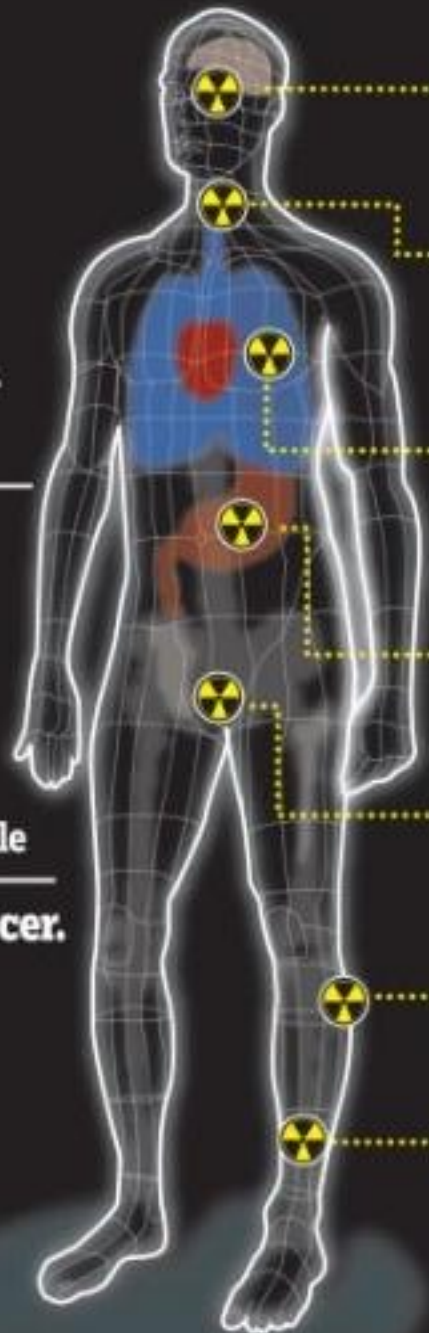
**10 mSv:** Average dose from a full body CT scan

**9 mSv:** Yearly dose for airline crews.

**3 mSv:** Single mammogram

**2 mSv:** Average yearly background radiation dose in UK

**0.1 mSv:** Single chest x-ray



**EYES** High doses can trigger cataracts months later.

**THYROID** Hormone glands vulnerable to cancer. Radioactive iodine builds up in thyroid. Children most at risk.

**LUNGS** Vulnerable to DNA damage when radioactive material is breathed in.

**STOMACH** Vulnerable if radioactive material is swallowed.

**REPRODUCTIVE ORGANS** High doses can cause sterility.

**SKIN** High doses cause redness and burning.

**BONE MARROW** Produces red and white blood cells. Radiation can lead to leukaemia and other immune system diseases.

# Sunlight

- The sun, sunlamps, and tanning booths all give off ultraviolet (UV) radiation.
  - Exposure to UV radiation causes early aging of the skin and skin damage that can lead to skin cancer.
  - People of all ages should limit the amount of time they spend in the sun, especially between mid-morning and late afternoon, and avoid other sources of UV radiation, such as tanning beds.
  - Keep in mind that UV radiation is reflected by sand, water, snow, and ice and can go through windshields and windows.

MAYBE NEXT TIME YOU'LL  
TRY A LITTLE SUNSCREEN...



# Tobacco

- Tobacco use is a leading cause of cancer and of death from cancer.
  - People who use tobacco products or who are regularly around environmental tobacco smoke (also called secondhand smoke) have an increased risk of cancer because tobacco products and secondhand smoke have many chemicals that damage DNA.
  - Tobacco use causes many types of cancer, including cancer of the lung, larynx (voice box), mouth, esophagus, throat, bladder, kidney, liver, stomach, pancreas, colon and rectum, and cervix, as well as acute myeloid leukemia.
  - People who use smokeless tobacco (snuff or chewing tobacco) have increased risks of cancers of the mouth, esophagus, and pancreas.





Who said smoking kills?



I'm 48 and still feeling good.

**PLEASE**

**DON'T THROW  
YOUR CIGARETTE ENDS  
ON THE FLOOR  
THE COCKROACHES  
ARE GETTING CANCER**

**CJ**

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SMOKING OR  
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