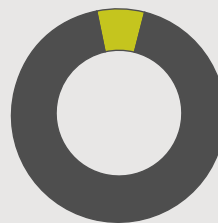




CANCER PREVENTION

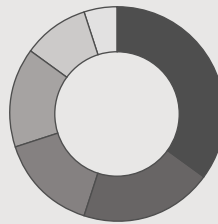
Each year, nearly 1.7 million people in the US are diagnosed with cancer. Of these, only about 5-10% can be attributed to genetic defects. The remaining 90-95% of cancer diagnoses have their roots in environmental and lifestyle causes. Lifestyle factors that can lead to cancer include:

- ✦ cigarette smoking
- ✦ diet (fried foods, red meat)
- ✦ alcohol consumption
- ✦ sun exposure
- ✦ environmental pollutants
- ✦ infections
- ✦ stress
- ✦ obesity
- ✦ physical inactivity



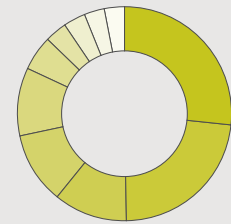
CAUSES OF CANCER

93% Environment
7% Genes



ENVIRONMENT

35% Diet
20% Tobacco
15% Obesity
15% Infections
10% Other
5% Alcohol



GENES

21% Melanoma
18% Breast
8.6% Testicular
8.5% Thyroid
8% Laryngeal
4.3% Multiple Myeloma
2.6% Lung
2.5% Colorectal
2.5% Kidney
2.2% Prostate



Almost 90% of patients diagnosed with lung cancer are cigarette smokers. Cigarette smoking combined with alcohol intake can synergistically contribute to tumorigenesis.

A CLOSER LOOK

Cigarette Smoking

Why It is Dangerous: Tobacco contains at least 50 carcinogens. Its use increases the risk of developing at least 14 types of cancer. In addition, it accounts for about 25–30% of all deaths from cancer and 87% of deaths from lung cancer.

How to Protect Yourself: Curcumin, from the dietary spice turmeric, as well as several natural phytochemicals, can block a cancer-causing signaling pathway induced by cigarette smoke. Thus, the carcinogenic effects of tobacco appear to be reduced by these dietary agents.

Alcohol

Why It Is Dangerous: Research shows an association between alcohol and an increased risk of cancers of the upper aerodigestive tract, including cancers of the oral cavity, pharynx, hypopharynx, larynx, esophagus, liver, pancreas, mouth, and breast. Of particular note is a 7.1% increase in the relative risk of breast cancer for each additional 10 g/day intake of alcohol. The relationship between alcohol and inflammation has also been well established, especially in terms of alcohol-induced inflammation of the liver.

Chronic inflammation is closely linked to the tumorigenic pathway, as evidenced from numerous lines of research.

How you can protect yourself: Limit or omit alcohol consumption in your diet.

Diet

Why It Is Dangerous: Approximately 30–35% of cancer deaths in the USA are linked to diet. Most carcinogens that are ingested come from food or food additives or from cooking.

- ✦ Carcinogens, including nitrates, nitrosamines, pesticides, and dioxins are found in certain foods, food additives, or from particular ways of cooking.
- ✦ Specifically, heavy consumption of red meat is a risk factor for several cancers, especially for those of the gastrointestinal tract, but also for colorectal, prostate, bladder, breast, gastric, pancreatic, and oral cancers.



- ✦ In addition, bisphenol from plastic food containers can migrate into food and may increase the risk of breast and prostate cancers.
- ✦ Ingestion of arsenic may increase the risk of bladder, kidney, liver, and lung cancers.
- ✦ Saturated fatty acids, trans fatty acids, and refined sugars and flour present in most foods have also been associated with various cancers.
- ✦ Several food carcinogens have been shown to activate inflammatory pathways.

How You Can Protect Yourself: More than 25,000 different phytochemicals have been identified that may have potential against various cancers. The major chemopreventive compounds identified from fruits and vegetables include carotenoids, vitamins, resveratrol, quercetin, silymarin, sulphoraphane and indole-3-carbinol.

Carotenoids: Various natural carotenoids present in fruits and vegetables are reported to have anti-inflammatory and anticarcinogenic activity. Lycopene is one of the main carotenoids and is present in fruits, including watermelon, apricots, pink guava, grapefruit, rosehip, and tomatoes. A wide variety of processed tomato-based products account for more than 85% of dietary lycopene.

Resveratrol: Resveratrol has been found in fruits such as grapes, peanuts, and berries, and exhibits anticancer properties against a wide variety of tumors, including lymphoid and myeloid cancers, multiple myeloma, and cancers of the breast, prostate, stomach, colon, and pancreas.

Quercetin: The flavone quercetin, one of the major dietary flavonoids, is found in a broad range of fruits, vegetables, and beverages such as tea, with a recommended daily intake in Western countries of 25–30 mg.

Silymarin: is commonly found in the dried fruit of the milk thistle plant and contains chemopreventive effects that exhibit activity against tumors.

Indole-3-carbinol: The flavonoid indole-3-carbinol is present in vegetables such as cabbage, broccoli, brussels sprout, cauliflower, and daikon artichoke.

Sulforaphane: An isothiocyanate found in cruciferous vegetables such as broccoli.

OTHER PROTECTIVE FOODS INCLUDE THE FOLLOWING:

Spices: used all over the world to add flavor, taste, and nutritional value to food. A growing body of research has demonstrated that phytochemicals such as catechins (green tea), curcumin (turmeric), diallyldisulfide (garlic), thymoquinone (black cumin), capsaicin (red chili), gingerol (ginger), anethole (licorice), diosgenin (fenugreek) and eugenol (clove, cinnamon) possess therapeutic and preventive potential against cancers of various anatomical origins. Other phytochemicals with this potential include ellagic acid (clove), ferulic acid (fennel, mustard, sesame), apigenin (coriander, parsley), betulinic acid (rosemary), kaempferol (clove, fenugreek), sesamin (sesame), piperine (pepper), limonene (rosemary), and gambogic acid (kokum).



Whole grain foods: including wheat, rice, maize, barley, sorghum, millet, rye, oats. Whole grains contain chemopreventive antioxidants such as vitamin E, tocotrienols, phenolic acids, lignans, and phytic acid. Research demonstrates that intake of whole grains was found to reduce the risk of several cancers including those of the oral cavity, pharynx, esophagus, gallbladder, larynx, bowel, colorectum, upper digestive tract, breasts, liver, endometrium, ovaries, prostate gland, bladder, kidneys, and thyroid gland, as well as lymphomas, leukemias, and myeloma by 30-70%.

However, it is important to note that the refining process concentrates the carbohydrate and reduces the amount of other macronutrients, vitamins, and minerals because the outer layers are removed. In fact, all nutrients with potential preventive actions against cancer are reduced – some by as much as 92%

Obesity

Why it is Dangerous: Energy balance and carcinogenesis has been closely linked. According to an American Cancer Society study, obesity has been associated with increased mortality from cancers of the colon, breast, endometrium, kidneys, esophagus, gastric cardia, pancreas, prostate, gallbladder, and liver. Fourteen percent of all cancer deaths in the United States in men and 20% in women are attributable to excess weight or obesity.

How You Can Protect Yourself: Various phytochemicals have been identified in fruits, vegetables, spices, and grains that exhibit chemopreventive potential. In fact, research demonstrates that a reasonably good fraction of cancer deaths can be prevented by modifying the diet. Further, extensive research has revealed that a diet consisting of fruits, vegetables, spices, and grains has the potential to prevent certain types of cancer

Infectious Agents

Why It is Dangerous: Viruses, including human papillomavirus, Epstein Barr virus, Kaposi's sarcoma-associated herpes virus, human T-lymphotropic virus 1, HIV, HBV, and HCV, account for most infection-caused cancers, especially cervical cancer, anogenital cancer, skin cancer, nasopharyngeal cancer, Burkitt's lymphoma, Hodgkin's lymphoma, Kaposi's sarcoma, adult T-cell leukemia, B-cell lymphoma, and liver cancer.

How You Can Protect Yourself: Agents that can block chronic inflammation and infection, including the HPV vaccine, should be effective in treating many of these conditions.



WAYS YOU CAN LOWER YOUR RISK OF DEVELOPING CANCER

Exercise

Physical inactivity has been linked with increased risk of cancer of the breast, colon, prostate, and pancreas and of melanoma.

- ✦ The increased risk of breast cancer among sedentary women that has been shown to be due to lack of exercise has been associated with a higher serum concentration of estradiol, lower concentration of hormone-binding globulin, larger fat masses, and higher serum insulin levels.
- ✦ Physical inactivity can also increase the risk of colon cancer (most likely because of an increase in GI transit time, thereby increasing the duration of contact with potential carcinogens), increase the circulating levels of insulin (promote proliferation of colonic epithelial cells), alter prostaglandin levels, depress the immune function, and modify bile acid metabolism.

There is extensive evidence suggesting that regular physical exercise may reduce the incidence of many kinds of cancers.

Fasting

Fasting is a type of caloric restriction that can significantly decrease the incidence of neoplasms. The first published report to demonstrate this was published in 1940 on the formation of skin tumors and hepatoma in mice. Since then, fasting has been strongly associated with a dramatic decrease in radiation-induced solid tumors and myeloid leukemia.

Cancer prevention requires smoking cessation, increased ingestion of fruits and vegetables, moderate use of alcohol, caloric restriction, exercise, avoidance of direct exposure to sun light, minimal meat consumption, use of whole grains, use of vaccinations, and regular check ups.

1. Anand, P. et al. Cancer is a preventable disease that requires major lifestyle changes. *Pharm Res* (2008); 25(9): 2097-2116.

