

Healthy Eating *for Life*

Physicians
Committee
for Responsible Medicine
PCRM.org



**Food Choices for Cancer
Prevention and Survival**



More than 1.6 million people are diagnosed with cancer in the United States each year, the fourth highest incidence rate among peer countries in the world, and there is an urgent need for a new direction in battling this disease. That's why the Physicians Committee for Responsible Medicine (PCRM) has created materials specifically for cancer prevention and survival.

PCRM has two cancer-fighting goals. First, we aim to make cancer prevention a top priority. Second, and just as important, we want to improve survival after cancer has been diagnosed by offering comprehensive information about the role of dietary factors in keeping people healthy.

PCRM provides cooking classes, books, television and video programs, Web-based information, brochures, and other educational materials on cancer prevention and survival. Our hands-on Food for Life nutrition and cooking classes help cancer survivors and their families learn new tastes and easy food preparation skills. Through regular media interviews, our staff members provide important information to the public about cancer prevention.

Let me encourage you to support PCRM's cancer awareness efforts. With your help, we'll make cancer prevention a priority and help people diagnosed with cancer have the tools they need. Through our detailed and user-friendly website PCRM.org/FFL, printed materials, television public service announcements, and hands-on services, we're able to spread a lifesaving message far and wide. All contributions are tax-deductible to the full extent allowed by law.

Thank you for your interest and support.



Neal D. Barnard, M.D.



Physician, researcher, and author Neal D. Barnard, M.D., is one of America's leading advocates for health, nutrition, and higher standards in research. Dr. Barnard is the founder and president of the Physicians Committee for Responsible Medicine. He also initiated Food for Life, a program dedicated to cancer prevention and survival.

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HEALTHY EATING FOR LIFE is not intended as individual medical advice. Always discuss any diet change with your personal physician. In some cases, diet changes may alter your need for medication. Persons who follow a vegetarian diet should be sure to include a source of vitamin B12 in their daily routine, such as fortified cereals, fortified soy milk, or any common multiple vitamin.

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Food Choices for Cancer Prevention and Survival

Approximately 80 percent of cancers are due to factors that have been identified and can potentially be controlled, according to the National Cancer Institute. Not only do we have the potential to prevent most cancers, we can also improve the survival rates of people who have cancer.

Cancer starts when one cell begins to multiply out of control. It begins to expand into a lump that can invade healthy tissues and spread to other parts of the body. But this deadly disease can often be prevented and, when it occurs, can often be stopped in its tracks.

At least one-third of annual cancer deaths in the United States are due to dietary factors.¹ A recent review of diet and cancer shows that much of our risk for colon, breast, and prostate cancer, among other types, is due to dietary factors.^{2,3}

The link between diet and cancer is not new. In January 1892, *Scientific American* printed the observation that “cancer is most frequent among those branches of the human race where carnivorous habits prevail.” Numerous research studies have since shown that cancer is much more common in populations consuming diets rich in fatty foods, particularly meat and dairy products, and much less common in countries with diets rich in grains, vegetables, and fruits. One reason is that foods affect the action of hormones in the body. They also affect the strength of the immune system. While fruits and vegetables contain a variety of vitamins, minerals, antioxidants, and phytochemicals that protect the body, research shows that, by contrast, animal products contain potentially carcinogenic compounds that may contribute to increased cancer risk.



Established or Suspected Obesity-Related Cancers⁴

Breast (postmenopausal)
Prostate (advanced)
Pancreas
Esophagus (adenocarcinoma)
Gastric Cardia (adenocarcinoma)
Endometrium
Colon and Rectum
Liver
Gallbladder
Kidney (renal cell)
Non-Hodgkin's Lymphoma
Multiple Myeloma
Leukemia
Stomach (men)
Ovary
Uterus
Cervix

Another 30 percent of cancers are caused by tobacco. Lung cancer is the most obvious example, but it is by no means the only one. Cancers of the mouth, throat, kidney, and bladder are also caused by tobacco. Other factors, including physical activity, reproductive and sexual behavior, bacterial and viral infections, and exposure to radiation and chemicals, may also contribute to the risk of certain forms of cancer.

Building Your Strength Against Cancer

Some dietary changes have a preventive effect for many types of cancer. Boosting your intake of vitamin-rich vegetables and fruits, for example, strengthens your immune system and helps knock out cancer cells. To help prevent cancer, it is also smart to avoid meats, dairy products, and fried foods. Choosing fiber-rich legumes, grains, vegetables, and fruits helps keep many types of cancer at bay. Plant foods also contain a wide variety of cancer-fighting substances called phytochemicals.

These facts all point to choosing a vegetarian diet to help prevent cancer and improve cancer survival. Studies of vegetarians show that death rates from cancer are only about one-half to three-quarters of those of the general population. Breast cancer rates are dramatically lower in countries such as China and Japan, where diets are typically based on rice, vegetables, and bean products, with very little use of meat, dairy products, or oily foods. When people from those countries adopt a Western, meat-based diet, their breast cancer rates soar.

Are you ready to start enjoying the powerful benefits of a vegetarian diet? See “The Three-Step Way to Go Vegetarian” on page 13.

Defending Your DNA From Harm

Let’s look at the steps we can take to build our general defenses. Oxygen is essential to life. But as oxygen is used in the body, some of the oxygen molecules become very unstable. These unstable molecules, called free radicals, can attack cell membranes and even damage the DNA (our genetic code) in the nucleus of the cell. Damage to DNA is the beginning of cancer.

Fortunately, the foods we eat can help protect our bodies. Antioxidants, including vitamin C, vitamin E, beta-carotene, selenium, lycopene, and others, can neutralize the damaging effects of oxygen. These powerful natural chemicals come to us in vegetables, fruits, grains, and beans. People who include fruits and vegetables in their daily diets have lower rates of many forms of cancer.

Diet	35 to 60%
Tobacco	30%
Air and water pollution	5%
Alcohol	3%
Radiation	3%
Medications	2%

Smokers have provided dramatic demonstrations of the power of vegetables and fruits. A 55-year-old male smoker whose diet is low in vitamin C has a one-in-four risk of dying of lung cancer in the next 25 years. But if the smoker has a high intake of vitamin C, either through diet or supplements, his risk drops to 7 percent. Effects of antioxidants have even been seen in childhood. When children with brain tumors were studied, it was found that their mothers consumed less vitamin C during pregnancy, compared to other women.⁷

To step up the antioxidant power of your menus, try a baked sweet potato, Low-Fat Guacamole, or baked corn chips with Colorful Corn Salsa (recipes on page 17).

Even with vegetables and fruits in the diet, damage to the cells’ DNA will occasionally occur, so the body has built-in repair machinery. Fixing damaged DNA, which could otherwise cause cancer, requires a B vitamin called folic acid, which is found in dark green leafy vegetables, fruits, peas, and beans. Recent evidence suggests that folic acid may be particularly important in preventing HPV-related cervical cancer.⁸

The Dietary Reference Intake for folic acid for adult women and men is 400 micrograms per day and increases to 600 micrograms per day for pregnant women. Beans and vegetables are rich in folic acid. Asparagus, black beans, black-eyed peas, chickpeas, lentils, pinto beans, and cooked spinach all have more than 200 micrograms in a 1-cup serving.

We are all exposed to cancer-causing chemicals despite our efforts to avoid them. Some people are smokers, and quitting smoking is a vital step for them. But all of us are exposed to chemicals in the air, water, food, and household products, in addition to the carcinogens produced within our bodies as a part of our metabolic processes. While trying to minimize our exposure to carcinogens, we can also shore up our defenses against these assaults by including generous amounts of vegetables and fruits in our diet.

Foods and Immunity

Even if we follow healthy lifestyles, cancer cells will arise in the body from time to time. Luckily, we have white blood cells that roam our bloodstreams looking for these troublemakers. Some white blood cells, called natural killer cells, seek out and destroy cancer cells and bacteria. They engulf and destroy aberrant cells before they can cause damage. The function of natural killer cells and other white blood cells is improved by as little as 30 milligrams of beta-carotene per day—the amount in two large carrots.

Although beta-carotene is safe, even in fairly substantial amounts, the best way to get beta-carotene is not in pills, but in carrots, winter squash, spinach, kale, and the other packages in which nature supplies it. Beta-carotene is only one of perhaps two dozen related substances called carotenoids that occur naturally in vegetables and fruits and have varying degrees of biological activity.

In a research review, cancer experts found significant evidence suggesting that carotenoids help protect against esophageal, lung, and mouth cancers.³

Antioxidants in Foods ^{9,10,11}	Vit C (mg)	B-carotene (mg)	Vit E (mg)
Apple (1 medium)	8	0.04	0.44
Broccoli	116	1.30	1.32
Brown rice	0	0.00	4.00
Brussels sprouts	96	0.67	1.33
Carrot (1 medium)	7	12.00	0.28
Cauliflower	54	0.01	0.05
Chickpeas	2	0.02	0.57
Corn	10	0.22	0.15
Grapefruit (pink, 1/2)	47	0.19	0.31
Navy beans	2	0.00	4.10
Orange (1 medium)	75	0.16	0.31
Orange juice	124	0.30	0.22
Pineapple	24	0.02	0.16
Soybeans	3	0.01	3.35
Fresh spinach	16	2.30	0.57
Strawberries	84	0.02	0.23
Sweet potato (1 medium with skin)	28	15.00	0.32

Serving sizes are 1 cup (8 oz.), except as otherwise noted.

In addition to their antioxidant effects, vitamins C and E and selenium bolster immune function, but the importance of these effects in protecting against cancer is not yet clear.

Too much fat in the diet can impair immunity, and cutting down on fat helps strengthen the immune defenses against cells that turn cancerous. Researchers in New York tested the effect of low-fat diets on immunity.¹² They put healthy volunteers on a diet that limited fat content to 20 percent, reducing all fats and oils—not just saturated or unsaturated fats. Three months later, the researchers took blood samples from the volunteers and examined their natural killer cells. The natural killer cell activity was greatly improved.

Dietary fat intake can also contribute to weight gain, which can impair immune function. Studies show that individuals who are overweight are at increased susceptibility to various infections and to certain forms of cancer, especially postmenopausal breast cancer.¹³

It should come as no surprise that vegetarians have stronger immune systems than meat-eaters. Studies of white blood cell samples from vegetarians have shown them to have more than double the cancer cell-destroying ability of their nonvegetarian counterparts.¹⁴ The immune-boosting power of vegetarian diets is partly due to their vitamin content, low fat content, and perhaps other contributors, such as reduced exposure to toxic chemicals and animal proteins.

Foods and Hormones

Several of the most common forms of cancer are linked to sex hormones. This is true of cancers of the breast, uterus, ovary, prostate, and perhaps other sites. The amount of hormones in our bodies and their actions are determined, in large part, by the foods we eat.



Cutting fat out of the diet helps strengthen the immune defenses against cells that turn cancerous.

Breast Cancer: Prevention

As long ago as 1982, the National Research Council in a report called “Diet, Nutrition, and Cancer,” showed the evidence already available linking specific dietary factors to cancer of the breast and other organs.

International comparisons offer a good illustration. Asian countries, such as Japan, have low rates of breast cancer, while Western countries have cancer rates many times higher. However, when Japanese girls are raised on Westernized diets, their rates of breast cancer increase dramatically.

The traditional Japanese diet is much lower in fat, especially animal fat, than the typical Western diet. In the late 1940s, when breast cancer was particularly rare in that country, less than 10 percent of the calories in the Japanese diet came from fat. The American diet is centered on animal products, which tend to be high in fat and low in other important nutrients. The fat content of the average American diet is well above 30 percent of calories.

It has long been known that countries with a higher intake of fat, especially animal fat, have a higher incidence of breast cancer. Even within Japan, affluent women who eat meat daily have an 8.5 times higher risk of breast cancer than poorer women who rarely or never eat meat. Decades ago, the surgeon general’s “Report on Nutrition and Health” stated, “Indeed, a comparison of populations indicates that death rates for cancers of the breast, colon, and prostate are directly proportional to estimated dietary fat intakes.”

Fat and Hormonal Effects

Fatty foods have a strong influence on hormonal activity in the body. First, high-fat diets increase the amount of estrogens, the female sex hormones, in the blood. This is a problem, because many breast tumors are “fueled” by estrogens. Estrogens are normal and essential hormones for both women and men, but the more estrogen present, the greater the driving force behind some kinds of breast cancer. On high-fat diets, estrogen levels increase. When women adopt low-fat diets, their estrogen levels drop noticeably in a very short time. Vegetarians have significantly lower estrogen levels than nonvegetarians, in part because of the lower fat content of their diet. In addition, they have more of certain carrier molecules, called sex hormone-binding globulin, that circulate in the blood and have the job of holding onto sex hormones, keeping them inactive until they are needed. Fatty foods do the reverse: They increase estrogens and reduce the amount of the carrier molecule that is supposed to keep estrogens in check.

Animal fats are apparently a bigger problem than vegetable oils. Paolo Toniolo of the New York University Cancer Institute compared the diets of 250 women with breast cancer to 499 women without cancer from the same province in northwestern Italy. The two groups ate about the same amount of olive oil and carbohydrates. What distinguished the cancer patients was that they had eaten more meat, cheese, butter, and milk. Women who consumed more animal products had as much as three times the cancer risk of other women.¹⁵

A 2003 Harvard University study that included more than 90,000 women showed that the women who had eaten the most animal fat had significantly higher risk of breast cancer, compared with women who ate the least.¹⁶

Even though cross-cultural comparisons have pointed a finger at animal fat as the principal problem, vegetable oil is also under some suspicion. A 2007 study conducted by the National Institutes of Health found a direct link with total dietary fat and postmenopausal invasive breast cancer.¹⁷ Vegetable oils can probably affect estrogen levels and, as we will see, can increase the production of cancer-causing free radicals. So it is no good just replacing fried chicken with fried onion rings. The best diet eliminates animal products and keeps vegetable oils to a minimum as well.

Certain foods have special benefits. Soybeans, for example, contain natural compounds called isoflavones. These are very weak estrogen-like compounds that can occupy the estrogen receptors on breast cells, presumably displacing normal estrogens. The result is less estrogen stimulation of each cell. Research studies have shown that soy foods are not only safe but helpful for both preventing and surviving breast cancer. Eating soy products during adolescence seems to offer the greatest protection for reducing breast cancer risk.¹⁸ Women who eat the most soy foods have a lower chance of developing pre- and postmenopausal breast cancer, compared with those who eat the least.¹⁹ Similarly, breast cancer survivors who eat more soy foods have a lower risk of recurrence and better chance of survival, compared with women who do not eat as much.²⁰ Soybeans are a mainstay of Asian diets and may be an additional reason why these countries have low cancer rates.

How Much Fat Is Too Much?

The National Cancer Institute has long recommended that fat be limited to less than 30 percent of calories and that the fattiest meats be replaced by leaner meat, poultry, fish, and vegetables. These recommendations, however, are much too weak to prevent cancer or to increase survival for those already diagnosed with the disease. A large study of American nurses showed that those who limited fat to 27 percent of their calories were not any better off in preventing cancer than those consuming more fat.²¹ Some have interpreted this to mean that diet has nothing to do with breast cancer. A more reasonable conclusion is that the diets these women followed were still high-risk diets. After all, a diet including regular consumption of animal products and drawing nearly 30 percent of calories from fat is nothing like the traditional plant-based Asian diets associated with low cancer risk.

Favoring Fiber

Grains, vegetables, fruits, and legumes ensure plenty of fiber, but chicken breasts, beef, pork, eggs, cheese, and all other animal products contain no fiber at all.

Getting the fat off your plate is important—but that is just the first step. Other food choices play important roles in cancer

prevention. Vegetables, fruits, grains, and beans provide fiber, which helps the body dispose of excess estrogen.

One way the body rids itself of sex hormones is through the digestive tract. The liver pulls sex hormones from the blood, chemically alters them, and sends them down the bile ducts into the intestinal tract. There, the fiber from grains, vegetables, fruits, and beans ushers sex hormones through the intestine and out the door as waste. At least, that is how the system is supposed to work. As animal products have taken up more and more space on the American plate, they have displaced grains, vegetables, beans, and fruits. Without adequate fiber to hold them in the digestive tract, sex hormones are reabsorbed into the bloodstream, where they once again become biologically active. The hormones your body was trying to eliminate are thus put back into circulation.

Building your diet from grains, vegetables, fruits, and legumes ensures plenty of fiber for the body's needs. To increase your daily fiber intake, start your day with oatmeal and fruit, and try adding delicious, low-fat, fiber-rich recipes such as Three-Bean Chili or Easy Bean Salad to your weekly menu (see recipes on page 18).

Carcinogenic Compounds in Cooked Meat

Not only is meat devoid of fiber and other nutrients that have a protective effect, but it also contains animal protein, saturated fat, and, in some cases, carcinogenic compounds formed during the process of cooking meat. These carcinogenic compounds may be to blame for part of the correlation between meat intake and increased cancer risk. Meat intake has been shown to be a risk factor for breast cancer even when researchers controlled for confounding factors such as total fat and calorie intake.²²

Heterocyclic Amines

Heterocyclic amines (HCAs) are DNA-damaging compounds that are produced as meat cooks. Grilling, frying, or oven-broiling meat produces large quantities of these mutagens. The longer and hotter the meat is cooked, the more of these compounds form. In some studies, grilled chicken formed higher concentrations of these cancer-causing substances than other types of cooked meat.²³

The major classes of HCAs are formed from creatine or creatinine, specific amino acids, and sugars. All meats, including fish, are high in creatine. HCA formation is greatest when meat is cooked at high temperatures, as is most common with grilling or frying. Consumption of well-done meat has been associated with increased risk of breast cancer²⁴ and colon cancer.²⁵

Polycyclic Aromatic Hydrocarbons

Grilling or broiling meat over a direct flame results in fat dropping on the hot fire and the production of flames containing polycyclic aromatic hydrocarbon (PAH). PAHs adhere to the surface of food; the more intense the heat, the more PAHs are present.³ They are believed to play a significant role in contributing to human cancers.

Other Factors

Aside from diet, other factors that increase breast cancer risk include:

Hormones: Supplemental hormones given to women after menopause increase breast cancer risk. Oral contraceptives may also increase risk slightly. Although newer birth control pills contain less estrogen and progesterone than older versions, evidence suggests some increase in risk.

Overweight: Higher body weight increases the risk of breast cancer after menopause.³

Radiation: Of all the different parts of the body, the breast is probably the most sensitive to X-ray damage, and there is no doubt that X-rays to the breast can cause cancer.

This raises obvious concerns about mammograms, which are X-rays. Annual mammograms are clearly beneficial for women over 50. But women should schedule mammograms only at modern facilities that do them regularly and maintain new equipment, which keeps radiation doses to a minimum. For women under 50, it is unclear whether routine mammograms are beneficial. Many cancers are missed on mammograms, and women have sometimes been falsely reassured by a negative mammogram, leading to delays in diagnosis and treatment. All women (especially those under 50) should do regular self-exams and follow their physicians' recommendations regarding mammogram screening.

Genetics: About 5 percent of breast cancer cases are purely attributable to genetics. In such cases, cancer is passed from parent to child as a dominant trait, and the family tree is riddled with the disease. For a larger group of individuals, genetics probably makes a contribution in subtle ways. For example, it may well be that different genes influence one's susceptibility to carcinogens, the strength of the immune system, body weight, and other factors. Each of these is also influenced by diet.

Toxic Chemicals: Populations in areas near toxic waste sites tend to have higher than average rates of breast cancer. That is true for other forms of cancer, too. And you don't have to live near a chemical waste site to be concerned about toxic exposures. Toxic chemicals are available at any grocery store. Chemical contaminants frequently end up in meats and dairy products, because pesticides are sprayed on grains fed to cows, chickens, pigs, and other livestock. In storage bins, feed grains are sprayed again. Animals concentrate these chemicals in their tissues. Meat, fish, and milk are the largest sources.^{26,27} Traces of pesticides can also be found on nonorganic produce. Fortunately, organic produce is now more widely available.

Women who avoid eating animal products have much lower concentrations of pesticides in their breast milk. It appears eggs, milk, meat, fish, and shrimp can contribute to higher levels of pesticides in pregnant women.²⁸ Pesticides such as DDT, chlordane, heptachlor, and dieldrin, and polychlorinated biphenyls (PCBs) have been measured at markedly lower levels in vegetarians than in omnivores. In a 1981 study, vegetarians had only 1 to 2 percent of the national

average levels of certain pesticides and industrial chemicals compared to levels in average Americans.²⁹ The exception was PCBs, for which vegetarians had levels comparable to meat-eaters. PCBs in the body often reflect past fish consumption, and levels drop slowly after people adopt a vegetarian diet. Once PCBs are in the body tissues, avoiding contaminated fish will reduce PCB levels only very slowly.

Time between Puberty and First Pregnancy: The younger a girl is when puberty occurs, the higher her risk of breast cancer. Also, the later the age of her first pregnancy, the higher her risk. However, it may be that the early age of puberty simply indicates elevated hormone levels, as described above. As high-fat, low-fiber diets have spread from the wealthy to most of the population, the age of puberty has dropped dramatically from 17 in 1840 to 12.5 today. Similarly, as Japan's diet has Westernized since World War II, the age of puberty has dropped from 15 to 12.5. It may be that early puberty and cancer are both the result of a hormonal aberration.

Cancers of the Uterus and Ovary: Prevention

The uterus and ovary are reproductive organs, and factors that affect hormone function can be expected to affect these organs as well. The risk of cancer of the uterus and ovary is higher in populations that have more breast cancer incidences, suggesting that they may be caused by similar factors. Obesity after menopause is also a strong yet modifiable risk factor for epithelial ovarian cancer risk.³⁰ Uterine cancer is linked to fatty diets and obesity, although other factors, including hormone supplements, also play an important role.³¹

Some researchers have suggested that a higher intake of dairy products may be linked to ovarian cancer.^{32,33} If this finding holds true, the culprit may be a product of the breakdown of the milk sugar lactose. Lactose breaks down in the body to form another sugar called galactose, which appears to be able to damage the ovary. The problem is the milk sugar, not the milk fat, so it is not solved by using nonfat products. Further research in this area is needed.

Prostate Cancer: Prevention

Like women, men on high-fat Western diets have more estrogens circulating in their blood and a higher risk of cancer of reproductive organs. High-fat diets alter the amounts of testosterone, estrogen, and other hormones in both men and women. Cancer of the prostate, which occurs primarily in older individuals, is the most common form of cancer in American men.

Cancer cells are found in the prostates of about 20 percent of men over the age of 45 years. In most cases, these cancer cells do not develop into cancerous tumors that affect the overall health or life span of the individual. However, in some cases, the cancer does grow, invade surrounding tissues, and spread to other parts of the body. Although the disease varies greatly from one person to the next, the average patient loses nine years from his normal life span. According to the National Cancer Institute, one in 6 men will develop prostate cancer at some point in his life.

Cancer of the prostate is strongly linked to what men eat. Milk, meat, eggs, cheese, cream, butter, and fats are found to be linked to prostate cancer.³⁴

More recently, milk consumption has been linked to prostate cancer due to high levels of the compound insulin-like growth factor (IGF-I), which is found both in dairy products and in increased levels in the bodies of those who consume dairy on a regular basis.³⁵ A Harvard University study showed that men who had the highest levels of IGF-I had more than four times the risk of prostate cancer compared with those who had the lowest levels.³⁶

In addition, two more Harvard studies have shown that milk-drinking men have 30 to 60 percent greater prostate cancer risk than men who generally avoid dairy products.^{37,38}

One glass of skim milk contains 8.4 grams of protein. Researchers estimate that every 35 grams of dairy protein consumed daily can increase prostate cancer risk by 32 percent.³⁹ Calcium from dairy products was also positively associated with risk, supporting the hypothesis that high intake of protein or calcium from dairy products may increase prostate cancer risk.

Who has a lower risk? Countries with more rice, soybean products, or green or yellow vegetables in the diet have far fewer prostate cancer deaths. Diets rich in lycopene, the bright red pigment found in tomatoes, watermelon, and pink grapefruit, have also been shown to prevent prostate cancer. Researchers found that men who had just two servings of tomato sauce per week had a 23 percent lower risk of prostate cancer, compared with those who rarely ate tomato products.⁴⁰ It is not surprising that vegetarians have low rates of prostate cancer. Switching to a vegetarian diet in adulthood is helpful, but men raised on vegetarian foods have the lowest risk.

Men who consume diets based on animal products tend to have higher levels of testosterone compared with men who eat plant-based diets. This increase may be due to overproduction of these hormones in the body. Also, fiber in the diet helps remove



excess hormones with body wastes. Those who eat meats and dairy products miss out on a substantial amount of fiber, because animal products have no fiber at all. This hormonal boost can affect the prostate, which is the likely reason for increased cancer risk among men on meat-based diets.

Colon Cancer: Prevention

The colon is another name for the large intestine, which makes up the second half of our digestive tract. Strong links have been found between colon cancer and the consumption of alcohol, meat, and other fatty foods.³

Red and processed meats (bacon, ham, hot dogs, sausage) are the biggest offenders. A 2007 comprehensive review by the American Institute for Cancer Research (AICR) of diet and cancer found that processed meats are strongly linked to colorectal cancer risk. Just one 50-gram serving (one hot dog) of processed meat per day increases the risk of colorectal cancer by 21 percent.³ In May 2011, AICR updated the report with even more supportive evidence that there is no safe amount of processed meat to consume.⁴¹

To absorb the fats we eat, our liver makes bile and stores it in the gallbladder. After a meal, the gallbladder releases bile acids into the intestine, where the acids chemically modify the fats so they can be absorbed. Unfortunately, bacteria in the intestine turn these bile acids into cancer-promoting substances called secondary bile acids. Meats contain a substantial amount of fat, and they also foster the growth of bacteria that cause carcinogenic secondary bile acids to form. When meat is cooked, carcinogens can form on the surface of the food. As with breast cancer, frequent consumption of meat—particularly red meat—is associated with an increased risk of colon cancer.⁴²

High-fiber diets offer a measure of protection. Fiber greatly speeds the passage of food through the colon, effectively removing carcinogens. And fiber actually changes the type of bacteria present in the intestine, which reduces production of

carcinogenic secondary bile acids. Fiber also absorbs and dilutes bile acids.

Even people at particular risk for cancer can be helped by high-fiber diets. Jerome J. DeCosse, M.D., a surgeon at Cornell Medical Center, gave bran to patients with recurrent polyps of the colon. These are small growths that have a tendency to become cancerous. Dr. DeCosse found that, within six months, the polyps became smaller and fewer in number. He believes that pentose fiber, which is plentiful in wheat, is the key to bran's power.⁴³

More recently, a 2011 study published in the *British Medical Journal* found that high-fiber foods, whole grains in particular, significantly reduced the risk of colon cancer.⁴⁴ People eating three servings of whole grains each day could decrease their risk by 17 percent.

Obesity also influences cancer risk. There is convincing evidence that abdominal and body fat increases one's risk of colon cancer.³ Avoiding obesity is one of the greatest preventative steps for significantly lowering cancer risk, as a higher body mass index or BMI is a risk for colon cancer.⁴⁵ The good news: Fiber is important for helping maintain a healthy body weight.

Vegetarian Foods: Powerful for Health

Two themes consistently emerge from cancer research: Vegetables and fruits help reduce risk, while animal products and other fatty foods are frequently found to increase risk.

When the terms “fiber” and “fat” are used, it is easy to forget the foods from which they come. When you hear about the dangers of fat, think meat- and- dairy-based diets, aided and abetted by oily foods. Fiber is found in whole grains, vegetables, fruits, and beans. There is no fiber in any product from an animal.

A vegetarian menu is a powerful and pleasurable way to achieve good health. The vegetarian eating pattern is based on a wide variety of foods that are satisfying, delicious, and healthful.



Even people at particular risk for cancer can be helped by high-fiber diets.

Try the New Four Food Groups and Discover a Healthier Way To Live!

Vegetables (4 or more servings a day)

Vegetables are packed with nutrients, including vitamin C, beta-carotene, riboflavin, iron, calcium, fiber, and other nutrients. Dark-green leafy vegetables, such as broccoli, collards, kale, mustard and turnip greens, chicory, and bok choy, are especially good sources of these important nutrients. Dark-yellow and orange vegetables such as carrots, winter squash, sweet potatoes, and pumpkin provide extra beta-carotene. Include generous portions of a variety of vegetables in your diet.

Serving size: 1 cup raw vegetables • 1/2 cup cooked vegetables

Whole Grains (5 or more servings a day)

This group includes bread, rice, pasta, hot or cold cereal, corn, millet, barley, bulgur, buckwheat groats, and tortillas. Build each of your meals around a hearty grain dish. Grains are rich in fiber and other complex carbohydrates, as well as protein, B vitamins, and zinc.

*Serving size: 1/2 cup hot cereal • 1 ounce dry cereal
1 slice bread*

Fruit (3 or more servings a day)

Fruits are rich in fiber, vitamin C, and beta-carotene. Be sure to include at least one serving each day of fruits high in vitamin C—citrus fruits, melons, and strawberries are all good choices. Choose whole fruit over fruit juices, which do not contain very much fiber.

*Serving size: 1 medium piece of fruit • 1/2 cup cooked fruit
4 ounces juice*

Legumes (2 or more servings a day)

Legumes, including beans, peas, and lentils, are all good sources of fiber, protein, iron, calcium, zinc, and B vitamins. This group also includes chickpeas, baked and refried beans, soymilk, tempeh, and texturized vegetable protein.

*Serving size: 1/2 cup cooked beans • 4 ounces tofu or tempeh
8 ounces soymilk*

Be sure to include a good source of vitamin B12, such as fortified foods or vitamin supplements.

Setting Blame Aside

Occasionally people who have cancer report feeling that, if food plays a role in cancer, then they are somehow to blame for their disease. As such, guilt and blame often become concerns for people dealing with cancer. However, these feelings are burdens that help no one. Besides, it makes no sense to blame anyone for what they had no way of knowing. Until major public education programs spread the word about the role of dietary factors and help people to change, cancer will remain an epidemic.

Steps to Cancer Prevention

- Do not use tobacco in any form.
- Eat a varied menu (whole grains, vegetables, fruits, and beans, without added fats), which supplies generous amounts of fiber, vitamins, and minerals.
- Have a variety of colors within your daily menu.
- Consume at least 40 grams of fiber per day.
- Avoid animal products and minimize added vegetable oils.
- Minimize alcohol intake.
- Engage in regular physical activity.
- Maintain your weight at or near your ideal level.
- Avoid excessive sunlight and unnecessary X-rays.
- Be sure to take a daily multiple vitamin without added minerals, or other reliable source of vitamin B12. Adults need 2.4 micrograms per day.

Surviving Cancer

Foods are important, not only in preventing cancer, but also in improving survival for those who already have cancer.

Breast Cancer: Survival

Not all cancers of the breast are the same. Some have a relatively good prognosis, and others have a very poor prognosis. For example, a tumor that is small and has not spread to the lymph nodes or other organs is less dangerous than a tumor that is larger and has already spread. (Lymph nodes are pea-sized collections of cells near the breast and other organs; they are important to immune function.) Hospital laboratories also determine whether a breast tumor has receptors for estrogen or progesterone hormones. If it does, the tumor is slightly less aggressive than a tumor lacking receptors.

These prognostic factors are not due to chance alone. Thirty years ago, Ernst Wynder of the American Health Foundation in New York observed that Japanese women are much less likely than American women to get breast cancer; in addition, when Japanese women do get the disease, they tend to survive longer.⁴⁶ Their improved survival is independent of age, tumor size, estrogen receptor status, the extent of spread to lymph nodes, and the microscopic appearance of the cancer cells. And it is not that Japanese women have better health care, because the

same pattern has been observed in Hawaii and California, where Japanese women live near other ethnic groups and have essentially the same health care systems.

Researchers have begun to look at whether diet plays a role in survival. It does. Our old enemy, fat in foods, rears its ugly head once again—the more fat in the diet, the shorter the survival time. In one Canadian research study, women with cancer were more likely to have lymph node involvement if they had a higher fat intake. This effect was found only for saturated fat and only for postmenopausal women.⁴⁷ Fat seems to have a measurable effect when cancer has spread to other parts of the body and little or no effect when the disease is localized.

Researchers in Buffalo, N.Y., calculated what they believe to be the degree of risk posed by fat in the diet: For a woman with metastatic breast cancer (cancer that has already spread at the time of diagnosis), the risk of dying from the disease at any point increases 40 percent for every 1,000 grams of fat consumed monthly.⁴⁸ To understand what this means, compare three different diets, each of which contains 1,800 calories per day:

- On a low-fat vegetarian diet, about 10 percent of calories come from fat. This type of diet contributes about 20 grams of fat per day, or 600 grams per month.
- On a typical American diet, 35 percent of calories come from fat. This means about 70 grams of fat per day, or 2,100 grams per month.
- On a diet with more fat than average, say 50 percent of calories, fat intake would be 100 grams per day, or 3,000 grams per month.

If the researchers' finding holds, the typical American diet would lead to about a 60 percent higher risk of dying of breast cancer at any given point, compared to the low-fat vegetarian diet, and the high-fat diet would lead to a more than 95 percent increase in risk of dying. These figures do not mean that a woman's risk of dying is 60 percent or 95 percent. They mean that the risk is 60 percent or 95 percent higher than it would otherwise have been, assuming the individual is comparable to those studied.

The Women's Intervention Study (WINS) evaluated dietary fat intake and breast cancer recurrence in postmenopausal women previously treated for breast cancer. A total of 2,437 women were enrolled in the study and were assigned either to a low-fat diet (20 percent energy from fat) or to a control group with no diet changes. After a five-year follow-up, participants who had previously been treated for estrogen-receptor-negative breast cancer, and who then reduced their fat intake to 33 grams daily, had a 42 percent reduced risk in breast cancer recurrence, compared with women who did not change their diets. Women who had been previously treated for estrogen-receptor-positive breast cancer and who then changed their diets had a 15 percent reduced risk for breast cancer recurrence, compared with women who did not change their diets.⁴⁹

Other parts of the diet play important roles. Diets high in

fiber, carbohydrate, and vitamin A seem to help the prognosis, while alcohol slightly worsens it.⁵⁰ Patients who have more estrogen receptors on their tumors—which indicates a better prognosis—tend to be those who had consumed more vitamin A. (Beta-carotene becomes vitamin A in the body.) For reasons that are not entirely clear, vegetables and fruits (and the vitamins they contain) help keep the cells of the body in better working order—one sign of which, for breast cells, is the presence of estrogen receptors. So vegetables and fruits are not only important in helping to prevent cancer, they also help improve survival for those who have cancer.

Higher body weight increases the risk of dying of breast cancer.⁵¹ Among postmenopausal women with breast cancer, slimmer women tend to have less lymph node involvement. Heavier women have more lymph node involvement, higher rates of recurrence, and poorer survival rates. Even among relatively slim women, it pays to avoid extra weight. A 2006 study from Shanghai, China, showed that women who had previously been diagnosed with breast cancer had greater survival rates if they were at the slimmer part of the normal weight range (body mass index below 23), compared with even slightly heavier women.⁵²

Cancers of the Uterus and Ovary: Survival

The uterus and ovary, like the breast, are strongly influenced by sex hormones. Again, a low-fat vegetarian diet is the best prescription for preventing the hormonal elevations that encourage cancer. In addition, as mentioned earlier, galactose—a product of the breakdown of the milk sugar lactose—may increase the risk of ovarian cancer.³⁶

One might assume that the factors that improve breast cancer survival could do the same for cancers of the uterus and ovary. Unfortunately, researchers have not yet tackled this issue. Until more information is available, it seems most prudent for those with ovarian or uterine cancer to follow the same diet that helps prevent cancer in these organs and that keeps the immune system in good working order: A low-fat vegetarian diet rich in vegetables and fruits.

Maintaining a healthy weight and following a low-fat vegetarian diet is the best prescription for preventing the hormonal elevations that encourage cancer.^{53, 54}

Prostate Cancer: Survival

Diet may help improve survival in prostate cancer as well. When pathologists conduct autopsies of men who die from accidents or other causes, they find cancer cells in the prostates of about 20 percent. These men did not know they had cancer and had no symptoms whatsoever. Historically, the prevalence of such latent cancers actually varies with geography: The lower rates were in Singapore (13 percent) and Hong Kong (15 percent), and the highest were in Sweden (31 percent).⁵⁵ In most men, the cells never grow into a large tumor, never spread, and never affect life or health in any way. However, just as the prevalence of latent cancers varies

from one country to another, the likelihood that they will turn into symptomatic cancer varies in precisely the same way, suggesting that the same factors that cause cancer cells to form in the first place also encourage them to grow and spread. So while a Swede is twice as likely as a man from Hong Kong to have cancerous cells in his prostate, he is more than eight times more likely to die of prostate cancer.

A low-fat, high-fiber diet can help eliminate the hormonal aberrations that are known to be linked with prostate cancer and may help improve survival among those who have the disease.⁵⁶

In a study of men with prostate cancer, Dean Ornish, M.D., tested a low-fat vegan diet accompanied by regular exercise and stress management. In the 42 men in the control group, the amount of prostate-specific antigen (PSA, which is used as an indicator of cancer advancement) levels rose over the three-month study period, and seven required additional treatment. But in the 42 men assigned to the vegan diet and lifestyle intervention, the average PSA level dropped from 6.3 to 5.8, and none required further treatment.⁵⁷

Colon Cancer: Survival

Colon cancer is encouraged by diets containing animal fat and discouraged by diets rich in vegetables and fiber. A low-fat plant-based diet is important both for those seeking to prevent cancer and those who have already been treated for it. In a prospective study evaluating 1,009 colon cancer patients, researchers found that survival depended to a great extent on dietary habits. The participants had completed initial cancer treatment. Those who consumed more red and processed meats, sweets, and refined grains were more likely to have a recurrence or die from the disease after a median 5.3-year follow-up, compared with those who consumed more fruits, vegetables, whole grains, and less red and processed meats and refined foods.⁵⁸

Researchers at the University of Arizona found that people who have been treated for colon or rectal cancer have less risk of recurrence when their diets are rich in fiber. They found benefits from daily supplements of 13.5 grams of wheat bran fiber (the amount in a half-cup of bran cereal), but they speculate that other forms of fiber might have the same effect. A vegetarian diet can easily boost fiber intake by 10 to 29 grams per day. If you have bran cereal, topping it with soymilk rather than cow's milk allows you to avoid animal fat, cholesterol, lactose, and animal proteins.

Colon cancer typically develops from polyps in the colon wall. These polyps become smaller and fewer in number within six months on a high-fiber diet.

It is clear that much more needs to be learned about the power of foods to prevent cancer or to improve cancer survival. The good news is that the diet that helps protect against cancer is the same one that keeps cholesterol low and waistlines slim. Eliminating animal products from the diet, keeping oils to a minimum, and including generous amounts of vegetables, grains, beans, and fruits is a powerful prescription.

Making Healthy Diet Changes

The Three-Step Way to Go Vegetarian

If you are making the switch to a vegetarian diet for its health benefits, you'll be pleased to discover a wonderful additional benefit to vegetarian eating: It's a delicious and fun way to explore new foods. A vegetarian meal can be as familiar as spaghetti with marinara sauce, as comforting as a bowl of rich potato soup, or as refreshing as Cucumber, Mango, and Spinach Salad (see the recipe on page 16).

The switch to a vegetarian diet is easier than you might think. Most people, whether vegetarians or meat-eaters, typically use



a limited variety of recipes; the average family eats only eight or nine different dinners repeatedly. You can use a simple, three-step method to come up with nine vegetarian dinner menus that you enjoy and can prepare easily.

First, think of three vegetarian meals you already enjoy. Common ones are pasta primavera, vegetable stir-fry, and vegetable stew.

Second, think of three recipes you prepare regularly that can easily be adapted to a vegetarian menu. For example, a favorite chili recipe can be made with almost the same ingredients; just replace the meat with beans or texturized vegetable protein. Prepare bean burritos (using canned vegetarian refried beans) instead of beef burritos, veggie burgers instead of hamburgers, and grilled eggplant and roasted red peppers instead of grilled chicken in sandwiches. Many soups, stews, and casseroles also can be made into vegetarian dishes with a few simple changes.

Third, check out some vegetarian cookbooks from the library and experiment with the recipes for a week or so until you find three new recipes that are delicious and easy to make. You can also explore the many recipes offered on our website, *NutritionMD.org*. Just like that, with minimal changes to your menus, you will have nine vegetarian dinners.

After that, coming up with vegetarian options for breakfast and lunch is easy. Try muffins with fruit spread, cholesterol-free French toast, or cereal for breakfasts. Sandwiches, with spreads like hummus or white bean pâté with lemon and garlic, pasta salads, or even dinner leftovers make great lunches.

Tips for Making the Switch to a Vegetarian Diet

- Convenience foods cut cooking time. Supermarkets and natural foods stores stock a huge array of instant soups and main-dish vegetarian convenience items. Many canned soups, such as minestrone, black bean, or vegetable, are vegetarian. Flavored rice or other grain mixes, like curried rice or tabbouleh salad, can be stretched into an entrée with a can of beans. Visit the frozen food section for internationally inspired vegetarian frozen entrées such as corn and bean enchiladas, lentil curry, or vegetarian pad thai. Or try vegetarian baked beans, refried beans, sloppy joe sauce, and meatless spaghetti sauce from the canned goods aisle.
- Ask for it! Even restaurants that don't offer vegetarian entrées can usually whip up a meatless pasta or vegetable plate if you ask. If attending a catered affair, catch the waiter before you are served and ask him or her to remove the chicken breast from your plate and slip on an extra baked potato.
- When you're dining out, the best bets for finding vegetarian food are international restaurants. Italian, Chinese, Mexican, Thai, Japanese, and Indian restaurants all offer a wide variety of vegetarian dishes.
- Summer barbecues are healthy and fun with meatless hot dogs and burgers, which are now available in most supermarkets. Or for a real change of pace, grill thick slices of marinated vegetables like eggplant, zucchini, or tomatoes.

Affordable Eating

Surprisingly, choosing healthful foods over high-fat and processed foods is a much more economical way to eat. Below are the costs comparing a chicken and cheese tortilla to a vegetarian tortilla. As you can see, the healthier vegetarian version costs nearly half as much!

Chicken and Cheese Tortilla (Serves 4):

Nutrition facts: 690 calories, 56 grams protein, 44 grams fat, 17 grams carbohydrate (per serving)

8 small corn tortillas: \$1.29

1 pound Kraft shredded cheddar cheese: \$3.29

1 pound chicken breast: \$3.48

1 4-ounce jar salsa: \$1.50

**Total Cost for Chicken and Cheese Tortilla Meal:
\$9.56 (\$2.39 per serving)**

Vegetarian Tortilla (Serves 4):

Nutrition facts: 485 calories, 12 grams protein, 7.6 grams fat, 93 grams carbohydrate (per serving)

8 small corn tortillas: \$1.29

16 ounces brown rice: \$1.19

1 15-ounce can of vegetarian refried beans: \$0.69

1 4-ounce jar of salsa: \$1.50

(1/2 head) fresh shredded lettuce: \$0.99

**Total for Cost for Vegetarian Tortilla Meal:
\$5.66 (\$1.42 per serving)**

Top Five Foods You Can't Live Without

1. Beans and lentils add heartiness to soups, stews, chili, and other recipes. Plus, they're loaded with cancer-fighting fiber and healthy plant protein.
2. Broccoli and other cruciferous vegetables such as kale, cauliflower, collard greens, and Brussels sprouts contain potent cancer-fighting compounds and have been shown to help rid the body of excess hormones.
3. Berries such as blueberries and blackberries are full of powerful antioxidants that help stop free radical damage which can otherwise lead to cancer.
4. Carrots and other orange-colored fruits and vegetables such as sweet potatoes, mango, cantaloupe, pumpkin, and squash are incredible sources of beta-carotene, which is crucial for cancer prevention and survival. Just one large carrot a day helps you meet your daily requirement!
5. Whole grains such as brown rice, quinoa, oats, and millet are rich sources of fiber and B vitamins, essential for health. Plus, they're loaded with complex carbohydrates to keep you full and help you avoid unhealthy snacking.

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Recipes

The following recipes are from *The Cancer Survivor's Guide: Foods that help you fight back!*
You'll be surprised how simple, delicious, and nutritious they are!

Roasted Red Pepper Hummus

Makes about 2 cups (8 1/4-cup servings)

Spread hummus on whole-wheat pita bread or serve as a dip for vegetables. This version is lower in fat than most commercial varieties, which is important when it comes to reducing hormone-dependent cancer risk and keeping your immune system operating smoothly.

1 15-ounce can garbanzo beans, or 1 1/2 cups of cooked garbanzo beans
1 tablespoon tahini (sesame seed butter)
1/4 cup lemon juice
3 green onions, chopped
1 tablespoon chopped garlic (about 3 cloves)
1 teaspoon ground cumin
1/2 teaspoon black pepper
1/2 cup roasted red peppers, packed in water

If using canned garbanzo beans, drain them, reserving liquid, and rinse beans. Place beans, tahini, lemon juice, green onions, garlic, cumin, black pepper, and roasted peppers in food processor or blender and process until smooth. Add reserved bean liquid, or if using cooked beans, water or vegetable broth, as needed for a smoother consistency.

Per 1/4-cup serving: 80 calories; 2.1 g fat; 0.3 g saturated fat; 23.3% calories from fat; 0 mg cholesterol; 3.9 g protein; 12.5 g carbohydrate; 1.4 g sugar; 2.8 g fiber; 32 mg sodium; 36 mg calcium; 1.6 mg iron; 23.5 mg vitamin C; 299 mcg beta-carotene; 0.4 mg vitamin E

Recipe by Jennifer Reilly, R.D.



Cucumber, Mango, and Spinach Salad

Makes 10 to 12 servings

This salad boasts beta-carotene from the mango and lutein from the spinach, which are cousins in the carotenoid family and important antioxidants. Aside from cancer prevention and survival, lutein is recognized for its key role in eye health.

1 bag or bunch fresh spinach
1 mango, peeled and cut into bite-size pieces
1 large cucumber, peeled and sliced
6 green onions, thinly sliced
1/2 cup chopped fresh basil
juice of 1 lime
1/2 cup seasoned rice vinegar
freshly ground black pepper, or to taste

Wash and drain spinach, tear into bite-size pieces, if necessary, and put into a large serving bowl. Toss mango, cucumber, green onions, and basil in a medium bowl. Add lime juice and vinegar and stir to mix. Arrange mango mixture on spinach and sprinkle with black pepper.

Per serving (1/10 of recipe): 45 calories; 0.3 g fat; 0 g saturated fat; 5.5% calories from fat; 0 mg cholesterol; 1.5 g protein; 10.9 g carbohydrate; 7.4 g sugar; 1.7 g fiber; 219 mg sodium; 50 mg calcium; 1.3 mg iron; 19.1 mg vitamin C; 2134 mcg beta-carotene; 1 mg vitamin E

Recipe by Amy Lanou, Ph.D.

Any Veggie Coconut Curry

Makes 6 servings

The vegetables listed below are favorites, but any vegetables you have on hand can be used along with the coconut milk and spices. If you decide to use coconut milk, it is important to note that this product has a high fat content and should be used in moderation. Try lite coconut to get the sweet nutty coconut flavor without all the fat. Cauliflower, squash, and sweet potatoes are other tasty choices. This is a great way to use up “going-bad” fresh or frozen vegetables! Serve over rice or your favorite whole grain.

1 cup dry (uncooked) brown rice
2 cups water
1 large onion, sliced
4 garlic cloves, chopped (about 4 teaspoons)
3 large carrots, chopped
1/4 cup vegetable broth or water
1 1/2 tablespoons curry powder
1 teaspoon ground cumin
1/2 teaspoon turmeric
pinch cayenne pepper
1 medium potato, chopped (peeling optional)
3 cups chopped kale

2 cups chopped broccoli florets, or 1 10-ounce package frozen chopped broccoli florets
 8 mushrooms, sliced
 1 15-ounce can garbanzo beans, drained and rinsed, or 1 1/2 cups cooked garbanzo beans
 1 cup fresh or frozen green peas
 1 cup lite coconut milk, or 1 cup nondairy milk + 1 teaspoon coconut extract
 3 tablespoons reduced-sodium soy sauce

Bring rice and water to a boil in a medium saucepan. Lower heat and simmer, covered, until all the water is absorbed (about 30 minutes).

In a large saucepan, sauté onion, garlic, and carrots in vegetable broth or water on medium-high heat until onion becomes translucent. Add curry, cumin, turmeric, and cayenne. Cook for 2 to 4 minutes, stirring often. Add potato, kale, broccoli, mushrooms, beans, peas, and coconut milk or nondairy milk mixture. Cover and reduce heat to medium-low. Simmer for 10 to 20 minutes, stirring occasionally, until potato can be pierced easily with a fork. Sprinkle with soy sauce before serving.

Per serving (1/6 of recipe): 320 calories; 5.2 g fat; 2.5 g saturated fat; 14.7% calories from fat; 0 mg cholesterol; 12.3 g protein; 59.3 g carbohydrate; 5.9 g sugar; 12.3 g fiber; 407 mg sodium; 115 mg calcium; 4.7 mg iron; 37.7 mg vitamin C; 6312 mcg beta-carotene; 1.7 mg vitamin E

Recipe by Jennifer Reilly, R.D.

Colorful Corn Salsa

Makes 4 1/2 cups (18 1/4-cup servings)

Corn adds fiber, onions supply allyl sulfides, and tomatoes bring lycopene to this nutrient-rich salsa—all are cancer-fighting ingredients. Enjoy it with baked chips, stuffed in a burrito, or atop a bed of fresh greens.

1 cup fresh or frozen corn kernels
 2 medium tomatoes, chopped
 1/4 cup chopped red onion (about 1/2 medium red onion)
 1/4 cup chopped green bell pepper (about 1/2 medium bell pepper)
 1/4 cup chopped orange bell pepper (about 1/2 medium bell pepper)
 10 fresh basil leaves, chopped
 juice of 1 lime
 3 tablespoons rice or cider vinegar

If using fresh corn, blanch in boiling water for 3 minutes and rinse in cold water. If using frozen corn that isn't thawed completely, either blanch it in boiling water for 2 minutes and drain, or microwave until thawed.

In a large bowl, combine all ingredients and set aside for 15 to 20 minutes to allow the flavors to develop. Serve at room temperature.

Per 1/4-cup serving: 13 calories; 0.1 g fat; 0 g saturated fat; 7.5% calories from fat; 0 mg cholesterol; 0.4 g protein; 3 g carbohydrate; 1.1 g sugar; 0.5 g fiber; 1 mg sodium; 4 mg calcium; 0.1 mg iron; 13.6 mg vitamin C; 88 mcg beta-carotene; 0.1 mg vitamin E

Recipe by Jennifer Reilly, R.D.



Low-Fat Guacamole

Makes 2 1/2 cups (10 1/4-cup servings)

The peas in this guacamole help to lower the fat content and they are also rich in cancer-fighting fiber. Fiber helps your body get rid of excess cholesterol and cancer-causing compounds which are otherwise reabsorbed back into your bloodstream. Despite the addition of peas, this guacamole derives a good portion of its calories from fat. However, the total fat grams and calories are still quite low and when eaten with baked chips and as part of a low-fat, plant-based diet, overall fat intake will be within the recommended range.

1 cup drained and rinsed canned green peas, or 1 cup fresh or frozen green peas
 1 ripe avocado
 1/2 cup mild salsa (commercial variety, or Colorful Corn Salsa p. 17)
 1 garlic clove, finely chopped, or 1 teaspoon chopped garlic
 1 green onion, chopped (optional)
 juice of 1 lemon
 1/2 teaspoon ground cumin
 1 tablespoon chopped fresh cilantro (optional)
 1/4 teaspoon salt, or to taste
 1/4 teaspoon black pepper, or to taste

If using fresh or frozen peas, blanch peas by placing them in boiling water for 2 minutes to soften, then cool with cold water and drain. Peel avocado and cut into large chunks. Mash avocado and peas together using a potato masher or fork, or, if a very creamy texture is desired, in a food processor. Mix in salsa, garlic, green onion (if using), lemon juice, cumin, and cilantro (if using). Add salt and black pepper or to taste.

Per 1/4-cup serving: 45 calories; 2.7 g fat; 0.4 g saturated fat; 53.5% calories from fat; 0 mg cholesterol; 1.3 g protein; 4.9 g carbohydrate; 1.3 g sugar; 2.1 g fiber; 227 mg sodium; 12 mg calcium; 0.5 mg iron; 6.1 mg vitamin C; 118 mcg beta-carotene; 0.5 mg vitamin E

Recipe by Amy Lanou, Ph.D.



395 mg sodium; 96 mg calcium; 3.9 mg iron; 16.8 mg vitamin C; 328 mcg beta-carotene; 1.3 mg vitamin E

Recipe by Jennifer Raymond, M.S., R.D.

Easy Bean Salad

Makes about 10 1-cup servings

The simplicity and widespread enjoyment of this salad have made it a Food for Life classic. Plus, it has tons of fiber to help move carcinogens, and excess cholesterol and hormones out of your body to improve overall health.

- 1/2 cup low-fat Italian salad dressing
- 1 15-ounce can kidney beans, drained and rinsed, or 1 1/2 cups cooked kidney beans
- 1 15-ounce can pinto beans, drained and rinsed, or 1 1/2 cups cooked pinto beans
- 1 15-ounce can black-eyed peas, drained and rinsed, or 1 1/2 cups cooked peas
- 1 10-ounce package frozen lima beans (preferably Fordhook lima beans), thawed completely, 1 1/2 cups cooked lima beans, or 1 1/2 cups cooked green soybeans (shelled edamame)
- 1 cup frozen corn, thawed completely, or cooked fresh corn, chilled
- 1 large red bell pepper, seeded and chopped
- 1/2 medium purple onion, chopped
- 1 teaspoon salt, or to taste
- 1 teaspoon black pepper, or to taste

Toss all ingredients together. Serve cold or at room temperature. May be covered and stored in refrigerator for several days.

Per serving (1/10 of recipe): 183 calories; 3 g fat; 0.5 g saturated fat ; 14.6% calories from fat; 0 mg cholesterol; 9.9 g protein; 31 g carbohydrate; 2.9 g sugar; 8 g fiber; 539 mg sodium; 43 mg calcium; 2.7 mg iron; 36.7 mg vitamin C; 311 mcg beta-carotene; 0.8 mg vitamin E

Recipe by Jennifer Reilly, R.D.

Penne with Kale, Tomatoes, and Olives

Makes 4 servings

The kale in this flavorful combination provides highly absorbable calcium and isothiocyanates, which have strong anti-cancer effects.

- 1 medium onion, chopped
- 1/4 cup vegetable broth or water
- 1 bunch kale, cut or torn into approximately 1-inch pieces (about 5 cups chopped)
- 2 14.5-ounce cans chopped, preferably fire-roasted, tomatoes, undrained, or 3 cups of freshly chopped tomatoes plus 1/2 cup water or vegetable broth
- 1/2 cup pitted and sliced Kalamata olives
- 1 tablespoon chopped fresh parsley
- 8 ounces dry whole-wheat penne pasta
- 1/4 cup dairy-free (vegan) parmesan cheese substitute or nutritional yeast (optional)

Sauté onion with vegetable broth or water over medium heat for 3 minutes. Add kale and tomatoes and their liquid. Bring to a boil and then reduce heat, cover, and simmer for 20 minutes.

Three-Bean Chili

Makes about 8 1-cup servings

This multicolor chili takes just 30 minutes to prepare, and it's chock full of fiber, which not only enhances immune function but also rids the body of excess circulating hormones and carcinogens, thus lowering cancer risk. Serve it with brown rice or warmed tortillas and a green salad.

- 2 cups water, divided (1/2 cup plus 1/2 cup plus 1 cup)
- 1 large onion, chopped (about 2 cups)
- 1 teaspoon cumin seeds
- 6 garlic cloves, minced or pressed
- 1 green bell pepper, seeded and chopped
- 1 cup crushed tomatoes or tomato sauce
- 2 tablespoons chili powder
- 1 15-ounce can black beans, undrained, or 1 1/2 cups of cooked black beans with 1/2 cup of added water or vegetable broth
- 1 15-ounce can great northern beans, undrained, or 1 1/2 cups of cooked northern beans with 1/2 cup of added water or vegetable broth
- 1 15-ounce can red beans, undrained, or 1 1/2 cups of cooked red beans with 1/2 cup of added water or vegetable broth

Heat 1/2 cup water in a large pot. Add onion and cumin seeds and cook over high heat, stirring often, until onion is soft, 3 to 5 minutes. Add a bit more water if onion begins to stick.

Stir in garlic, bell pepper, and 1/2 cup water. Reduce heat to medium and cook 3 minutes, stirring occasionally.

Add tomatoes or tomato sauce, chili powder, and remaining 1 cup water. Cover and simmer 5 minutes.

Add beans and their liquid. Cover loosely and simmer 15 minutes.

Per 1-cup serving: 174 calories; 1 g fat; 0.2 g saturated fat ; 5.1% calories from fat; 0 mg cholesterol; 10.8 g protein; 32.5 g carbohydrate; 3.7 g sugar; 8.3 g fiber;

Add olives and parsley. Cook an additional 5 minutes.

Meanwhile, cook pasta according to package directions. Drain and transfer to a serving bowl. Add kale mixture and toss gently. Serve immediately. Sprinkle vegan parmesan substitute or nutritional yeast over top, if using.

Per serving (1/4 of recipe): 281 calories; 3.3 g fat; 0.5 g saturated fat ; 10.5% calories from fat; 0 mg cholesterol; 12 g protein; 57.6 g carbohydrate; 8.3 g sugar; 8.7 g fiber; 497 mg sodium; 166 mg calcium; 5 mg iron; 53.9 mg vitamin C; 6796 mcg beta-carotene; 2.9 mg vitamin E

Recipe by Amy Lanou, Ph.D.

Berry Applesauce

Makes 4 1/2-cup servings

Serve this applesauce hot or cold. Berries give this applesauce a deep red or purple color and add a hefty dose of anthocyanins, potent cancer-fighting antioxidants.

2 cups peeled, cored, and chopped apples
2 cups fresh or frozen (unsweetened) strawberries, blueberries, or raspberries
1/2 cup frozen apple juice concentrate
1 teaspoon cinnamon

Combine all ingredients in a medium saucepan. Bring to a simmer, then cover and cook over very low heat for about 25 minutes, or until apples are tender when pierced with a fork. Mash lightly with a potato masher or purée in a food processor, if desired.

Per 1/2-cup serving: 108 calories; 0.4 g fat; 0 g saturated fat ; 3.5% calories from fat; 0 mg cholesterol; 0.8 g protein; 26.9 g carbohydrate; 20.1 g sugar; 2.7 g fiber; 11 mg sodium; 29 mg calcium; 0.9 mg iron; 49.2 mg vitamin C; 13 mcg beta-carotene; 0.4 mg vitamin E

Recipe by Jennifer Raymond, M.S., R.D.

Chocolate Mousse or Chocolate Mousse Pie

Makes 10 servings

When consumed in moderation, this is a healthier version of the high-fat, high-calorie French delicacy. Chocolate contains the phenolic compounds gallic acid and epicatechin, which are important antioxidants for cancer prevention. Cornell researchers have found that cocoa has nearly twice the antioxidants of red wine and up to three times those found in green tea.

1 cup semisweet chocolate chips
1 cup nondairy milk, such as soy milk or rice milk
2 12.3-ounce packages low-fat silken tofu
1 teaspoon vanilla extract
1 ready-made graham cracker pie crust (optional)
10 strawberries, chopped
10 mint sprigs for garnish (optional)

Place chocolate chips and nondairy milk in a microwave-safe bowl and microwave for 1 minute. Let sit for 2 minutes.

Place tofu, vanilla, and chocolate chip/nondairy milk mixture in a food processor or blender and process until smooth. Transfer into a graham cracker pie crust, if using, or small individual serving dishes and chill for 2 hours in the refrigerator or 30 minutes in the freezer. Serve topped with strawberries and garnished with mint, if using.

Variation: Add a chopped banana to the blender or food processor when you process the tofu and chocolate together.

Per serving (1/10 of recipe): 125 calories; 6 g fat; 3.1 g saturated fat ; 43.5% calories from fat; 0 mg cholesterol; 6 g protein; 14.1 g carbohydrate; 10.5 g sugar; 1.5 g fiber; 75 mg sodium; 63 mg calcium; 1.4 mg iron; 7.2 mg vitamin C; 7 mcg beta-carotene; 0.5 mg vitamin E

Recipe by Amy Lanou, Ph.D.

Mixed Berry Banana Smoothie

Makes 4 servings

Frozen berries in smoothies add fiber, taste, and iciness, not to mention the hefty dose of cancer-fighting compounds!

1 banana
1 cup frozen mixed berries (raspberries, blueberries, strawberries)
1 cup fortified vanilla nondairy milk
2 tablespoons maple syrup (optional)
2 tablespoons calcium-fortified orange juice concentrate

Place all ingredients in a blender. Blend at high speed until smooth, stopping the blender occasionally to move the unblended fruit to the center with a spatula.

Per serving (1/4 of recipe): 107 calories; 1.4 g fat; 0.2 g saturated fat; 11.5% calories from fat; 0 mg cholesterol; 3.3 g protein; 22.3 g carbohydrate; 12.9 g sugar; 3.7 g fiber; 36 mg sodium; 130 mg calcium; 1 mg iron; 33.1 mg vitamin C; 24 mcg beta-carotene; 1.3 mg vitamin E

Recipe by Amy Lanou, Ph.D.



Physicians Committee

for Responsible Medicine

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About The Physicians Committee for Responsible Medicine

With more than 1.6 million people diagnosed with cancer in the United States each year—and many more cases in other countries across the globe—there is an urgent need for a new direction in battling this disease. The Physicians Committee for Responsible Medicine has created materials and programs to educate the public on how a healthful diet can protect us from cancer and help us regain our health once cancer has been diagnosed.

The Key Is Information

Most Americans do not yet have the facts about the relationship between nutrition and cancer. Opinion Research Corporation International surveys have found that most people are unfamiliar with the link between diet and cancer.

Getting the Word Out

PCRM distributes information on reducing cancer risk and, when cancer has been diagnosed, how diet and other factors may help improve survival. Vital information has reached millions of individuals and families through brochures, television advertisements, websites, and our Food for Life nutrition and cooking classes.

PCRM also conducts clinical research, hosts national conferences, and provides literature and resources to thousands of health professionals. The Food for Life: Cancer Project nutrition and cooking classes, taught in more than 100 cities across the country, help tens of thousands of individuals understand the power of their plates. The classes provide nutrition education and serve as support groups. Two resources developed to accompany the classes, *The Cancer Survivor's Guide: Foods That Help You Fight Back*, and its companion DVD set, *Eating Right for Cancer Survival*, can also provide home access to this powerful nutrition message. Find them at www.PCRM.org/shop/.



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