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**Diet, Exercise and Cancer**  
**The American Cancer Society Nutrition and Exercise Guide**  
**Part III: Foods and Cancer**  
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**Your Life your Health**  
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The American Cancer Society has published guidelines for diet and exercise in regard to decreasing your risk of developing various cancers. Part III and IV of this series addresses specific foods or nutrients in regard to cancer causation and/or cancer prevention. Because people are interested in the relationship specific foods or nutrients have to specific cancers, research on dietary factors and cancer risk is often widely publicized.

Health professionals who counsel patients should emphasize that no one study provides the last word on any subject, and that individual news reports may overemphasize what appear to be contradictory or conflicting results. In brief news stories, reporters cannot always put new research findings in their proper context. The best advice about diet and physical activity is that it is rarely, if ever, advisable to change diet or activity levels based on a single study or news report, especially if the data are reported as "preliminary findings." The following questions and answers address common concerns about foods in relation to cancer.

### **What are phytochemicals, and do they reduce cancer risk?**

The term "phytochemicals" refers to a wide variety of compounds produced by plants. Some of these compounds protect plants against insects or have other biologically important functions. Some have either antioxidant or hormone-like actions both in plants and in people who eat them. Because consumption of vegetables and fruits reduces cancer risk, researchers are searching for specific components that might account for the beneficial effects. There is no evidence that phytochemicals taken as supplements are as beneficial as the vegetables, fruits, beans, and grains from which they are extracted.

### **Can nutritional supplements lower cancer risk?**

There is strong evidence that a diet rich in vegetables, fruits, and other plant-based foods may reduce the risk of cancer, but there is no evidence at this time that supplements can reduce cancer risk. The few intervention/ clinical trials done in human populations designed to test whether supplements can reduce cancer risk have yielded disappointing

results. Vitamin and mineral supplements have been shown to reduce the risk of stomach cancer in intervention studies of malnourished persons in China and South America, but other studies using high doses of single nutrients have shown no benefit and have even shown harm. Food is the best source of vitamins and minerals. Supplements, however, may be beneficial for some people, such as pregnant women, women of childbearing age, and people with restricted dietary intakes. If a supplement is taken, the best choice is a balanced multivitamin/mineral supplement containing no more than 100 percent of the "Daily Value" (formerly listed on supplement labels as 'RDA') of most nutrients, since high doses of some nutrients can have adverse effects.

### **Can I get the nutritional equivalent of vegetables and fruits in a pill?**

No. Many healthful compounds are found in vegetables and fruits, and it is likely that these compounds work synergistically to exert their beneficial effect. In many cases, it is not known which compounds or combination of compounds are most beneficial in reducing cancer risk. There are likely to be important, but as yet unidentified, components of whole food that are not included in supplements. Additionally, the small amount of dried powder in the pills that are represented as being equivalent to vegetables and fruits frequently contains only a small fraction of the levels contained in the whole foods.

### **Will eating vegetables and fruits lower cancer risk?**

Greater consumption of vegetables, fruits, or both together has been associated in the majority of epidemiological studies with a lower risk of lung, oral, esophageal, stomach, and colon cancer. Because it is not known which of the many compounds in vegetables and fruits are most protective, the best advice is to consume five or more servings of a variety of vegetables and fruits each day.

### **What are cruciferous vegetables and are they important in cancer prevention?**

Cruciferous vegetables belong to the cabbage family, and include broccoli, cauliflower, Brussels sprouts, and kale. These vegetables contain certain chemicals thought to reduce the risk for colorectal cancer. The best evidence suggests that a wide variety of vegetables, including cruciferous and other vegetables, reduces cancer risk.

### **Is there a difference in the nutritional value of fresh, frozen, and canned vegetables and fruits?**

Yes, but they can all be good choices. Fresh foods are usually considered to have the most nutritional value. However, frozen foods can be more nutritious than fresh foods because they are often picked ripe and quickly frozen. Canning is more likely to reduce the heat sensitive and water-soluble nutrients because of the high heat temperatures necessary in the canning process. Be aware that some fruits are packed in heavy syrup, and some canned vegetables are high in sodium. Choose vegetables and fruits in a variety of forms.

### **Does cooking affect the nutritional value of vegetables?**

Boiling vegetables, especially for long periods, can leach out their content of water-soluble vitamins. Microwaving and steaming may be the best ways to preserve the nutritional content in vegetables.

### **Should I be juicing my vegetables and fruits?**

Juicing can add variety to the diet, and can be a good way to consume vegetables and fruits, especially for those who have difficulty chewing or swallowing. Juicing also improves the body's absorption of some of the nutrients in vegetables and fruits. However, juices may be less filling than whole vegetables and fruits and contain less fiber. Fruit juice, in particular, can contribute lots of calories to one's diet. Commercially juiced products should be 100% vegetable or fruit juices and should be pasteurized to eliminate harmful microorganisms.

### **Do vegetarian diets reduce cancer risk?**

Vegetarian diets include many health-promoting features; they tend to be low in saturated fat and high in fiber, vitamins, and phytochemicals (e.g., flavonoids, etc.). It is not possible to conclude at this time, however, that a vegetarian diet has any special benefits for the prevention of cancer. Vegetarian diets differ in composition, although all avoid consumption of red meat. A vegetarian diet can be quite healthful if it is carefully planned and provides adequate calories. Diets including lean meats in small to moderate amounts can be just as healthful. The greater the restriction of food groups in a particular diet, the more possibility there is of dietary deficiencies. Strict vegetarian diets that avoid all animal products, including milk and eggs, should be supplemented with vitamin B12, zinc, and iron (especially for children and premenopausal women).

### **What are antioxidants and what do they have to do with cancer?**

Certain nutrients in vegetables and fruits appear to protect the body against the damage to tissues that occurs constantly as a result of normal metabolism. Because such damage is associated with increased cancer risk, the so-called "antioxidant nutrients" are thought to protect against cancer. Antioxidants include vitamin C, vitamin E, selenium, carotenoids, and many other phytochemicals. Studies suggest that people who eat more vegetables and fruits, which are rich sources of antioxidants, have a lower risk for some types of cancer. Clinical studies of antioxidant supplements are currently underway, but studies have not yet demonstrated a reduction in cancer risk from vitamin supplements. To reduce cancer risk, the best advice presently is to consume antioxidants through food sources rather than supplements.

### **What are bioengineered foods, and are they safe?**

Bioengineered foods are made by adding genes from other plants or organisms to increase a plant's resistance to insect pests, retard spoilage, or improve transportability, flavor,

nutrient composition, or other desired qualities. In theory, these added genes might create substances that could cause adverse reactions among sensitized or allergic individuals. However, there is currently no evidence that the substances found in bioengineered foods now on the market are harmful or that they would either increase or decrease cancer risk because of the added genes.

### **Why are foods irradiated, and do irradiated foods cause cancer?**

Radiation is increasingly used to kill harmful organisms on foods in order to extend their "shelf life." Radiation does not remain in the foods after treatment, however, and there is no evidence that consuming irradiated foods increases cancer risk.

### **Should I avoid processed meats?**

Some epidemiological studies have linked high consumption of processed meats with increased risk of colorectal and stomach cancers. This association may or may not be due to nitrites, which are added to many luncheon meats, hams, and hot dogs to maintain color and to prevent contamination with bacteria. Nitrites can be converted within the stomach into carcinogenic nitrosamines, which may increase the risk of gastric cancer. Diets high in vegetables and fruits containing vitamin C and phytochemicals retard the conversion of nitrites into nitrosamines. Consumption of meats preserved by methods involving smoke or salt increases exposure to potentially carcinogenic chemicals, and so should be minimized.

### **How does cooking meat affect cancer risk?**

Adequate cooking is necessary to kill harmful microorganisms within meat. However, some research suggests that frying, broiling, or grilling meats at very high temperatures creates chemicals that might increase cancer risk. Although studies show these chemicals cause cancer in animals, it is uncertain whether they actually cause cancer in humans. Techniques such as braising, steaming, poaching, stewing, and microwaving meats minimize the production of these chemicals.

### **Do food additives cause cancer?**

Many substances are added to foods to preserve them and to enhance color, flavor, and texture. Additives are usually present in very small quantities in food, and no convincing evidence exists that any additive consumed at these levels causes human cancers.

### **Does olive oil affect cancer risk?**

Consumption of olive oil is not associated with any increased risk of cancer, and is most likely neutral with respect to cancer risk. Olive oil is a significant source of calories and should be used in moderation.

### **Are foods labeled "organic" more effective in lowering cancer risk?**

The term "organic" is popularly used to designate plant foods grown without pesticides and genetic modifications. At present, no research exists to demonstrate whether such foods are more effective in reducing cancer risk than are similar foods produced by other farming methods.

### **Does cholesterol in the diet increase cancer risk?**

Cholesterol in the diet comes only from foods derived from animal sources—meat, dairy foods, eggs, and animal fats. At present, there is little evidence that cholesterol itself causes the increased risk of certain cancers associated with eating foods from animal sources. Lowering blood cholesterol lowers cardiovascular disease risk, but there is no evidence that lowering blood cholesterol has an effect on cancer risk.

### **Does drinking coffee cause cancer?**

Caffeine may heighten symptoms of fibrocystic breast lumps (a type of benign breast disease) in some women, but there is no evidence that it increases the risk of breast cancer or other types of cancer. The association between coffee and pancreatic cancer, widely publicized in the past, has not been confirmed by other studies.

### **Will eating less fat lower cancer risk?**

Diets high in fat are also high in calories and contribute to obesity, which in turn is associated with increased risk of cancers at several sites. Although all types of fats have similar numbers of calories, there is some evidence that certain types, such as saturated fats, may have a greater effect on increasing cancer risk, and that fats containing omega-3 fatty acids may reduce cancer risk.

### **What is dietary fiber and can it prevent cancer?**

Dietary fiber includes a wide variety of plant carbohydrates that are not digestible by humans. Specific categories of fiber are "soluble" (like oat bran) or "insoluble" (like wheat bran and cellulose). Soluble fiber helps to reduce blood cholesterol and therefore, helps lower the risk of coronary heart disease. Good sources of fiber are beans, vegetables, whole grains, and fruits. Associations between fiber and cancer risk are inconclusive, but consumption of these foods is still recommended because they contain other substances that can help prevent cancer and because of their other health benefits.

### **Does eating fish protect against cancer?**

Fish is a rich source of omega-3 fatty acids. Studies in animals have found that these fatty acids suppress cancer formation, and there is limited suggestive evidence of a possible benefit in humans. Research has not yet demonstrated whether the possible benefits of fish consumption may be reproducible by taking omega-3 or fish oil supplements.