American Institute for Cancer Research®

FACTS ON
PREVENTING CANCER

The Cancer Fighters in Your Food

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Scientists are finding more evidence that the foods we eat affect cancer risk. AICR estimates that up to one-third of the most common cancers could be prevented if Americans:

- ate a healthy diet
- got at least 30 minutes of moderate physical activity daily and
- maintained a healthy weight.

To lower cancer risk, AICR's Recommendations for Cancer Prevention, based on our expert report and Continuous Update Project, advise eating a mostly plant-based diet.

That's because plant foods like vegetables, fruits, whole grains and beans contain a variety of cancer fighters including vitamins, minerals, fiber and phytochemicals.

Limiting red meat and avoiding processed meat can also lower cancer risk.

What are phytochemicals?

Phytochemicals are naturally occurring compounds. They give a plant-based food its color, aroma and flavor and protect it from infection and predators.

When we eat plant foods, phytochemicals work together to fend off cancer and other diseases. Findings from laboratory studies have shown that phytochemicals have the potential to:

- stimulate the immune system
- block substances we eat, drink and breathe from becoming carcinogens
- reduce the kind of inflammation that makes cancer growth more likely

- prevent DNA damage and help with DNA repair
- reduce oxidative damage to cells that can spark cancer
- slow the growth rate of cancer cells
- trigger damaged cells to die before they can reproduce
- block the development of new blood vessels tumors need
- help to regulate hormones

Scientists have identified thousands of phytochemicals so far.

Are phytochemicals the same as antioxidants?

Antioxidants are substances in plant foods like vegetables and fruits. They prevent damage to cells from unstable molecules in the environment called "free radicals."

Eating vegetables and fruits that contain antioxidants, such as vitamin C, wards off the damage free radicals cause. A balance between antioxidants and free radicals in our bodies is important for health. If not kept in check, free radicals lead to cell damage linked to chronic diseases.

Some phytochemicals may act as antioxidants in your body. Some nutrients, like vitamins C and E and the mineral selenium, seem to block free radicals directly.

Phytochemicals work together to boost health.

No *single* phytochemical or food can protect you from cancer or any other disease.

In laboratory studies, many individual minerals, vitamins and phytochemicals demonstrate anti-cancer effects. Yet evidence suggests it is the many compounds *working together* in our overall diet that gives us the strongest cancer protection.

According to the USDA, most adults should eat the following minimum amounts for good health. The amount you need to eat depends on your age, gender and level of physical activity.

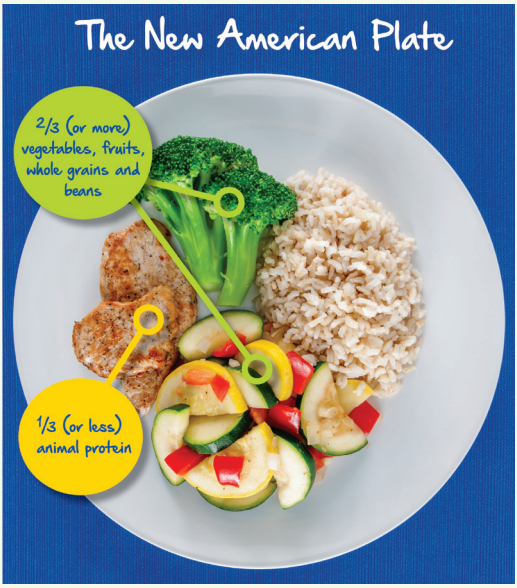
- Fruits: 1½–2 cups daily
- Vegetables: 2–3 cups daily
- Whole grains: at least 3 ounces daily (a 1-ounce portion equals 1 slice of bread or a half-cup of cooked pasta, rice or cereal)
- Legumes (beans and peas): at least 1 ½ cups per week (in a 2,000 calorie-per-day diet)

Eating a diet with lots of different fruits, vegetables, beans and whole grains seems to offer the most protection. For example, instead of eating only apples and bananas from the fruit group, mix it up by enjoying cantaloupe, kiwi fruit, cherries, berries, citrus, grapes, peaches and more.

Look inside to

A Model for Healthy Meals

To help you plan nutritious meals for cancer prevention, AICR recommends using a simple model called the New American Plate: Fill at least 2/3 of your plate with plant foods such as fruits, vegetables, beans and whole grains and no more than 1/3 of your plate with poultry, fish, lean meat and low-fat dairy foods.



Following the New American Plate model can help you control your weight too. Extra body fat increases the risk for more than 10 types of cancer and other chronic diseases like diabetes and heart disease. The fiber and water in vegetables, fruits, whole grains and beans can help fill you up with fewer calories so losing weight or maintaining your weight is easier.

learn more!

Putting it together.

While research continues, the best bets for achieving the maximum health benefits are to:

- Eat a diet high in a variety of vegetables, fruits, whole grains and beans
- Favor brightly colored or strongly flavored vegetables and fruits, which are often the best sources of phytochemicals
- Stick to food sources—phytochemicals in supplements (such as pills and powders) may not be as easily absorbed as those from food.

To include more colorful plant foods in your meals, try:

- Blueberries and oatmeal for breakfast
- Nuts and grapes for snacks
- Vegetable-bean soup for lunch, and
- Green salad with red peppers and carrots for dinner.

Need more help?

Visit **www.aicr.org/foods-that-fight-cancer** for more information. To order our free brochures (up to 3 copies) about diet, physical activity and weight management for lower cancer risk, email **info@aicr.org** or write to:

American Institute for Cancer Research
1759 R Street, NW, P.O. Box 97167
Washington, DC 20090-7167
or call: 1-800-843-8114 or 202-328-7744

A Word about Supplements

AICR recommends that people get their nutrients through food and not rely on supplements—including phytochemical supplements—to reduce cancer risk. Here's why:

- It is possible to get too much of one nutrient or phytochemical when you take supplements.
- Some studies have found that some high-dose antioxidant or phytochemical supplements may be harmful. However, eating the foods that they come from is beneficial.
- When you get a phytochemical from a plant food, you are also getting many other healthy compounds rather than just the one or few in a supplement.
- In the United States, supplements are not regulated as are other food and drug products. The manufacturer of a dietary supplement is responsible for ensuring the product's safety before it is marketed. The Food and Drug Administration is responsible for taking action against any unsafe dietary supplement product after it reaches the market.

Remember: AICR cautions against using supplements to protect against cancer, not against using supplements at all. Some groups of people may benefit from taking supplements for specific health reasons. For more advice tailored to your specific needs, speak to your healthcare provider.

About AICR

OUR VISION: We want to live in a world where no one develops a preventable cancer.

OUR MISSION: We champion the latest and most authoritative scientific research from around the world on cancer prevention and survival through diet, weight and physical activity, so that we can help people make informed lifestyle choices to reduce their cancer risk.

We have contributed over $105 million for innovative research conducted at universities, hospitals and research centers across the country. Find evidence-based tools and information for lowering cancer risk, including AICR's Recommendations for Cancer Prevention, at **www.aicr.org**.

AICR Guidelines for Cancer Prevention

- Choose mostly plant foods, limit red meat and avoid processed meat.
- Be physically active every day in any way for 30 minutes or more. Limit sedentary habits, like watching television.
- Aim to be a healthy weight throughout life.

And always remember—do not smoke or chew tobacco.

American Institute for Cancer Research®

www.aicr.org

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Phytochemicals in Your Diet (PARTIAL LIST)

For specific research references, please visit www.aicr.org/foods-that-fight-cancer

FOOD	COMPOUNDS (partial list)	POSSIBLE PROTECTIVE ACTIONS* (most from laboratory studies; see note, below)
Apples	**Flavonoids** • anthocyanins (red apples) • epicatechin • quercetin **Triterpenoids**	• slowed development of colon, lung and breast cancer cells in several stages of cancer development
Blackberries, Blueberries, Raspberries, Strawberries	**Elligatannins** **Pterostilbene** **Flavonoids** **Resveratrol** • anthocyanins • catechins • kaempferol • quercetin	• decrease free radical damage to DNA that can lead to cancer • decrease growth and stimulate self-destruction of mouth, breast, colon and prostate cancer cells **In animal studies:** • decrease inflammatory cytokines, esophageal cancer and pre-cancerous changes in the colon • decrease estrogen-induced breast cancer and DNA damage • increase self-destruction of lung, stomach, pancreatic and breast cancer cells • decrease formation of pre-cancerous colon polyps and reduce markers of inflammation
Broccoli (and other cruciferous vegetables such as arugula, Brussels sprouts, cabbage [bok choy, Napa, red, green and other], cauliflower, collard greens, horseradish, kale, mustard greens, radishes, rutabaga, turnips, watercress)	**Carotenoids** • beta-carotene (in green selections) **Indoles** **Isothiocyanates** • allyl isothiocyanate • benzylisothiocyanate • crambene • phenylethylisothiocyanate • sulforaphane • 3-phenylpropylisothiocyanate	• decrease inflammation linked to increased cancer risk • inhibit enzymes that activate carcinogens and stimulate enzymes that de-activate carcinogens • “turn on” genes that suppress tumors, slow cancer cell growth and stimulate cancer cell self-destruction • promote cell communication that helps control abnormal cell growth
Coffee	**Caffeine** **Phenolic Acids** **Diterpenes** • chlorogenic acid • quinic acid	• speed carcinogens’ passage through the digestive tract • influence cell signaling to help regulate cell growth, reduce inflammation and increase self-destruction of cancer cells • link to lower risk of endometrial and liver cancer in humans
Dark Green Leafy Vegetables	**Carotenoids** **Flavonoids** • beta-carotene • alpha-carotene • lutein)	• inhibit the growth of certain types of breast cancer cells, skin cancer cells, lung cancer cells and stomach cancer cells • decrease free radical damage to DNA that can lead to cancer
Dry Beans and Peas (Legumes)	**Inositol** **Protease inhibitors** **Flavonoids** **Saponins** **Lignans** **Sterols** **Polyphenols** **Triterpenoids**	• decrease growth factors and chronic inflammation • increase self-destruction of cancerous cells
Soy (a type of legume) and soy products (such as edamame, soymilk, tofu)	**Additional Flavonoids** • isoflavones (daidzein, genistein, glycitein) **Phenolic acids** **Protein kinase inhibitors** **Sphingolipids**	• 1–2 servings of soy foods daily does not raise breast cancer risk among breast cancer survivors • benefit prostate cancer survivors
Flaxseed	**Lignans**	• slow tumor growth and the ability to spread both estrogen receptor-positive (ER+) and -negative (ER-) breast cancer in animals • decrease markers of inflammation, decrease number and size of colon cancer tumors and inhibit growth and spread of negative prostate cancer in animals
Garlic (and onions, chives, leeks, scallions and shallots)	**Allium Compounds** • allicin • alliin • allyl sulfides **Flavonoids**	• reduce carcinogens’ ability to initiate cancer • reduce growth of bladder, colon, prostate and stomach cancer cells • slow growth of breast, colon, esophageal, lung and stomach cancers in animals • link to lower risk of colorectal cancer in humans
Grapefruit (and other citrus fruits)	**Carotenoids** **Flavonoids** • beta-carotene • naringenin • lycopene **Limonoids**	• decrease free radical damage to DNA that can lead to cancer • decrease growth and increase self-destruction of colon, mouth, skin, lung, breast and stomach cancers in animals
Squash (winter) and other orange-fleshed vegetables like carrots and sweet potatoes; and fruits like apricots, cantaloupes and mangoes	**Carotenoids** • alpha-carotene • lutein • beta-carotene • zeaxanthin • beta-cryptoxanthin	• decrease free radical damage to DNA that can lead to cancer • help to control cell growth • stimulate self-destruction and decrease growth and metastasis of several types of cancer cells
Tomatoes	**Carotenoids** • beta-carotene • lycopene	• decrease free radical damage to DNA that can lead to cancer • stimulate self-destruction and decrease growth and metastasis of several types of cancer cells
Tea	**Caffeine** **Flavonoids**	• stimulate enzymes that shut down carcinogens • decrease tumor growth • increase self-destruction of cancer cells • restrain spread of cancer cells • decrease free radical damage to DNA that can lead to cancer
Walnuts	**Elligatannins** **Flavonoids** **Phenolic acids** **Phytosterols**	• decrease inflammation and free radical damage to DNA that can lead to cancer • Inhibit growth of cancer cells • decrease growth of breast and colon tumors in animals
Whole Grains	**Flavonoids** **Phytic acid** **Lignans** **Protease inhibitors** **Phenolic acids** **Saponins**	• decrease growth of cancer cells • link to lower colorectal cancer risk

***Human studies using whole foods have been conducted, but results are limited and not conclusive. Most actions listed come from cell and animal studies. These often use phytochemicals or extracts from foods, and results could be different than results from consuming whole foods. AICR recommends eating a mostly plant-based diet that includes a wide variety of plant foods. For more discussion of current human studies, go to AICR’s Foods That Fight Cancer™ at www.aicr.org/foods-that-fight-cancer.**