

# Phytochemicals

## Cancer Fighters in Your Food



**ROSWELL  
PARK.**  
COMPREHENSIVE CANCER CENTER

**PATIENT  
EDUCATION**



## About Phytochemicals

*Phyto* means plant in Greek.

Phytochemicals occur naturally in food as plant chemicals. They give plants their color, odor, and flavor.

Research shows that eating phytochemicals can be good for your body in several ways. They can:

- ✓ help your immune system work as it should
- ✓ reduce inflammation that may cause cancer or make it grow
- ✓ help repair the cells' genetic codes (DNA) and prevent DNA damage
- ✓ trigger damaged cells to destroy themselves before they reproduce
- ✓ help regulate hormones

Antioxidants are substances in plant-based foods such as vitamin C that prevent damage to cells from unstable molecules known as free radicals. Some phytochemicals act as antioxidants in your body.

### **Phytochemicals work together to improve your health.**

The many phytochemicals in a variety of plant foods work together to give you the strongest cancer protection.

Most adults should eat a variety of plant foods daily.

- 1 – 1 ½ cups fruit. **Healthy tip:** Add dried fruit (raisins, dried cranberries or cherries) to whole grain cereals or oatmeal. If you have diabetes, count 2 Tablespoons as 1 carbohydrate choice.
- 2 – 3 cups vegetables. **Healthy tip:** Make extra vegetables at dinner and use them for lunch the next day.
- 6-8 servings of whole grains (1 serving = 1 slice bread or ½ cup cooked pasta, rice, or cereal). Whole grains supply essential nutrients like fiber and B vitamins such as thiamine. **Healthy tip:** These are an important part of a healthy diet but do not overindulge.
- 1 ½ cups legumes, pulses, or peas per week. Pulses are edible seeds in the legume family such as beans and lentils. **Healthy tip:** Add chick peas or cannellini beans to a ground meat dish to lower the amount of animal fat in your meal. You can also add red beans to rice.

### **Should you take supplements in pill or liquid form?**

- It is possible to get too much of a nutrient or phytochemical if you take supplements. This may be harmful to your body. There is no research stating that supplements prevent cancer.
- If you have a deficiency of a nutrient, or if you are on an extremely limited diet, your doctor may recommend that you take a supplement or multivitamin.
- Keep in mind that supplements are not regulated in the United States. The manufacturer is responsible for

product safety. The FDA must take action against unsafe dietary supplements, these safety issues are usually discovered **after** the supplement is on the market.

- Plant foods have more benefits than a supplement. They give you calories, fiber, vitamins, and antioxidants. Plant foods also provide carbohydrates, which give you the energy for an active lifestyle.

### **What you can do to get the most health benefits.**

- ✓ Eat lots of vegetables, fruits, whole grains, and legumes every day.
- ✓ Choose brightly colored and strongly flavored vegetables and fruits for the highest phytochemical content. You may have to try a food a few times to get used to the taste, but it is worth the effort.
- ✓ Stay with food sources as much as possible. Your body may not absorb phytochemicals and antioxidants in pills and powders as easily as it does from food sources.
- ✓ Add beets; red, orange, or yellow peppers; garbanzo or black beans (legumes); and a variety of greens to your salads instead of just iceberg and romaine lettuces with carrots, tomatoes, and cucumbers.
- ✓ When you make soups, add extra vegetables such as carrots, tomatoes, zucchini, peppers, and legumes to increase the phytochemicals.
- ✓ Try different cooking methods and a variety of spices.
  - Toss Brussels sprouts in a citrus flavored olive oil, sprinkle with cracked pepper and coarse sea salt and roast in the oven.

- Microwave broccoli florets. Add powdered ginger and olive oil and briefly stir fry.
- Try nutmeg on asparagus.
- Carrots go well with walnut oil and ginger.
- Use turmeric and pepper in stir fry veggies. Some studies show pepper increases turmeric's benefits.
- Caramelize vegetables in a flavored balsamic vinegar.

There are thousands of phytochemicals. Below, we list common foods, the phytochemicals they contain, and the potential benefits.

## Apples

### Phytochemicals or Compounds

Flavonoids: anthocyanins (red apples), epicatechin, and quercetin

**Possible Protective Action:** Slows development of colon, lung, and breast cancer cells

## Dark Green Leafy Vegetables

### Phytochemicals or Compounds

- Carotenoids: beta-carotene, alpha-carotene, lutein
- Flavonoids

**Possible Protective Action:** Inhibits growth of certain breast, skin, lung, and stomach cancers.

## Coffee

### Phytochemicals or Compounds

- Caffeine
- Diterpenes
- Phenolic Acids: chlorogenic acid, quinic acid

**Possible Protective Action:** Speed the passage of carcinogens in digestive tract. Linked to lower risk of endometrial and liver cancer in humans.

## Broccoli, Arugula, Brussels Sprouts, Cabbage, Cauliflower, Collard Greens, Horseradish, Kale, Mustard Greens, Radishes, Rutabaga, Turnips, Watercress

### Phytochemicals or Compounds

- Carotenoids: beta-carotene in green foods listed
- Indoles
- Isothiocyanates: allyl isothiocyanate, benzylisothiocyanate, crambene, phenylethylisothiocyanate, sulforaphane, 3-phenylpropylisothiocyanate

**Possible Protective Action:** Inhibit enzymes that activate carcinogens. Stimulate enzymes that de-activate carcinogens. Turn on genes that suppress tumors and stimulate cancer cell destruction. Decrease inflammation related to cancer risk.

## **Black/Blueberries, Raspberries, Strawberries**

### Phytochemicals or Compounds

- Ellagitannins
- Flavonoids: anthocyanins, catechins, kaempferol, and quercetin
- Pterostilbene
- Resveratrol

**Possible Protective Action:** Decrease free radical damage to DNA that leads to cancer. Stimulate self-destruction of mouth, breast, colon & prostate cancer cells

## **Dry Beans and Peas**

### Phytochemicals or Compounds

- Inositol
- Flavonoids
- Lignans
- Polyphenols
- Protease Inhibitors
- Saponins
- Sterols
- Triterpenoids

**Possible Protective Action:** Decrease growth factors and chronic inflammation. Increase self-destruction of cancer cells.



## Soy (a legume) and Soy Products (edamame, tofu)

### Phytochemicals or Compounds

- Flavonoids
- Isoflavones: daidzein, genistein, glycitein
- Phenolic acids
- Protein Kinase inhibitors
- Sphingolipids

**Possible Protective Action:** 1 – 2 servings of soy foods a day is safe; it does not raise breast cancer risk and may improve overall survival for breast cancer survivors.

## Flaxseed

### Phytochemicals or Compounds

- Lignans

**Possible Protective Action:** Slows tumor growth and reduces ability to spread estrogen receptor-positive (ER+) and (ER-) breast cancer in animals. Inhibits growth and spread of prostate cancer in animals. Decreases number and size of colon cancer tumors in animals.

## Tea

### Phytochemicals or Compounds

- Caffeine
- Flavonoids

**Possible Protective Action:** Decrease free radical damage to DNA that can lead to cancer, decrease tumor growth. Stimulates enzymes that shut down carcinogens.

## Garlic, Onions, Chives, Leeks, Scallions, Shallots

### Phytochemicals or Compounds

- Allium Compounds: allicin, alliin, allyl sulfides
- Flavonoids

**Possible Protective Action:** Reduces growth of bladder, colon, prostate, and stomach cancer cells. Linked to lower risk of colorectal cancer in humans.

## Grapefruit and other citrus fruits

### Phytochemicals or Compounds

- Carotenoids (in *red* grapefruit): beta-carotene, lycopene
- Flavonoids: naringenin
- Limonoids

Possible Protective Action: Decreases free radical damage to DNA that can lead to cancer.

## Orange- Fleshed Vegetable (Winter Squash, Carrots, Sweet Potatoes) and Fruits (Apricot, Cantaloupe, Peach, Mango)

### Phytochemicals or Compounds

- Carotenoids: alpha-carotene, beta-carotene, beta-cryptoxanthin, lutein, zeaxanthin

**Possible Protective Action:** Stimulates self- destruction and decreases growth and spread of several types of cancer cells.

## Tomatoes

### Phytochemicals or Compounds

Carotenoids (beta-carotene, lycopene)

**Possible Protective Action:** Stimulates self- destruction and decreases growth and spread of several types of cancer cells.

## Walnuts

### Phytochemicals or Compounds

- Ellagitannins
- Flavonoids
- Phenolic acids
- Phytosterols

**Possible Protective Action:** Decrease inflammation and free radical damage to DNA that can lead to cancer.

Inhibits growth of cancer cells.

## Whole Grains

### Phytochemicals or Compounds

- Flavonoids
- Lignans
- Phenolic acids
- Phytic acid
- Protease inhibitors
- Saponins

**Possible Protective Action:** Decrease growth of cancer cells, link to lower colorectal cancer risk.

# Questions?

**Please call the Roswell Park  
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716-845-2398**

