






## Phytochemicals

Phytochemicals literally mean “plant chemicals.” Scientists have identified thousands of different phytochemicals, found in vegetables, fruits, beans, whole grains, nuts and seeds. Eating lots of plant foods rich in phytochemicals may help to prevent at least one in every five cases of cancer, as well as other serious ailments such as heart disease.

### How Do Phytochemicals Help Prevent Diseases?

- Stimulate the immune system, the body’s defense against viruses, bacteria and other disease-causing agents
- Block the potential for carcinogens (cancer-causing substances) to be formed in the body from substances we eat, drink and absorb from the environment
- Reduce oxidation, the damage to cells that occurs with aging and exposure to pollution. Oxidation, caused by molecules called “free radicals,” can cause abnormalities in cells that may eventually lead to cancer
- Slow the growth rate of cancer cells
- Reduce inflammation that provides a setting favorable for cancer growth
- Trigger death (a process known as apoptosis) of damaged cells that may be precursors to cancer
- Prevent DNA damage and help with DNA repair mechanisms
- Help to regulate hormones, such as estrogen and insulin. Excess levels of these hormones are linked with increased risk for breast and colon cancer

Red	White	Blue/Purple	Green	Yellow/Orange
				
Carotenoids Flavonoids Polyphenols Terpenes	Flavonoids Inositol Isoflavones	Flavonoids Polyphenols	Carotenoids Flavonoids Indoles Glucosinolates Isothiocyanates	Carotenoids Flavonoids Polyphenols Terpenes

## Types of Phytochemicals

Phytochemical(s)	Plant Source	Possible Benefits
<b>Carotenoids</b> (beta-carotene, lycopene, lutein, zeaxanthin)	Red, orange and green fruits and vegetables including broccoli, carrots, cooked tomatoes, leafy greens, sweet potatoes, winter squash, apricots, cantaloupe, oranges and watermelon.	May inhibit cancer cell growth, work as antioxidants and improve immune response
<b>Flavonoids</b> (anthocyanins, quercetin)	Apples, citrus fruits, onions, soybeans and soy products (tofu, soy milk, edamame, etc.), coffee and tea	May inhibit inflammation and tumor growth; may aid immunity and boost production of detoxifying enzymes in the body
<b>Indoles and Glucosinolates</b> (sulforaphane)	Cruciferous vegetables (broccoli, cabbage, collard greens, kale, cauliflower and Brussels sprouts)	May induce detoxification of carcinogens, limit production of cancer-related hormones, block carcinogens and prevent tumor growth
<b>Inositol</b> (phytic acid)	Bran from corn, oats, rice rye and wheat, nuts, soybeans and soy products (tofu, soy milk, edamame, etc.)	May retard cell growth and work as antioxidant
<b>Isoflavones</b> (daidzein, genistein)	Soybeans and soy products (tofu, soy milk, edamame, etc.)	May inhibit tumor growth, limit production of cancer-related hormones and generally work as antioxidant
<b>Isothiocyanates</b>	Cruciferous vegetables (broccoli, cabbage, collard greens, kale, cauliflower and Brussels sprouts)	May induce detoxification of carcinogens, block tumor growth and work as antioxidants
<b>Polyphenols</b> (ellagic acid, resveratrol)	Green tea, grapes, wine, berries, citrus fruits, apples, whole grains and peanuts	May prevent cancer formation, prevent inflammation and work as antioxidants
<b>Terpenes</b> (perillyl alcohol, limonene, carnosol)	Cherries, citrus fruit peel, rosemary	May protect cells from becoming cancerous, slow cancer cell growth, strengthen immune function, limit production of cancer-related hormones, fight viruses, work as antioxidant