

Phytochemicals 2004

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Plant-derived chemicals, many of which are beneficial to human health and disease prevention, represent a rapidly expanding area of nutrition. Around 4,000 have been identified, of which approximately 150 have been studied. As nutritional therapeutics continue to evolve, it is likely that phytochemicals will play an increasing role in nutritional therapeutics. The following is an updated version of a chart I compiled a few years ago.

Name	Food Source	Effects
Allyl sulfides	Garlic, onions	Lowers the risk of stomach and colon cancer. Increases glutathione production. Limits phase I enzyme production. (Phase I byproducts are quite reactive.), Retains activity after cooking.
Alpha carotene	Carrots, pumpkins	An antioxidant with powerful anticarcinogenic properties.
Beta cryptoxanthin	Oranges, tangerines, papaya	A carotenoid with antioxidant properties.
Brassinin	Cabbage	Has antioxidant properties that, in animal studies, have been shown to reduce tumors in the breasts and skin.
Caffeic acid	Apples	Neutralizes free radicals.
Capsaicin	Hot peppers	An antioxidant, particularly adept at protecting DNA. Blocks nitrosamine formation. Kills helicobacter pylori (a cause of ulcers). Used topically to promote the release of substance P, which results in pain reduction.
Chlorogenic acid	Tomatoes, bell peppers, pineapple, strawberries	Blocks nitrosamine formation during digestion. (Nitrosamine is a powerful carcinogen.
Ellagic acid	Grapes, strawberries, raspberries, blueberries, blackberries, nuts	An antioxidant adept at protecting DNA. It remains active after freezing or cooking.
D-carvone	Car away seeds	A monoterpene with anticarcinogenic properties
Diadzein	Soybeans	An isoflavone that may reduce hot flashes and osteoporosis. Also reduces alcohol consumption in dependent animals. Its synthetic metabolite is ipriflavone.

Dithiolthiones	Broccoli and other cruciferous vegetables	An antioxidant that specifically stimulates enzymes in the glutathione family (powerful free radical scavengers).
Epigallocatechin gallate (EGCG)	Green tea	EGCG is a polyphenol that, in animal and in vitro studies, has shown inhibition of bladder, breast, colon, liver, leukemic, ovarian, pancreatic, skin and stomach cancers. It may also reduce cholesterol, LDL cholesterol and LDL oxidation. It also has antiviral, antimicrobial, and powerful antioxidant effects against multiple species of free radicals. It increases fat burning in humans beyond what would be expected by the caffeine it contains. It has also been shown to increase the concentration of chemotherapeutic drugs in cancer cells and can protect the surrounding healthy tissue. More human studies are greatly anticipated.
Genistein	Soybeans	An isoflavone that inhibits angiogenesis, increases endogenous production of superoxide dismutase (SOD), glutathione, and catalase. It has weak estrogenic activity that allows it to bind on sites reserved for estrogens. This results in a reduction of estrogenic effects.
Indole 3 carbinol (I3C)	Cruciferous vegetables	Modulates estrogen metabolism by increasing the ratio of 2-hydroxyestrone (a cancer protector) to 16-hydroxyestrone (a cancer promoter).
Isoflavones	Soybeans	Binds with receptors reserved for estrogen. Standard isoflavone preparations contain approximately 50 percent genistein, 38 percent diadzin and 12 percent glycitin.
Limonene	Citrus fruit	A monoterpene that up-regulates enzymes required to remove carcinogens from inside cell membranes.
Lutein	Corn, kiwi, zucchini squash, yellow squash, butternut, squash, celery, cucumbers, grapes, peas, egg yolk	A carotenoid that can prevent age-related macular degeneration and cataract formation by acting as an intraretinal antioxidant.

Lycopene	Tomato products (sauce, paste catsup), juice watermelon, guava, pink grapefruit	A carotenoid that, in vitro, was found to be twice as powerful an antioxidant as beta-carotene and has been shown to be especially beneficial in reducing prostate, lung and stomach cancer. Quite stable and is in a much higher concentration in tomato products. Its potency is not affected by cooking or freezing.
Monoterpenes	Broccoli, cucumber, cabbage, carrots, squash, yams, eggplant	Can reduce cholesterol and lowers the risk of breast, skin, liver, pancreatic, lung, and stomach cancers.
Oltipraz	Cabbage and other cruciferous vegetables	An antioxidant that stimulates glutathione production and can protect liver cells from aflatoxins.
P-coumaric acid	Tomatoes, bell peppers, pineapple, strawberries, citrus	Blocks nitrosamine formation. May reduce stomach cancer. Prevents blood clotting.
3-phthalide	Celery, parsley, carrots	Has antihypertensive effects.
Polyacetylenes	Parsley, celery, carrots	Breaks down tobacco-generated carcinogens.
Phenethyl isothiocyanates (PEIPC)	Cabbage, turnips and other cruciferous vegetables	Antioxidant especially good at protecting DNA. Reduces estrogen to the nontoxic metabolite estradiol.
Phytosterols	Beans	May inhibit some types of colon cancer by a mechanism not yet fully understood. Reduces LDL and total cholesterol without affecting HDL or triglycerides.
Proanthocyanidins [a.k.a. omeric procyanidins (OPC)], procyanidolic oligomers (PCO), anthocyanidins	Grape skins, grape seeds, apples, cranberries, blueberries, French maritime pine bark, peanuts, almonds	Inhibited breast, lung, and stomach cancer in vitro. Also exhibited greater antioxidant protection to brain and liver cells than vitamins C, E, and beta-carotene. Animal studies show promotion of hair growth and inhibited development of atherosclerosis. Can also strengthen collagen by promoting cross-linking and reduced postoperative edema in women following facial cosmetic surgery.
Resveratrol	Grapes, red wine, peanuts and mulberries	A powerful antioxidant that inhibits LDL oxidation. Is also a natural COX-2 inhibitor that can prevent the growth of cancer cells by reducing angiogenesis. It also induces phase II liver-detoxifying enzymes.

Sulforaphane	Broccoli, brussel sprouts, cauliflower, kale	An isothiocyanate that increases phase II enzyme activity. It also has powerful antioxidant effects, shown in animal studies to reduce breast cancer. It remains active after cooking.
Terpenoids	Winter squash, sweet potatoes, yams, apricots, cantaloupe, turnips, greens, spinach, kale, carrots, citrus	Reduces arterial plaque formation and quenches multiple species of free radicals.
Triter penoids	Citrus, soy, licorice extract	It has antiulcer/anti-ulcer and anti-dental-decay activity.
Zeaxanthin	Orange bell peppers, orange juice, corn, honeydew, mango, egg yolks, red bell peppers	A carotenoid with antioxidant properties that has been shown to reduce the incidence of age-related macular degeneration and cataract formation by filtering out phototoxic blue light and UV radiation. It is the main pigment in the center of the macula.

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