

FUNCTIONAL FOODS

Functional foods are ingredients that offer health benefits that extend beyond their nutritional value. Some types contain supplements or other additional ingredients designed to improve health. The concept originated in Japan in the 1980s when government agencies started approving foods with proven benefits in an effort to better the health of the general populations. Some examples include foods fortified with vitamins, minerals, probiotics, or fiber. Nutrient-rich ingredients like fruits, vegetables, nuts, seeds, and grains are often considered functional foods as well. Oats, for instance, contain a type of fiber called beta glucan, which has been shown to reduce inflammation, enhance immune function, and improve heart health. Similarly, fruits and vegetables are packed with antioxidants, which are beneficial compounds that help protect against disease.

Functional food components are potentially beneficial components found naturally in foods or added to them as functional ingredients, and include carotenoids, dietary fiber, fatty acids, flavonoids, isothiocyanates, phenolic acids, plant stanols and sterols, polyols, prebiotics and probiotics, phytoestrogens, soy protein, vitamins and minerals. At present, professionals are recognizing that some functional components of foods have a major role in health enhancement. In fact, the big importance of these “bioactives” present in many foods, either naturally or added, has led many scientists of different fields to conduct studies aimed for establishing the scientific basis that supports and validates the benefits of a particular food or component for the human health. It appears that people should strive to consume a wide variety of foods such as to assure the ingestion of compounds such as carotenoids, fiber, flavonoids, specific fatty acids, minerals, prebiotics and probiotics, phytoestrogens, soy protein and vitamins, among others, in order to reduce the risk of developing some diseases, or even to help curing others.

Some potential benefits of functional foods are they:

- May prevent nutrient deficiencies
- May protect against disease
- May promote proper growth and development.

Practical examples of a functional food include:

- a natural food such as fruit or grain which may or may not be modified by plant breeding or other technologies (e.g. lycopene-enhanced tomatoes, vitamin E-enriched vegetable oils, vitamin A-enriched rice);
- a food to which a component has been added (e.g. a spread with added phytosterols);
- a food from which a component has been removed or reduced (e.g. a yogurt with reduced fat);
- a food in which one, or several components, have been modified, replaced or enhanced to improve its health properties (e.g. a juice drink with enhanced antioxidant content, a yogurt with added prebiotic or probiotic).

EXAMPLES OF FUNCTIONAL COMPONENTS

Class/Components	Source*	Potential Benefit
Carotenoids		
Beta-carotene	carrots, pumpkin, sweet potatoes, cantaloupe, spinach, tomatoes	neutralizes free radicals which may damage cells; bolsters cellular antioxidant defenses; can be made into vitamin A in the body
Lutein, Zeaxanthin	kale, collards, spinach, corn, eggs, citrus fruits, asparagus, carrots, broccoli	supports maintenance of eye health
Lycopene	tomatoes and processed tomato products, watermelon, red/pink grapefruit	supports maintenance of prostate health
Dietary Fibre		
Insoluble fiber	wheat bran, corn bran, fruit skins	supports maintenance of digestive health; may reduce the risk of some types of cancer
Beta glucan	oat bran, oatmeal, oat flour, barley, rye	May reduce risk of Coronary heart disease (CHD).
Soluble fibre	Psyllium husk, peas, beans, apples, citrus fruits.	may reduce risk of CHD and some types of cancer
Whole grains	cereal grains, whole wheat bread, oatmeal, brown rice	may reduce risk of CHD and some types of cancers; supports maintenance of healthy blood glucose levels
Fatty Acids		
Monounsaturated fatty acids (MUFAs)**	tree nuts, olive oil, canola oil	may reduce risk of CHD

Polyunsaturated fatty acids (PUFAs) – Omega-3 fatty acids— ALA	walnuts, flaxseeds, flaxseed oil	supports maintenance of heart and eye health; supports maintenance of mental function
PUFAs – Omega-3 fatty acids— DHA/EPA**	salmon, tuna, marine and other fish oils	may reduce risk of CHD; supports maintenance of eye health and mental function
Conjugated linoleic acid (CLA)	beef and lamb; some cheese	supports maintenance of desirable body composition and immune health
Flavonoids		
Anthocyanins	berries, cherries, red grapes	bolster cellular antioxidant defenses; supports maintenance of healthy brain function
Flavanols – Catechins, Epicatechins, Epigallocatechin	tea, cocoa, chocolate, apples, grapes	supports maintenance of heart health
Procyanidins and Proanthocyanidins	cranberries, cocoa, apples, strawberries, grapes, red wine, peanuts, cinnamon, tea, chocolate	supports maintenance of urinary tract health and heart health
Flavanones – Hesperetin	citrus fruits	neutralizes free radicals which may damage cells; bolster cellular antioxidant defenses
Quercetin	onions, apples, tea, broccoli	neutralizes free radicals which may damage cells; bolster cellular antioxidant defenses
Isothiocyanates		
Sulforaphane	cauliflower, broccoli, brussel sprouts, cabbage, kale, horseradish	may enhance detoxification of undesirable compounds; bolsters cellular antioxidant defenses
Minerals		

Calcium*	sardines, spinach, yogurt, low-fat dairy products, fortified foods and beverages	may reduce the risk of osteoporosis
Magnesium	spinach, pumpkin seeds, whole grain breads and cereals, halibut, almonds, brazil nuts, beans	supports maintenance of normal muscle and nerve function, immune health and bone health
Potassium**	potatoes, low-fat dairy products, whole grain breads and cereals, citrus juices, beans, banana, leafy greens	may reduce the risk of high blood pressure and stroke, in combination with a low sodium diet
Selenium	fish, red meat, whole grains, garlic, liver, eggs	neutralizes free radicals which may damage cells; supports maintenance of immune and prostate health
Phenolic Acids		
Caffeic acid, Ferulic acid	apples, pears, citrus fruits, some vegetables, whole grains, coffee	bolsters cellular antioxidant defenses; supports maintenance of eye and heart health
Plant stanols/ sterols		
Free Stanols/Sterols**	corn, soy, wheat, fortified foods and beverages	may reduce risk of CHD
Stanol/Sterol esters**	stanol ester dietary supplements, fortified foods and beverages, including table spreads	may reduce risk of CHD
Polyols Sugar alcohols** – Xylitol, Sorbitol, Mannitol, Lactitol	some chewing gums and other food applications	may reduce risk of dental caries
Prebiotics Inulin, Fructooligosaccharides (FOS), Polydextrose	whole grains, onions, some fruits, garlic, honey, leeks, banana, fortified foods and beverages	supports maintenance of digestive health; supports calcium absorption
Probiotics	certain yogurts and other cultured	supports maintenance of

Yeast, Lactobacilli, Bifidobacteria and other specific strains of beneficial bacteria	dairy and nondairy applications	digestive and immune health; benefits are strainspecific
Phytoestrogens		
Isoflavones – Daidzein, Genistein	soybeans and soy-based foods	supports maintenance of bone and immune health, and healthy brain function; for women, supports menopausal health
Lignans	flax seeds, rye, some vegetables, seeds and nuts, lentils, triticale, broccoli, cauliflower, carrot	support maintenance of heart and immune health
Soy Protein**	soybeans and soy-based foods like milk, yogurt, cheese and tofu	may reduce risk of CHD
Sulfide/ Thiols		
Diallyl sulfide, Allyl methyl trisulfide	garlic, onions, leeks, scallions	may enhance detoxification of undesirable compounds; supports maintenance of heart, immune and digestive health
Dithiolthiones	cruciferous vegetables	may enhance detoxification of undesirable compounds; supports maintenance of healthy immune function
Vitamins		
A**	organ meats, milk, eggs, carrots, sweet potato, spinach, yellow orange vegetables	supports maintenance of eye, immune and bone health; contributes to cell integrity
Thiamin (Vitamin B1)	lentils, peas, brown or enriched white rice, pistachios and certain fortified breakfast cereals	supports maintenance of mental function; helps regulate metabolism
Riboflavin(Vitamin B2)	lean meats, eggs, green leafy vegetables, dairy products and certain fortified breakfast cereals	Supports cell growth, helps regulate metabolism.

Niacin (Vitamin B3)	dairy products, poultry, fish, nuts, eggs and certain fortified breakfast cereals	Supports cell growth, helps regulate metabolism.
Pantothenic acid (Vitamin B5)	sweet potato, organ meats, lobster, soybeans, lentils and certain fortified breakfast cereals	helps regulate metabolism and hormone synthesis
Pyridoxine (Vitamin B6)	beans, nuts, legumes, fish, meat, whole grains and certain fortified breakfast cereals	supports maintenance of immune health; helps regulate metabolism
Folate or folic acid (Vitamin B9)**	beans, legumes, citrus fruits, green leafy vegetables and fortified breads, cereals, pasta, rice	may reduce a woman's risk of having a child with a brain or spinal cord defect; supports maintenance of immune health.
B12 (Cobalamin)	eggs, meat, poultry, milk and certain fortified breakfast cereals	supports maintenance of mental function; helps regulate metabolism and supports blood cell formation
Biotin	liver, salmon, dairy, eggs, oysters and certain fortified breakfast cereals.	helps regulate metabolism and hormone synthesis
C	guava, sweet red/green pepper, kiwi, citrus fruit, strawberries, fortified foods and beverages	neutralizes free radicals which may damage cells; supports maintenance of bone and immune health
D**	sunlight, fish, fortified foods such as yogurts or cereals, and beverages, including milk and juices	may reduce the risk of osteoporosis; helps regulate calcium and phosphorus; supports immune health; helps support cell growth
E	sunflower seeds, almonds, hazelnuts, turnip greens, fortified foods and beverages	neutralizes free radicals, which may damage cells; supports maintenance of immune and heart health

**FDA-approved health claim for component

Conclusion

Functional foods are a category of food associated with several powerful health benefits. They can not only prevent nutrient deficiencies but also protect against disease and promote proper growth and development. In addition to enjoying a variety of healthy whole foods, you can include more fortified foods in your diet to fill any nutritional gaps and support better health.