

Functional Foods















Did you know that certain foods or food components may provide health and wellness benefits? These foods, also known as "functional foods," are thought to provide benefits beyond basic nutrition and may play a role in reducing or minimizing the risk of certain diseases and other health conditions. Examples of these foods include fruits and vegetables, whole grains, fortified foods and beverages and some dietary supplements. Functional characteristics of many traditional foods are being discovered and studied, while new food products are being developed to include beneficial components. By knowing which foods can provide specific health benefits, you can make food and beverage choices that allow you to take greater control of your health.

DEMAND

Consumer interest in the relationship between diet and health has increased the demand for information about functional foods. Factors fueling U.S. interest in these foods include the rapid advances in science and technology, increasing healthcare costs, changes in food laws affecting label and product claims, an aging population and rising interest in attaining wellness through diet, among others.



HEALTH CLAIMS

According to IFIC consumer research, Americans name the media, health professionals, and family and friends as their top sources of information about foods that can promote health. Credible scientific research indicates there are many clinically proven and potential health benefits from food components. Claims on food packages are just one vehicle

for informing consumers about these diet and health relationships. In the US, the 1990 Nutrition Labeling and Education Act authorized the Food and Drug Administration to create regulations for the use of health claims on foods and dietary supplements. Benefits that are substantiated by scientific research are often communicated to consumers through the product packaging, websites or advertising. Such health-related statements or claims are made according to the applicable regulations and guidelines of the FDA and Federal Trade Commission.

Many academic, scientific and regulatory bodies have developed, or are developing, guidelines to establish the scientific evidence base needed to support and further validate claims for functional components or the foods containing them. FDA regulates food products according to their intended use and the nature of claims made on the package. Five types of health-related statements or claims are allowed on food and dietary supplement labels:

- 1. *Nutrient content claims* indicate the presence of a specific nutrient at a certain level.
- 2. Structure and function claims describe the effect of dietary components on the normal structure or function of the body.
- 3. *Dietary guidance claims* describe the health benefits of broad categories of foods or diets and do not refer to a disease or a health related condition.
- 4. Qualified health claims convey a developing relationship between components in the diet and reduced risk of disease, as reviewed by the FDA and supported by the weight of credible scientific evidence available.

Personalizing nutrition to an individual's unique genetic makeup has the potential for positive health outcomes overall.

5. *Health claims* confirm a relationship between components in the diet and reduced risk of disease or health condition, as approved by FDA and supported by significant scientific agreement.

The scientific community continues to increase its understanding of the potential for functional foods and their role in maintaining and optimizing health. For benefits to be validated and claims to be made, a strong and reliable body of credible scientific research is needed to confirm the benefits of any particular food or component. For functional foods to deliver their potential public health benefits, consumers must be able to rely on the scientific criteria that are used to document such health statements and claims.

NUTRIGENOMICS "PERSONALIZED NUTRITION"

As scientific and technological advances develop in the field of health and nutrition, more focus has been directed toward the emerging field of nutrigenomics, or "personalized nutrition." The science of nutrigenomics involves the application of the human genome to nutrition and personal health to provide individual dietary recommendations. By using an individual's unique genetic makeup and nutritional requirements to tailor recommendations, consumers may one day have a greater ability to reduce their risk of disease and optimize their health.

Personalizing nutrition to an individual's unique genetic makeup has the potential for positive health outcomes overall. Choosing an individualized approach, over a more traditional or general approach, to health and nutrition recommendations can provide consumers with the most appropriate and beneficial information for their specific nutritional needs. While personalized nutrition seems promising, research is still in the preliminary stages, and years may pass before accurate and effective recommendations can be made for individuals.

Functional foods/foods for health are an important part of an overall healthful lifestyle that includes a balanced diet and physical activity. People should strive to consume a wide variety of foods, including the examples listed here. These examples are not "magic bullets." The best advice is to include a variety of foods, as recommended by the 2010 Dietary Guidelines for Americans and ChooseMyPlate.gov, which would provide many potentially beneficial components.





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FOR MORE INFORMATION ON FUNCTIONAL FOODS VISIT:

www.foodinsight.org/foodsforhealth.aspx

July 2011

Class/Components	Source*	Potential Benefit	Tips to Include Healthful Components in the Diet
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	For beta-carotene rich french fries, thinly slice sweet potatoes, lightly coat with olive oil or fat-free cooking spray, add spices (pepper, rosemary, thyme) to taste and bake in 425-degree oven until golden brown (10-15 mins). Time-saver: Buy pre-cut sweet potatoes in the frozen foods section.
Lutein, Zeaxanthin	kale, collards, spinach,	supports maintenance of eye health	Enjoy a crisp spinach salad with hard-boiled egg slices.
	corn, eggs, citrus fruits, asparagus, carrots, broccoli		For a lutein-rich breakfast, make a spinach omelet. Beat 2 eggs; stir in ¼ C milk and ½ C spinach (fresh or frozen and drained). Lightly coat skillet with fat-free cooking spray. Cook on low heat until set. Kale, which provides the same health benefits, can be an easy substitute for spinach.
Lycopene	tomatoes and processed tomato products, watermelon, red/pink grapefruit	supports maintenance of prostate health	Like other carotenoids, lycopene is best absorbed from a meal containing some oil. If you love tomatoes, try adding tomato sauce to sautéed zucchini for a fun and colorful side dish!
			Sprinkle a little sugar or low-calorie sweetener on sliced grapefruit before eating to bring out the natural sweetness within.
DIETARY(function	al and total) FIBER		
Insoluble fiber	wheat bran, corn bran, fruit skins	supports maintenance of digestive health; may reduce the risk of some types of cancer	Add a little dry wheat bran when making smoothies or muffins to bulk up the fiber content.
Beta glucan**	oat bran, oatmeal, oat flour, barley, rye	may reduce risk of coronary heart disease (CHD)	Jazz up your oatmeal with these tasty extras: 1 Tbsp peanut butter and jelly; a sprinkle of cinnamon and pumpkin puree; slivered almonds and $\frac{1}{2}$ C frozen berries
			Keep instant oatmeal packets in your desk drawer to have on hand when you miss breakfast or need a hearty afternoon snack to tide you over until dinner.
Soluble fiber**	psyllium seed husk, peas, beans, apples, citrus fruits	may reduce risk of CHD and some types of cancer	Try adding canned beans (black, pinto or garbanzo) to your regular meal - layer them in quesadillas, add to an omelet or enjoy in a mixed green salad.
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	Keep a few mini-bags of microwave popcorn in your desk drawer to pop for a quick, low-calorie snack. Spice up your popcorn with garlic powder and cinnamon or rosemary and parmesan cheese. Yum!
			Are your kids picky eaters? Make their next sandwich visually appealing: use one slice of white bread and one slice of whole grain bread, cut sandwich into four pieces,

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**FDA-approved health claim for component

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FATTY ACIDS			
Monounsaturated fatty acids (MUFAs)**	tree nuts, olive oil, canola oil	may reduce risk of CHD	Make portion-controlled snack bags of mixed nuts such as almonds, pecans and cashews and add dried fruit for extra flavor and fiber. Keep the bags on hand to grab on your way out the door for a quick and easy mid-morning or afternoon snack.
Polyunsaturated fatty acids (PUFAs) –	walnuts, flaxseeds, flaxseed oil	supports maintenance of heart and eye health; supports maintenance of mental function	When cooking, substitute flax seed oil for canola or olive oil one to two times per week.
Omega-3 fatty acids— ALA			Keep in mind, flax seed oil is fragile; refrigerate in a dark container and use at low-temperature for stir-frying.
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	Salmon or tuna canned in water or a shelf-stable pouch can make easy and affordable meals; add a few tablespoons of olive oil, season with pepper and thyme and enjoy on top of whole grain crackers or wrapped with tomatoes in a lettuce leaf.
Conjugated linoleic acid (CLA)	beef and lamb; some cheese	supports maintenance of desirable body composition and immune health	Bring Hawaii to your next cook-out by preparing these kebabs for the grill: alternate pineapple, beef, onions and bell peppers on wooden skewers; season with garlic powder, pepper, paprika, oil and lime.
FLAVONOIDS			
Anthocyanins – Cyanidin, Pelargonidin, Delphinidin, Malvidin	berries, cherries, red grapes	bolster cellular antioxidant defenses; supports maintenance of healthy brain function	Add berries to your yogurt or morning oatmeal for extra flavor. For a cold treat, enjoy a smoothie! Combine 1 C frozen berries, ½ banana, ¾ C yogurt, and ¾ C milk in a blender; blend until smooth.
Flavanols – Catechins, Epicatechins, Epigallocatechin	tea, cocoa, chocolate, apples, grapes	supports maintenance of heart health	Make your own iced tea by pouring boiling water over 3-4 bags of your favorite tea; let sit for 5 minutes, then pour over a pitcher of ice and fill to the brim with water; stir and refrigerate to chill. Enjoy with fresh-squeezed lemon. When included in moderation, dark chocolate can be part of a balanced diet.
Procyanidins and Proanthocyanidins	cranberries, cocoa, apples, strawberries, grapes, red wine, peanuts, cinnamon, tea, chocolate	supports maintenance of urinary tract health and heart health	Dice apples and simmer in water until soft, add to blender with dash of cinnamon; puree. Enjoy as a spread on whole wheat toast or crackers!
Flavanones – Hesperetin, Naringenin	citrus fruits	neutralizes free radicals which may damage cells; bolster cellular antioxidant defenses	Squeeze ½ orange and ½ lemon into a small dish; add olive or flax oil, dashes of salt, pepper, and basil for a perfectly refreshing salad dressing. Rushed for time? Get the same benefits from orange or grapefruit juice.
Flavonols – Quercetin, Kaempferol, Isorhamnetin, Myricetin	onions, apples, tea, broccoli	neutralizes free radicals which may damage cells; bolster cellular antioxidant defenses	Caramelized onions make a sweet and tasty garnish to many main dishes. Sauté onions over low heat in 1 tsp. oil until deep gold in color; use to top prepared steak, chicken, or fish.

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ISOTHIOCYANA	ATES		
Sulforaphane	cauliflower, broccoli, broccoli sprouts, cabbage, kale, horseradish	may enhance detoxification of undesirable compounds; bolsters cellular antioxidant defenses	Keep frozen broccoli and cauliflower on hand for an easy side dish. In a microwaveable bowl, cover frozen vegetables with paper towel and cook 1-1 ½ minutes. Add slivered almonds and sprinkle with parmesan cheese, cook 30-60 seconds more or until the cheese melts.
MINERALS			
Calcium**	sardines, spinach, yogurt, low-fat dairy products, fortified foods and beverages	may reduce the risk of osteoporosis	Add cooked spinach, canned artichokes and plain yogurt to blender or food processor; puree for a tasty cracker spread or dip. Season to taste - try black pepper, basil and garlic powder.
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	For extra flavor, sprinkle a fish fillet with pumpkin seeds before baking or add them to a veggie stir-fry.
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	Puree ripe bananas with crushed peanuts and portion into freezer cups to enjoy as a frozen treat! For extra indulgence, add some fresh chocolate shavings.
Selenium	fish, red meat, whole grains, garlic, liver, eggs	neutralizes free radicals which may damage cells; supports maintenance of immune and prostate health	Roasting garlic gives it a rich, buttery flavor. Cut a full bulb of garlic crosswise to expose wrapped cloves; drizzle with olive/flax oil, season with salt/pepper, cover with aluminum foil to bake in 400-degree oven for 30 minutes or microwave on high (No foil) for 1 minute, turn bulb upside down and cook 1 minute more. Delicious!
PHENOLIC ACI	DS		
Caffeic acid, Ferulic acid	apples, pears, citrus fruits, some vegetables, whole grains, coffee	bolsters cellular antioxidant defenses; supports maintenance of eye and heart health	Love your morning coffee? Good news - coffee is a powerful source of antioxidants. Pair it with apples and peanut butter for an antioxidant-packed breakfast.
PLANT STANOI	LS/STEROLS		
Free Stanols/Sterols**	corn, soy, wheat, fortified foods and beverages	may reduce risk of CHD	Get your free stanols/sterols from fortified foods such as bread containing "whole wheat flour," low-fat yogurt, soy milks and some cereals. Dietary supplements in softgel form that contain free stanols and sterols are also available and can provide similar benefits when used as part of a low-fat, low-cholesterol diet.
Stanol/Sterol esters**	stanol ester dietary supplements, fortified foods and beverages, including table spreads	may reduce risk of CHD	Many table spreads (butter or margarine alternatives) are fortified with stanol and/or sterol esters. Other commercial products fortified with stanols and sterols include some orange juices, yogurt beverages, chocolate and granola bars. Check product labels and ingredient lists to confirm the presence and amount of stanols and sterols.
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POLYOLS			
Sugar alcohols** – Xylitol, Sorbitol, Mannitol, Lactitol	some chewing gums and other food applications	may reduce risk of dental caries	Reduce your risk for dental caries and help curb your appetite by chewing sugar-free gum after eating.
PREBIOTICS			
Inulin, Fructo- oligosaccharides (FOS), Polydextrose	whole grains, onions, some fruits, garlic, honey, leeks, banana, fortified foods and beverages	supports maintenance of digestive health; supports calcium absorption	Food products fortified with prebiotics are beginning to appear, but did you know that you can also get prebiotics by simply adding honey to some of your routine meals? Add honey to oatmeal or yogurt, drizzle it over a banana, spread it on your morning toast, or treat yourself to ½ peanut butter and honey sandwich.
PROBIOTICS			
Yeast, Lactobacilli, Bifidobacteria and other specific strains of beneficial bacteria	certain yogurts and other cultured dairy and non- dairy applications	supports maintenance of digestive and immune health; benefits are strain- specific	Add probiotics to your diet by choosing low-fat yogurt with a beneficial probiotic strain: choose from a variety of flavored or plain yogurts with probiotics for a quick and tasty snack. Blend 6-8oz yogurt, 6oz orange juice, 1 Tbsp honey, ½ banana and ice for a 30-second smoothie.
			For a healthful breakfast, top pancakes with flavored yogurt and fresh fruit like strawberries and bananas.
PHYTOESTROGI	ENS		
Isoflavones – Daidzein, Genistein	soybeans and soy-based foods	supports maintenance of bone and immune health, and healthy brain function; for women, supports menopausal health	Try including tofu in some of your favorite recipes. Get your isoflavones by choosing soft, silken tofu and adding it to the cheese sauce mixture when making lasagna. Other recipes that work well with tofu additions include quiches, veggie dips, quesadillas, chili, chocolate mousse and even baked goods!
Lignans	flax seeds, rye, some vegetables, seeds and nuts, lentils, triticale, broccoli, cauliflower, carrot	support maintenance of heart and immune health	Add whole or ground flax seeds to a smoothie or baked goods recipe. You can also try occasionally substituting rye bread for your usual bread of choice at home or when eating at a restaurant.
SOY PROTEIN			
Soy Protein**	soybeans and soy-based foods like milk, yogurt, cheese and tofu	may reduce risk of CHD	Soybeans are also called "edamame" in many Asian cuisine restaurants; try ordering a plate to share before your meal arrives. When cooking at home, look for frozen edamame to easily prepare as a healthy snack or party sampler. Soy milks are another option for increasing soy protein intake. Check the ingredients of nutrition bars or meal replacements for "soy protein."

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SULFIDES/THIC	DLS		
Diallyl sulfide, Allyl methyl trisulfide	garlic, onions, leeks, scallions	may enhance detoxification of undesirable compounds; supports maintenance of heart, immune and digestive health	Scallions, or "green onions," are milder than traditional onions and are commonly used to garnish salads or cooked sauces. Incorporate scallions into meals by thinly chopping the green stalks and adding them to mashed potatoes, cold pasta salad, tuna salad or canned soups. Leeks can also be an easy substitute, but are more commonly used in soups.
Dithiolthiones	cruciferous vegetables	may enhance detoxification of undesirable compounds; supports maintenance of healthy immune function	Broccoli and cauliflower are the more commonly known cruciferous vegetables that we eat, but did you know that varieties of cabbage, bok choy, brussel sprouts, kale and wasabi, among others, are also sources of dithiolthiones?
			Bok choy is great in any stir-fry or by itself. To cook: Separate the white stem from the leaves and chop into 1"-thick pieces. Add to oil in skillet on mediumhigh heat, sauté 3 minutes, add the leaves and ½ cup of water or vegetable stock, stir until the leaves are wilted and cooked (about 5-10 minutes). Season to taste and enjoy!
VITAMINS			
A***	organ meats, milk, eggs, carrots, sweet potato, spinach	supports maintenance of eye, immune and bone health; contributes to cell integrity	If you are not a fan of boiled or raw carrots, try buying the larger carrots and slice them lengthwise into wide strips. Add them to the grill after lightly brushing with oil and season with fajita seasoning or other spices to give them a unique BBQ flavor.
Thiamin (Vitamin B1)	lentils, peas, brown or enriched white rice, pistachios and certain fortified breakfast cereals	supports maintenance of mental function; helps regulate metabolism	If you are still unsure about making the transition to long-grain brown rice, start slow and create a half and half mixture of brown and white rice. Think about adding dried cranberries and slivered almonds to the rice mix as well for appealing color and a little sweetness to complement the dense "nutty" flavored rice.
Riboflavin (Vitamin B2)	lean meats, eggs, green leafy vegetables, dairy products and certain fortified breakfast cereals	supports cell growth; helps regulate metabolism	Get lots of vitamin B2 by bulking up your whole wheat sandwich with lean-cut deli meat and double-stacked green and red leaf lettuce or spinach. The extra greens will give your sandwich that mouthwatering crunch in every bite.
Niacin (Vitamin B3)	dairy products, poultry, fish, nuts, eggs and certain fortified breakfast cereals	supports cell growth; helps regulate metabolism	For a spicy twist on chicken, grill chicken breasts and cut into strips, toss in your favorite hot sauce and serve with celery—healthful "chicken wings" for the next football party!
Pantothenic acid (Vitamin B5)	sweet potato, organ meats, lobster, soybeans, lentils and certain fortified breakfast cereals	helps regulate metabolism and hormone synthesis	Looking for a healthful crunch? Try dried soy nuts and dried fruit for a fiber-rich, vitamin B5-friendly snack. Soy nuts are easily added to yogurts, oatmeal, salads, stir-fries, chicken bakes and much more.

^{*}Examples are not an all-inclusive list

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^{**}FDA-approved health claim for component

^{***}Preformed vitamin A is found in foods that come from animals. Provitamin A carotenoids are found in many darkly colored fruits and vegetables and are a major source of vitamin A for vegetarians.

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Class/Components	Source*	Potential Benefit	Tips to Include Healthful Components in the Diet
VITAMINS (contin	nued)		
Pyridoxine (Vitamin B6)	beans, nuts, legumes, fish, meat, whole grains and certain fortified breakfast cereals	supports maintenance of immune health; helps regulate metabolism	Legumes come in all shapes and varieties. To add more vitamin B6 to your diet, try sugar snap peas with hummus for a healthful snack.
			Keep frozen green beans on hand for a quick side dish or snack. Boil beans 2-3 minutes until tender but firm. Season with oil, soy nuts or sunflower seeds, basil, salt and pepper.
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	Many breads and cereals are fortified with folate, check the nutrition facts panel to be sure.
			To get folate in your diet with whole foods, think about buying canned or raw beans; they are affordable and easy to prepare. Try this culturally-charged take on lentils: sauté chopped onions until a deep golden brown; add drained, canned or cooked lentils, curry powder, salt and pepper; stir in ½ C water and let simmer for 10 minutes. Serve over long-grain brown rice.
B12 (Cobalamin)	eggs, meat, poultry, milk and certain fortified breakfast cereals	supports maintenance of mental function; helps regulate metabolism and supports blood cell formation	Hard-boiled eggs can be healthful, easy meal additions on- the-go. Boil 6-8 eggs over the weekend to store as a time-saver during the week. For an easy fail-proof method: Place eggs on the bottom of a stove pot, cover with water, add 1-2 tsp vinegar (to prevent cracking), place on high heat. When water is at a rolling boil (big bubbles), cover and turn off heat. Let sit for 30 minutes. Remove the eggs from the water and store in the refrigerator until ready to enjoy!
Biotin	liver, salmon, dairy, eggs, oysters and certain fortified breakfast cereals	helps regulate metabolism and hormone synthesis	Swap grilled chicken or steak on a salad for salmon at least once a week. Think about keeping a can or pouch of salmon in your desk drawer to have on hand the next time someone brings bagels and cream cheese to the office.
С	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	Boost your vitamin C intake with a fruit smoothie. Save money and preparation time by using frozen fruit. Canned fruit in lite syrup can also be cost-friendly and nutritious choice. Add it to low-fat or fat-free cottage cheese or yogurt.
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	Did you know you can get calcium and vitamin D from your morning glass of orange juice? More dairy and juice products around the supermarket are fortified with vitamin D and calcium. Make sure to check the label when making your next purchase. Vitamin D dietary supplements are also a great way to add vitamin D to your diet.
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	Raw and chopped hazelnuts make excellent additions to vegetable sautés, pancake batter and frozen yogurt.
			Sunflower seeds in the shell can be a good alternative or addition to peanuts at sporting events. Unshelled sunflower seeds are great salad toppers; look for them at the end of the salad bar line.

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