



## BENEFITS FROM FOODS BEYOND BASIC NUTRITION

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### ABSTRACT

Certain foods or food components provide health and wellness benefits. These foods, also known as “functional foods,” 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.

**Keywords:** Lenoleic, Anthocyanin, Carotene, Lycopene, Omega -3.

### INTRODUCTION

There has been a wide-spread interest in the relationship between health and diet; the rapid advances in science technology; increasing health care costs; and increasing life-span are just a few of the reasons that consumers are demanding more information about benefits from foods.

Nutrients from foods are understood to be a potentially healthful food or ingredient that may provide a health benefit beyond basic nutrition. And, the best part, all you have to do is to select these foods over its competitor.

Research has clearly shown that diets rich in fruits and vegetables can reduce cancer risk. Mounting evidence also shows that there are other components in plant-based diets, other than the traditional nutrients, that can reduce cancer risk.

These components are bioactive plant chemicals known as phytochemicals. Phytochemicals presumably promote good health. Examples of phytochemicals include

carotenoids and flavonoids. Lycopene is a carotenoid that is found in tomatoes and tomato products. Lycopene may reduce the risk of prostate cancer. Lutein, also in the carotenoid class, is found in green vegetables and contributes to the maintenance of healthy vision. Flavones, found in fruits and vegetables, are flavonoids that neutralize free radicals and may also reduce the risk of cancer.

Other benefits of foods such as cholesterol lowering margarines contain plant sterol esters, which inhibit cholesterol absorption and therefore lower blood cholesterol levels. Benefits from foods are not limited to plant based foods.

For example, fish contains bioactive components called Omega-3 fatty acids which may play an important role in the prevention of cardiovascular disease. Dairy products are functional foods because they contain calcium, an essential nutrient which can prevent osteoporosis and possibly colon cancer.

**Table 1. Functional components of foods:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
<b>Carotenids-</b>			
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, corn, eggs, citrus fruits, asparagus, carrots, broccoli	supports maintenance of eye health	Enjoy a crisp spinach salad with hard-boiled egg slices. 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.

**Table 2. Dietary (functional and total) fiber:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
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 ½ 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, turn two sections to create a checker board effect.

**Table 3. Fatty acids:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
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) – Omega-3 fatty acids— ALA	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. 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.

**Table 4. Flavonoids:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
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.

**Table 5. Isothiocyanates:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
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 microwavable 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.

**Table 6. Minerals:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
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!

**Table 7. Phenolic acids:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
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.

**Table 8. Plant stanols/sterols:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
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 soft-gel 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.

**Table 9. Polyols:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
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.

**Table 10. Prebiotics:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
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.

**Table 11. Probiotics:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
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.

**Table 12. Phytoestrogens:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
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.

**Table 13. Soy protein:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
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.”

**Table 14. Sulfides/Thiols:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
Diallyl sulfide, Allyl methyl trisulfide	garlic, onions, leeks, scallions	may enhance detoxification of undesirable compounds; supports maintenance of heart, immune and	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

		digestive health	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 medium- high 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!

**Table 15. Vitamins:**

Class/Components	Source	Potential Benefit	Healthful Components in the Diet
Vitamin 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.
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	beans, legumes,	may reduce a woman's	Many breads and cereals are fortified with folate,

(Vitamin B9)	citrus fruits, green leafy vegetables and fortified breads, cereals, pasta, rice	risk of having a child with a brain or spinal cord defect; supports maintenance of immune health	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.
Vitamin 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	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.
Vitamin 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.
Vitamin 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.

## CONCLUSION

Whether from plant or animal sources, nutrients of foods contain bioactive components that can provide health benefits. However, these foods are not a prescription for poor eating habits. One cannot overlook the benefits of the traditional balanced, varied diet that emphasizes moderation. 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. Nutrients of foods 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. The best advice is to include a variety of foods, which would provide many potentially beneficial components.

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