## Sengamala Thayaar Educational Trust Women’s College

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**FUNCTIONAL FOODS AND NUTRACEUTICALS**

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**FUNCTIONAL FOODS AND NUTRACEUTICALS**

**HISTORY OF FUNCTIONAL FOODS**

**FUNCTIONAL FOODS.** The term "functional foods" refers to foods and their components that may provide a health benefit beyond basic nutrition. [Functional foods](https://www.encyclopedia.com/sports-and-everyday-life/food-and-drink/food-and-cooking/functional-foods) do more than meet minimum daily nutrient requirements—they also can play a role in reducing the risk of disease and promoting good health. Biologically active components in functional foods impart health benefits or desirable physiological effects.

All foods have a function when consumed in proper balance as part of an overall healthy diet. [Functional foods](https://www.encyclopedia.com/sports-and-everyday-life/food-and-drink/food-and-cooking/functional-foods) may include whole foods, such as fruits and vegetables, which represent the simplest example. Those foods that have been fortified, enriched, or enhanced with nutrients, phytochemicals, or botanicals, as well as dietary supplements, also fall within the realm of functional foods.

The functional attributes of many traditional foods are only now being discovered. Examples include phytoestrogens in soy foods and a variety of antioxidants in fruits and vegetables, such as lycopene in tomatoes. Still, new food products are being developed with beneficial components, with a focus on wellness and the reduced risk of chronic disease (i.e., foods and beverages containing pre-and probiotics to maintain gastrointestinal health, calcium-fortified beverages to maintain bone health, and dressings and spreads containing plant stanol and sterol esters, which may decrease the risk of [heart disease](https://www.encyclopedia.com/medicine/diseases-and-conditions/pathology/heart-disease)).

**History**

Over two thousand years ago [Hippocrates](https://www.encyclopedia.com/people/medicine/medicine-biographies/hippocrates) said, "Let food be thy medicine." Although the concept of functional foods is not entirely new, it has evolved considerably over the years. In the early 1900s food manufacturers in the [United States](https://www.encyclopedia.com/places/united-states-and-canada/us-political-geography/united-states) began adding iodine to salt in an effort to prevent goiter, representing one of the first attempts at creating a functional food through fortification.

Other twentieth-century examples include vitamin A and D fortification of milk and niacin and folic acid fortification of grains. These early fortification examples, however, focused on reducing the risk of diseases of deficiency. In the latter part of the twentieth century, consumers began to focus on wellness and the reduction of chronic disease. Research now focuses frequently on the promotion of health through many lifestyle factors, including the consumption of an optimal diet. As of 2002, researchers have identified hundreds of food components with functional qualities, and they continue to make new discoveries surrounding the complex benefits of phytochemicals in foods.

**Demand**

Consumer interest in the relationship between diet and health has increased the demand for information on functional foods. Rapid advances in science and technology, increasing health-care costs, changes in food laws affecting label and product claims, an aging population, and a rising interest in attaining wellness through diet are among the factors fueling U.S. interest in functional foods. Credible scientific research indicates many potential health benefits from food components. These benefits could expand the health claims now permitted by the U.S. [Food and Drug Administration](https://www.encyclopedia.com/social-sciences-and-law/political-science-and-government/us-government/food-and-drug-administration) ([FDA](https://www.encyclopedia.com/social-sciences-and-law/political-science-and-government/us-government/food-and-drug-administration)).

**Consumer Attitudes**

The International Food Information Council (IFIC) has been researching awareness of, and attitudes about, functional foods, through both qualitative and quantitative research. In 2002 telephone surveys with U.S. consumers were conducted, building on quantitative data collected in 1998 and 2000.

As in 1998 and 2000, the vast majority of consumers believe that they have a "great amount" of control over their own health. Also, in comparing the effects of nutrition, exercise, and family health history on health, consumers believe that nutrition plays the greatest role (71 percent versus 63 percent and 41 percent, respectively). Therefore, it is no surprise that 93 percent of Americans believe that some foods have health benefits that go beyond basic nutrition and that 85 percent are interested

| **Examples of functional components** \* | | |
| --- | --- | --- |
| **Class/Components** | **Source** \* | **Potential benefit** |
| Carotenoids | | |
| Alpha-carotene | carrots | Neutralizes [free radicals](https://www.encyclopedia.com/sports-and-everyday-life/food-and-drink/food-and-cooking/free-radicals) that may cause damage to cells |
| Beta-carotene | various fruits, vegetables | Neutralizes [free radicals](https://www.encyclopedia.com/sports-and-everyday-life/food-and-drink/food-and-cooking/free-radicals) |
| Lutein | green vegetables | Contributes to maintenance of vision |
| Lycopene | tomatoes and tomato products (ketchup, sauces, etc.) | May reduce risk of prostate cancer |
| Zeaxanthin | eggs, citrus, corn | Contributes to maintenance of vision |
| Collagen Hydrolysate | | |
| Collagen Hydrolysate | gelatin | May help alleviate some symptoms associated with osteoarthritis |
| Dietary Fiber | | |
| Insoluble fiber | wheat bran | May reduce risk of breast and/or colon cancer |
| Beta glucan \*\* | oats | Reduces risk of cardiovascular disease (CVD) |
| Soluble fiber\*\* | psyllium | Reduces risk of CVD |
| Whole grains\*\* | cereal grains | Reduce risk of CVD |
| Fatty Acids | | |
| Omega-3 fatty acids, DHA/EPA | tuna; fish and marine oils | May reduce risk of CVD and improve mental, visual functions |
| Conjugated linoleic acid (CLA) | cheese, meat products | May improve body composition, may decrease risk of certain cancers |
| Flavonoids | | |
| Anthocyanidins | fruits | Neutralize free radicals, may reduce risk of cancer |
| Catechins | tea | Neutralize free radicals, may reduce risk of cancer |
| Flavanones | citrus | Neutralize free radicals, may reduce risk of cancer |
| Flavones | fruits/vegetables | Neutralize free radicals, may reduce risk of cancer |
| Glucosinolates, Indoles, Isothiocyanates | | |
| Sulphoraphane | cruciferous vegetables (broccoli, kale), horseradish | Neutralizes free radicals, may reduce risk of cancer |
| Phenols | | |
| Caffeic acid |  |  |
| ferulic acid | fruits, vegetables, citrus | Antioxidantlike activities, may reduce risk of degenerative diseases like [heart disease](https://www.encyclopedia.com/medicine/diseases-and-conditions/pathology/heart-disease) and eye disease |
| Plant Stanols/Sterols | | |
| Stanol/stanol ester\*\* | corn, soy, wheat, wood oils | May reduce the risk of coronary hear disease (CHD) by lowering blood cholesterol levels |
| Prebiotic/Probiotics | | |
| Fructo-oligosaccharides (FOS) | [Jerusalem](https://www.encyclopedia.com/places/asia/israeli-political-geography/jerusalem) artichokes, shallots, onion powder | May improve gastrointestinal health |
| Lactobacillus | yogurt, other dairy | May improve gastrointestinal health |
| Saponins | | |
| Saponins | soybeans, soy foods, soy protein-containing foods | May lower LDL cholesterol, contains anticancer enzymes |
| Soy Protein | | |
| Soy Protein\*\* | soybeans and soy-based foods | 1 ounce per day may reduce risk of heat disease |
| Phytoestrogens | | |
| Isoflavones, daidzein, genistein | soybeans and soy-based foods | May reduce symptoms of menopause, such as hot flashes |
| Lignans | flax, rye, vegetables | May protect against heart disease and some cancers; lowers LDL cholesterol, total cholesterol, and triglycerides |
| Sulfides/Thiols | | |
| Diallyl sulfide | onions, garlic, olives, leeks, scallions | Lowers LDL cholesterol, maintains healthy immune system |
| Allyl methyl trisulfide, dithiolthiones | cruciferous vegetables | Lowers LDL cholesterol, maintains healthy immune system |
| Tannins | | |
| Proanthocyanidins | cranberries, cranberry products, cocoa, chocolate | May improve urinary tract health and reduce risk of CVD |
| \*Examples are not an all-inclusive list. \*\* FDA-approved health claim established for component. | | |

in learning more about such foods. These levels of interest have been consistently strong since 1998.

The top ten foods that consumers identify as having a health benefit beyond basic nutrition include broccoli (9 percent), fish or fish oil (9 percent), green, leafy vegetables (9 percent), oranges or orange juice (9 percent), carrots (8 percent), garlic (7 percent), fiber (6 percent), milk (6 percent), calcium (5 percent), oats/oat bran/oat-meal (6 percent), and tomatoes (6 percent). The top five foods have remained consistent for the past three surveys; they are associated with America's top health concerns. Cardiovascular disease factors, including heart disease/attack, high [blood pressure](https://www.encyclopedia.com/medicine/anatomy-and-physiology/anatomy-and-physiology/blood-pressure), stroke, and high cholesterol, remain the primary collective concern of American consumers. Cancer continues to concern almost a third (30 percent) of all consumers. Other areas of worry include weight (17 percent), diabetes (17 percent), and nutrition/diet (12 percent).

Almost two-thirds (63 percent) of Americans say they are eating at least one food in order to receive a functional health benefit. Although not significantly different from the 2000 results (59 percent), this does represent a significant increase since 1998 (53 percent).

Finally, the terms "functional foods" and "nutraceuticals" are often used to describe foods that may have health benefits beyond basic nutrition. "Functional foods" is preferred over "nutraceuticals" two to one (62 percent versus 31 percent). In reality, all foods have some function even if it is mostly taste and enjoyment. In addition, health benefits can be reaped from an apple, yogurt, or a filet of salmon as much as from calcium-fortified fruit juice or a supplement.

**Scientific Criteria**

Many academic, scientific, and regulatory organizations are considering ways to establish the scientific basis to support 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. Three types of claims are allowed on food and dietary supplement labels: (1) structure and function claims describing effects on the normal function of the body; (2) disease risk-reduction (health) claims implying relationships between components in the diet and diseases or health conditions, as approved by FDA and supported by significant scientific agreement; and (3) content claims.

Whereas science can confirm broad connections between some foods or eating patterns and health benefits, it is still not known how all individual food components work and whether there are synergistic effects among compounds. For example, numerous studies suggest that the consumption of a diet rich in whole grains, fruits, and vegetables is associated with a decreased risk of prostate, bladder, esophageal, stomach, and other cancers. However, the interactions among various components in these foods continue to be elucidated. The roles of vitamins, minerals, fiber, antioxidants, and other phytonutrients do not stand alone.

A large body of credible scientific research is needed to confirm the benefits of any particular food or component. Although scientific studies point to many functional components in foods that provide added health benefits, more research is needed to determine which components are responsible for the beneficial effects as well as how individual components interact. The scientific community is still in the early stages of understanding the potential for functional foods. For functional foods to deliver their potential public-health benefits, consumers must have a clear understanding of and a strong confidence level in the scientific criteria that are used to document health effects and claims.

Functional foods are an important part of wellness, which includes a balanced diet and physical activity. The good news with functional foods is that what one does eat may be more important for health than what one does not eat. Individuals should consume a wide variety of foods, including the examples listed in Table 1. These examples are not "magic bullets." The best advice is to include a variety of foods from each of the food groups, which would incorporate many potentially beneficial components.