

Functional Food

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Abstract

The notion that foods have health promotion effects beyond their nutritional value has been increasingly accepted in recent years, and the specific effects of nutrition prevention on disease have led to the discovery of functional foods. Functional foods are products that contain various biologically active compounds and which, consumed in a current diet, contribute to maintaining the optimal state of physical, mental and mental health of the population. Functional foods are consumed in the normal diet and contain biologically active compounds with potential to improve health or to reduce the risk of disease. The objectives of this review are to highlight the strengths of functional foods.

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Introduction

The term was introduced for the first time in Japan in the mid-1980s, and since then the functional food market has been steadily developing, reaching over \$ 21.3 billion in the United States over the past years and over \$ 8 billion in Europe.¹ Some the functional foods have been known since antiquity and are the traditionally consumed for their the health benefits. Many of them of the biological active substances they contain have been identified and characterized only in not long past years.² A category of functional foods are probiotics, used for thousands of years, and whose health benefits have been proven over time. Although studied by Elie Metchnikoff at the beginning of the last century, research has increased in the past 20 years, with the number of scientific studies rising to over 600 per year.²

In recent decades, the assumption that proper nutrition is one of the main factors behind the person's well-being is scientifically proven. The modern consumer is more and more aware that "man is what he eats," and has begun looking for alternative and varied answers, depending on age and sex, in terms of nutrition science.³ Proper and balanced nutrition is based on both quality and quantity food consumption in order to meet the energy and nutritional needs without causing any health risks. Unfortunately, the modern diet is only "apparently" rich in the sense that, on the one hand, the amount of food has increased, while the other diet has decreased its quality.⁴ To appease hunger is a totally different thing to feed! The quality deficiency of the modern foods stems from the need to provide food to as many people as possible, quickly and quickly. The foods in this way suffer different manipulations to meet the needs to offer *immediately* but also be *merchant*: the product has to last a long time in spite of transportation, refrigeration, it must remain on the store shelves and in the consumer's homes.⁵

Unfortunately, in many cases, losing land is almost always the natural and fragile product. Similarly, a serial product, appropriate in shape and appearance to the sales requirements, will have more "value" than a non-homogeneous, non-standard product and more difficult to manage. In recent years, consumers, aware of these tendencies, have gradually begun to return to

green, in the highest sense of the term, without sacrificing comfort, which is essential in modern times.⁶ Thus, the functional foods already produced naturally rich in preserved elements, sometimes with the addition of vitamins or active substances necessary to regain and maintain good health, were born. In the last decade, preventive medicine has made you much progress, demonstrating the crucial role of nutrition in preventing diseases, especially those related to diet.⁷

The Foundation for Healthy Food, explained: "A functional food can be a natural product that contains useful biological components or a food obtained through a technological intervention that increases its level of biologically active compounds. Biologically active compounds are components of foods that act positively on key body functions that are relevant to health. They reduce the risk of developing diseases such as atherosclerosis, hypertension, myocardial infarction, diabetes, *etc.*"⁸

Undoubtedly, the richest sources of compounds with beneficial health effects are the plants. "Fresh fruits and vegetables, tea (especially green) are rich in polyphenols, a very effective source of antioxidants needed to prevent excess accumulation of free radicals in the body."² Flavones and catechins in these products have been shown to produce a decrease in mortality due to cardiovascular disease, and a reduction in risk for malignancies.¹ For health, eat at least five fresh fruits or vegetables a day ", so" soy plays a special role in the prevention of cardiovascular disease, cancer and osteoporosis. Recently, the isoflavones, compounds present in soybeans, prevent the phenomenon of atherosclerosis.⁹ Oats are an the significant source of the beta-glucans, that lower blood cholesterol and hence the risk of cardiovascular disease, and oleaginous seeds (peanut, nuts) contain the omega-3 polyunsaturated fats with the anti-inflammatory effect amateur, limiting the development of diseases such as the rheumatoid arthritis, Alzheimer's, atherosclerosis, and with the effect of stimulating the immune system."¹⁰

The aim of this review is to highlight the strengths of functional foods and to better understand the notions related to these nutrients.

Classification of Functional Foods

The functional foods include foods containing

minerals, vitamins, fatty acids, dietary fiber, foods with the addition of biologically active substances such as antioxidants and probiotics. The top 10 foods identified as beneficial to health include: broccoli, fish / fish oil, green vegetables, oranges, carrot, garlic, fiber, milk, tomatoes and oats¹¹.

Functional Foods Can Be

- conventional foods containing natural bioactive substances (eg oat betaglucan, rich fruit and vegetables in lycopene and lutein);
- foods that have been modified by enrichment with bioactive substances (eg: margarine with phytosterol added, calcium fortified orange juice, folic acid-rich pomegranate, energy drinks with ginseng and guarana);
- foods - a medicine that should only be consumed after prescription (example: special formula for children with medical problems);
- foods for special dietary use (examples: gluten-free foods, lactose-free products, infant food).
- synthesized food ingredients (example: special carbohydrates with probiotic effects).¹¹
- A functional food can be:
- a natural food; a food in which a component has been added;
- food in which a component has been replaced;
- a food whose bioavailability has been changed;
- any combinations thereof.¹²

A food can become functional by using any of the following five ways: eliminating a component that causes harmful effects when consumed (eg allergenic proteins); increasing the concentration of a natural component present in the food up to a point where it can induce beneficial effects (eg, fortification with a micronutrient to increase daily intake over recommended); addition of a component which is not normally present in many foods and which is not necessary as a macro- or micronutrient but for whose beneficial effects it has been used (e.g., non-vitamin anti-oxidants i.e. the hydrophilic polyphenols plus their glycosides or prebiotic fructan);¹¹ replacing a

component, usually macro-nutrient (fatty acids) that is excessive with a component with beneficial effects (modified starch); increasing the bioavailability or stability of a recognized component for its functional effects or reducing the potential risk of the disease.¹³

Functional Foods Have the Following Roles

promotion of children's growth and development; optimizes metabolic processes and physiological activity of organs; and diminishes the risk of chronic disease with onset during childhood.¹⁴ The use of functional foods as a medicine is particularly relevant for intrauterine development and early childhood. During pregnancy, the nutrition can be thought of as functional due to influences on prenatal development.¹⁵ Some examples of:

Yoghurt with Omega 3

low amounts of omega 3, without specifying the exact content of DHA and EPA. Often, the source is not known, as omega 3 fatty acids of plant origin are inferior to those of animal origin (oceanic).^{2, 11, 16}

Bread with Iron and / or Vitamins, Minerals

it is after all a white bread without enough fiber and protein. The amounts of vitamins and minerals are small. The mineral side is usually provided by cheap and low-quality raw materials with low bioavailability. Obviously, the gluten is still an important allergen factor and empty calories are still there.¹⁷

Soybean with Calcium

In an attempt to imitate true dairy products, it has been proposed to fortify soy products (soy milk, tofu) with calcium. Do not be afraid: soy protein is the same protein of low biological value and phytoestrogens can cause problems. Obviously, the problem of excessive calcium intake compared to magnesium is aggravated.¹⁸

Soft Drinks with Antioxidants

It's very easy to sell, because there is already a market for water mixed with sugar and ink. The amount of antioxidants is infinite and their concrete effect almost null. Generally, these products contain the same main ingredients (especially cheap raw materials with low nutritional value), the additions of active substances we mentioned above and the same additives:

preservatives, dyes, artificial flavors, flavor enhancers, *etc.*¹⁹

So, when you're tempted to buy such a food, which claims to have these ingredients among these ingredients, great attention to the quantities and the way health benefits are presented. Indeed, omega 3 fatty acids are very good, but it takes a few grams a day, not a few tens of milligrams.²⁰ The food-producing companies have a huge economic, political and social force, with the influence of legislation and regulations on the market, basically buying the right to claim that their product is beneficial to health, while the nutritional supplements manufacturers have the pressure of dose limitation of permitted active substances. A healthy diet involves consuming a large amount of clean, unprocessed foods, prepared in a way that preserves nutritional qualities, avoiding the occurrence of toxic products.²¹

Obtaining Functional Foods, a new Challenge for Farmers

Impaired people's health by the foods they consume is closely followed by researchers, biologists, nutritionists, which has led to the emergence of a new "functional food" concept. Functional foods are products that contain various biologically active compounds and which, consumed in a current diet, contribute to maintaining the optimal state of physical, mental and mental health of the population. It should be noted that this concept derives from nutrition and not from pharmacology.²² Functional foods are not medicines, so they do not have therapeutic effects. The role of these foods in relation to the disease is, in the vast majority of cases, to reduce the risk of occurrence rather than prevent them. There is a much greater recognition lately that people can themselves help reduce the risk of disease and maintain their health and well-being through a healthy lifestyle, including diet.²³

Recent research has highlighted the important role of some foods (such as fruits, vegetables and whole grains) or their compounds (antioxidants, vitamins, prebiotics, *etc.*) in the prevention of diseases, which has determined the development of the functional food market in Europe in the context of profiling a new concept of 'optimized nutrition'. A functional food may be a whole natural food, a food to which a component

has been added / removed by technological or biotechnological means, a food whose bioavailability has been modified, or any combinations of these variants.²⁴

Population demographic trends and socio-economic changes indicate the need for foods with increased health benefits. An increase in life expectancy, leading to an increase in the elderly and the desire for a better quality of life, as well as increased health care costs, has stimulated governments, doctors, researchers, agriculture and the food industry to find how to manage these changes more effectively.²⁵ There is already a wide range of foods available to today's consumers, but now the impetus is to identify those functional foods that have the potential to improve health, reduce the risk of chronic diseases, and delay the onset of major illnesses, as such as cardiovascular disease (CVD), cancer and osteoporosis. Combined with a healthy lifestyle, functional foods can make a positive contribution to today's health.²⁶ There are researches aimed at developing a biotechnology for obtaining safe functional foods with an optimal content of chemopreventive compounds, by selectively bioprotecting selenium of cruciferous crops (cabbage and cauliflower). The protein bioprophylax technology with selenium of crops for the production of functional foods has a dual practical relevance, public health (supplementing the food chain with safe levels of selenium) and agronomic (increasing the efficiency of crops by protecting them against biotic stresses and abiotic and limiting the effects of drought).²⁷

The cabbage and cauliflower resulting from the application of the proposed technology prevents cancer cells from growing due to increased content of isothiocyanates and sulforaphane (chemopreventive compounds). These two substances reduce the risk of developing tumors, preventing breast, colon, lung, ovarian or prostate cancer.²⁸

There are institutes that carry out activities in the field of Life Sciences, promote fundamental and applicative researches in the fields of cellular and molecular biology, biotechnology, biodiversity, bioanalysis and bioinformatics and which has developed biofortification technology and the composition of the treatment solution), companies with the object of activity the realization of innovative products for niche

applications in agriculture and providing the bioactive substances that apply to cruciferous crops made the cabbage and cauliflower crops and the application of biofortification technology under normal watering and water stress conditions *etc.*²⁹

Research opportunities in making functional foods and explaining the relationship between their consumption and improving the health of the population is the greatest challenge for scientists now and in the future. Communicating the benefits to the health of consumers is also of great importance so that they have the necessary information to make informed choices about the foods they consume.³⁰

So a Food can Become Functional by Using any of the Following Ways

- removing a component that causes harmful effects when consumed (eg allergenic proteins);
- increasing the concentration of a component present in the food up to a point where it can induce beneficial effects (eg biofortification with a micronutrient to increase daily intake - as in the case of cruciferous selenium);
- replacement of a component, usually macronutrient (fatty acids) that is excessive, with a component with beneficial effects (modified starch);
- increasing the bioavailability or stability of a recognized component for its functional effects or reducing the potential risk of the disease.³¹

"Functional" Foods are the Category of Foods that Bring specific Health Benefits, in Addition to Their Nutritional Value

These foods can have specific functional benefits at devices and systems: digestive system, immune system, cardio-circulatory system and even cellular. These foods have traditionally been consumed by the peoples of the world because of the health benefits even though the biological active substances they contain have been identified and characterized only in the last decades.³²

Polyunsaturated Fatty Acids

Docosahexanoic acid (DHA) is a long chain omega-3 fatty acid derived from fatty fish and marine mammals. It has a positive effect on retinal and visual

function, on visual memory and learning, as well as on the development of attention. The mother's milk provides the optimal proportion of DHA and arachidonic acid. Therefore, it is necessary to add LCPUFA to infant formulas.³³ DHA as well as eicosapentanoic acid are contained in large amounts in salmon, mackerel, herring, sardines and in smaller quantities in tuna and cod.³⁴ Soybean oil contains omega-3 polyunsaturated fatty acids that inhibit the action of interleukins, tumor necrosis factor, leukotrienes, and exert cellular immunosuppressive action.³⁵ Sunflower and maize sunflower oil contains omega-6 fatty acids with pro-inflammatory action.³⁶ Omega-3 (eicosapentanoic and docosahexanoic) fatty acids and alpha-linolenic acid from nuts and seeds help improve mental and visual function.³⁶

Probiotics

Probiotics are living, non-pathogenic, resistant gastrointestinal and non-absorbable bacteria. They play a role in the formation of microbiocenosis, the mucosal barrier, the stimulation of lymphoid tissue from Peyer plaques, and IgA and IgM formation of the plasma lamina own cells.³⁷

Probiotics Have the Following Effects on Health

- modulating action on the immune system;
- antitumoral and hepatoprotective action;
- balance of intestinal microflora;
- preventing diarrhea caused by *Rotavirus*, *Clostridium difficile* and diarrhea of the traveler;
- reduce enzymes with inactivating action of carcinogenic agents.³⁸

Probiotics are contained in beaten milk, yoghurt, kefir. Fermented oat, olives, cabbage and pickled cucumbers are rich in *Lactobacillus plantarum* with probiotic action.³⁹

Prebiotics

They are non-digestible food ingredients that stimulate the activity of bifidobacteria by giving them the substrate.⁴⁰ Milk oligosaccharides, vegetable fiber, some meat peptides stimulate their fermentation by bifidobacteria with the synthesis of short chain fatty acids and lactic acid formation.⁴¹ They have an intestinal trophic role, increase blood flow to the colon, stimulate

the synthesis of enterohormones, the development of the intestinal nervous system and gastrointestinal motility.^{42, 43}

Functional Foods in Plants

Vegetables contain food fibers that resist hydrolysis of digestive enzymes, are not absorbed, but are the substrate of fermentation of bacterial enzymes in the cecum and the ascending colon with short chain fatty acids.³⁷ Feeding fibers (cellulose, pectins, gums, starch) are hydrophilic, draw water in the intestine, gel, increase volume, and regulate intestinal peristalsis. They are found in cereal bran, potatoes, mushrooms, cabbage, carrots, broccoli, pears, apples, quinces, bananas. Vegetables contain saponins and vitamin A with neurotrophic and neuroprotective effect. Cereals (wheat, oats, rye, rice) act as a lipid antioxidant in the membranes of the immune system cells by the content of vitamin A, E, folic acid, polyphenols, phytoestrogens and their degradation products. Oat-based foods contribute to lowering total cholesterol and LDL-cholesterol.⁴⁴ Soy may also be beneficial for bone health. Of all oily seeds, flax seeds contain most linolenic acid (57%). Insect consumption reduces total cholesterol and LDL-cholesterol as well as platelet aggregation. Tomato juice consumption increases cellular immunity, and lycopene also neutralizes the activity of free radicals.⁴⁵ Garlic has antibacterial, antifungal and antiviral properties. Fruits and intensely colored plants (blueberries, blackberries, cherries, kiwi, broccoli, spinach, parsley leaves) have antioxidant effects.⁴⁶ Blueberries have proven effective in the treatment of urinary infections, and this fruit rich in benzoic acid determines acidification of the urine.^{47, 39}

Functional Foods of Animal Nature

Cow's milk is the main supplier of substances for modulating growth, mineralization and bone density. Protein, calcium and phosphorus content promotes the absorption and deposition of these minerals in the protein matrix of the bone.⁴⁸ Compared to mother milk, cow's milk has differences in the content of modulating factors of bone development. Naturally fermented dairy products contain probiotic flora.⁴⁹ They prevent pathogen adhesion, stimulate the proliferation of B and T lymphocytes, immunoglobulin synthesis, and cytokine formation.⁵⁰ Yoghurts are functional foods: they are the

best source of calcium, the essential nutrient that can prevent osteoporosis.⁴⁸ The various health benefits of yogurt have been attributed to probiotics: hypocholesterolemia, anticancerogenic effect, antagonistic action against intestinal pathogens.⁵¹ Also, natural probiotic yogurt helps to supply the body with essential nutrients (vitamin B6 and B12, folic acid, riboflavin, thiamine, niacin), enhances immune response by stimulating antibody production (IgA) and reduces intestinal microflora destroyed by gastrointestinal disorders -intestinal or antibiotic use.⁵² The meat, the viscera and the fish contain a series of vitamins that are cofactors of enzymes that play a role in the development and function of the nervous system.^{53,54} Polyunsaturated fatty acids in fish interfere in hemostasis regulation, protects against arrhythmias and hypertension and plays a vital role in maintaining neuronal function and preventing psychiatric illness.^{55, 56} Vegetables are also part of the family of functional foods.⁵³ The most popular are tomatoes, which contain lycopene, a primary carotenoid with antioxidant effect, which can help reduce the risk of cancer. Garlic is recognized for its antibiotic, anti-hypertensive and cholesterol-lowering properties.^{57, 58}

Conclusions and Recommendations

In recent years, functional foods have come up with a much-researched science. Together with a healthy lifestyle, functional foods can contribute to health and well-being. In the child, functional foods have been shown to be beneficial for modulating the development and functioning of the intestine, the nervous system and the bone, as well as immunological modulation. Studies are needed to clarify the interactive effect of functional foods with the usual diet, optimal dosing times, optimal dosages and efficacy in different populations. One of the most important things we have learned is that food is a fuel for the body and that it has to provide me with a number of substances to help the body work better and better. Unfortunately, having a healthy diet is not enough if it is not balanced. This is the clearest example of quality, not quantity. After familiarizing myself with the idea of superfoods, my interest was awakened by functional foods - a concept born in the 1980s in Japan in the form of a movement to improve the general health of the population and reduce the risk of occurrence diseases. In short, functional

foods are those foods or compounds that contain biologically active components that have the potential to optimize their physical and mental well-being, and which in the long run help prevent chronic diseases. These foods are rich in specific minerals, vitamins, fatty acids, dietary fiber, antioxidants, prebiotics and probiotics that balance the diet so that the body is provided with all the nutrients it needs and no longer found in the products offered by intensive farming.

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