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## RESEARCH ARTICLE

# AN OVERVIEW OF PROSPECTIVE STUDY ON FUNCTIONAL FOOD

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### ABSTRACT

Functional foods are a broad term that has attracted significant attention from scientific researchers, health professionals & Journalist. Food can be regarded as functional if it is satisfactorily demonstrated to affect beneficially one or more target function in the body, beyond adequate nutritional effects in a way which is relevant to either the state of well-being and health or the reduction of the risk of a disease. Functional food from animal sources includes fish because of the presence of Omega-3 fatty acids, meat because of its content of conjugated linoleic acid (CLA), and dairy foods. Dairy foods contain many functional or health promoting components Present study is concerned about Functional food, functional ingredients/ components & their role in health effect. Our understanding of functional foods and their market potential is in its infancy and little is known about their long-term health benefits. It enters the concept of considering food not only necessary for living but also as a source of mental and physical well-being, contributing to the prevention and reduction of risk factors for several diseases or enhancing certain physiological functions. Functional foods should be viewed as part of an overall healthful diet and not as 'magic bullets' to improve health and reduce risk of disease.

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### INTRODUCTION

Present study is concerned about Functional food, functional ingredients/ components & their role in health effect. The term "Functional Foods" was introduced in Japan in the mid 1980s. (Włodzimierz *et al*, 2005).

Functional foods are a broad term that has attracted significant attention from scientific researchers, health professionals & Journalist. Although there is no consensus on an exact definition. Some of the definitions of Functional food which are given by different Scientist/ organization are as follows:- Functional food are generally characterized as foods similar in appearance to conventional foods, consumed as part of a usual diet and providing health-related benefits beyond meeting basic nutritional needs (Mazza, 1998 and Dairy Council Digest, 1999). Functional foods are generally presented as "food" nutraceuticals are often considered to be the products produced from but sold in other forms (e.g. Peels, powders) and demonstrated to have physiological benefits (Mazza-Stephen, 1998). Functional food usually refers to food containing significant levels of naturally occurring, biologically active components that impart health benefits beyond the basic essential nutrients. These components may play a vital role in disease prevention & health promotion, but there is no Recommended Daily Allowance (RDA) for them. (Klotzbach Kathleen, *et al*, 1999).

Functional foods that contain bio-active ingredients thought to enhance health & fitness (Bruulsema *et al*, 2000). Functional food is basically a food derived from naturally occurring raw materials which is taken as a part of daily diet & has this additional functionally (Varshney, 2002). Functional food is a part of an everyday diet & is demonstrated to offer health benefits & to reduce the risk of chronic disease beyond the widely accepted nutritional effects. (Włodzimierz *et al*, 2005).

#### History of Functional Food

The concept of using foods to prevent disease and or promote health is not new. In the early 1900's, the practice of fortifying table salt with iodine to prevent goiter was an early attempt at creating a functional food. Since that time, many foods that we are familiar with have become fortified, such as breakfast cereals, orange juice milk and grain food. Other foods that have lost some of their nutrient content due to processing are enriched with the lost nutrients. Classic examples of enriched foods are bread and bakery products. More recently, as technology has improved, scientists have come to recognize the advantage of a natural balance of wholesome foods. With the advancement of genetic engineering, crops can now be grow that optimize their beneficial nutritional qualities, functional food have been selected because of their qualities designed by nature to promote health and prevent disease beyond their basic nutrient content (Egg Nutrition Centre, Fact Sheet). According

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to British Nutrition Foundation, a dietary ingredient that affects its host in a targeted manner so as to exert positive effects (so as to justify a health claim) can be classified as “functional ingredients”. In other words, foods containing such ingredients that have health giving properties over & above their nutritional value.

The Japanese definition of “Functional food” is any food that has a positive impact on an individual’s health, physical performance or state of mind, in addition to its nutritive values (Varshney, 2002).

The functional food industry is considered to have tremendous potential for market growth. In the U.S. alone, sales of dietary supplements, herbs & botanicals, natural foods, and personal care products amounted to \$ 25.8 billion in 1998 (Bruulsema, 2000). In Japan, functional foods are regulated as Foods for Specified Health Use (FOSHU). Over 154 products are already registered as FOSHU, and their sales in Japan amount to \$ 1.5 billion annually (Bruulsema, 2000). World market for functional foods has grown by about 60% over the period 1995-2000 & was valued at U.S. \$ 50,000 million in 2000. Functional ingredients are available abundantly in natural foods such as vegetables, fruits, cereals, nuts, milk and milk based products (Varshney, 2002).

### Basic Concept About Functional Food

The term "functional food" originated in Japan in the 1980s, when it was used by the industry to describe foods fortified with specific ingredients imparting certain health benefits, "Food for Specified Health Use" (FOSHU) (Wahba *et al.*, 2006). Functional Foods can be divided into 3 different groups (Boija, 1995), those with specific/increased content of fatty acids, vitamins, minerals or fiber, those in which substances which can cause allergy or intolerance have been eliminated and those with active components which are not traditional nutrients, but have an effect on immune defense and can influence cancer risk, mood or intestinal flora.

Food can be regarded as functional if it is satisfactorily demonstrated to affect beneficially one or more target function in the body, beyond adequate nutritional effects in a way which is relevant to either the state of well-being and health or the reduction of the risk of a disease (Diplock *et al.*, 1999). Functional foods, also known as nutraceuticals, medical foods or nutritional foods, are driving food markets around the world and are expected to be one of the emerging trends for the food industry in the new millennium (Xe-Yeu, 2001).

### Driving The Demand For Functional Food

The development of the functional foods market is based on the positive contribution of functional foods to improve health in contrast to conventional foods to maintain health.

Demand For:-

- Health and longevity.
- Quick / convenient solutions.
- Natural product.
- Preventive measure (Varshney, 2002).

- Due to:-
- Increasing health costs.
- Prevention cure.
- Graying population.
- Encouraging self health maintenance.
- Consumer health awareness and choice (Varshney, 2002).

### Benefits Of Functional Food

A wide variety of functional foods and food components of plant and animal origin is available. Phytochemical (i.e. lycopene flavonoids, indols phenols) in plant-based foods are linked to reduced cancer risk; oats are documented to lower blood cholesterol levels; and several anticarcinogens (e.g., protease inhibitors, saponins, isoflavones) have been identified in soybeans (Dairy Council Digest, 1999).

**Table 1** Omega-3 and Omega-6 Fatty Acids

Long-chain PUFAs	Name	Abbr.	Structure	Food Source
Omega-3	alpha-linolenic acid	ALA	18:3n-3	Walnuts, flaxseed oil, and canola oil
	eicosapentaenoic acid	EPA	20:5n-3	Fatty fish and fish oils
	docosahexaenoic acid	DHA	22:6n-3	Fatty fish and fish oils
Omega-6	linoleic acid	LA	18:2n-6	Corn, safflower, soybean, cottonseed, and sunflower oils
	gamma-linolenic acid	GLA	18:3n-6	Evening primrose oil, borage oil, and black current seed oil
	arachidonic acid	ARA	20:4n-6	Meat, poultry, and eggs

(Source: International Food Information Council, 2005)

Functional food from animal sources includes fish because of the presence of Omega-3 fatty acids, meat because of its content of conjugated linoleic acid (CLA), and dairy foods. Dairy foods contain many functional or health promoting components (Dairy Council Digest, 1999; Jelen & Lutz, 1998). Calcium, an essential nutrient in milk and other dairy foods, has been demonstrated to help reduce the risk of osteoporosis, hypertension, and possibly colon cancer, among other diseases. Milk proteins such as casein-based bioactive peptides and whey proteins (e.g., lactoferrin, lactoperoxidase, lysozyme, and immunoglobins) have several unique properties including anticarcinogenic and antimicrobial functions. Lipid based bioactive compounds in milk and other dairy foods such as CLA, Sphingolipids, and butyric acid may inhibit chronic diseases such as cancer and heart disease as well as enhance immune function (Dairy Council Digest, 1999).

Functional food has been benefited in various ways such as:

- Beta carotene neutralizes free radicals, which may damage cells.
- Lutein, Zeaxanthin may contribute to maintenance of healthy vision.
- Lycopene may contribute to maintenance of prostate health.
- Insoluble fiber may contribute to maintenance of a healthy digestive tract.

- Soluble fiber may reduce risk of CHD and some types of cancer.
  - Beta glucan may reduce risk of coronary heart disease (CHD).
  - Whole grains may contribute to maintenance of healthy blood glucose levels.
  - Fatty Acids may reduce risk of CHD; may contribute to maintenance of mental and visual function.
  - Flavonoids neutralize free radicals, which may damage cells; bolster cellular antioxidant defenses.
  - Minerals may reduce the risk of high blood pressure and stroke.
  - Isothiocyanates may enhance detoxification of undesirable compounds.
  - Soy Protein may reduce risk of CHD.
  - Prebiotics may improve gastrointestinal health.
- Vitamins may contribute to maintenance of healthy vision, immune function, and bone health; may

contribute to cell integrity helps regulate calcium and phosphorus; helps contribute to bone health; may contribute to juices, and cereals healthy immune function; helps support cell growth

### CONCLUSION

Functional foods are an important part of an overall healthful lifestyle that includes a balanced diet and physical activity. Biologically active components in functional foods may impart health benefits or desirable physiological effects.

Whether or not functional foods will be successful long-term depends on several factors including their effectiveness, safety, and quality, as well as how the benefits of these foods are communicated to consumers. Our understanding of functional foods and their market potential is in its infancy and little is known about their long-term health benefits.

**Table-2** Classification of Functional Components

Sl.No.	Name of the Functional Components	
1.	Carotenoids	Beta-carotene, Lutein, Zeaxanthin, Lycopene
2.	Dietary (functional and total) Fibe	Soluble fiber, Insoluble fiber, Beta glucan, Whole grains
3.	Fatty Acids	Monounsaturated fatty acids (MUFAs) Polyunsaturated fatty acids (PUFAs) Conjugated linoleic acid (CLA) Omega-3 fatty acids
4.	Flavonoids	Anthocyanins Flavanols Flavanones Flavonols Proanthocyanidins Sulfuraphane Cyanidin, Delphinidin, Malvidin Catechins, Epicatechins, Epigallocatechin, Procyanidins Hesperetin, Naringenin Quercetin, Kaempferol, Myricetin
5.	Isothiocyanates	
6.	Minerals	Calcium, Magnesium, Potassium, Selenium
7.	Phenolic Compound	Caffeic acid, Ferulic acid
8.	Phytochemicals	Allicin, Astaxanthin, Beta-sitosterol, Coumarin, Curcumin, Ellagic Acid, Geraniol, Hydroxy tyrosol, Indole-3-carbinol, Limonene, Lutein, Phytic Acid, Resveratrol, Rutin, Silymarin, Theobromine, Ursolic acid
9.	Polyols	Sugar alcohols Xylitol, Sorbitol, Mannitol, Lactitol
10.	Prebiotics	Inulin, Fructo-oligosaccharides (FOS), Polydextrose
11.	Probiotics	Yeast, Lactobacilli, Bifidobacteria
12.	Phytoestrogens	Isoflavones Daidzein, Genistein
13.	Soy Protein	Soy Protein Soy Milk, Soy Paneer (Tofu)
14.	Sulphides/ Thiols	Diallyl sulfide, Allyl methyl trisulfide
15.	Vitamins	Vitamin A (Retinol), Vitamin B1 (Thiamin), Vitamin B2 (Riboflavin), Vitamin B3 (Niacin), Vitamin B5 (Pantothenic acid), Vitamin B6 (Pyridoxine), Vitamin B9 (Folate), Vitamin B12 (Cobalamin), Biotin, Vitamin C (Ascorbic Acid), Vitamin D (Calciferol)

(Source: International Food Information Council Foundation November, 2006)

**Table3** Vitamins their sources, RDA, Deficiency Symptoms and Upper Intake Level

Name of Vitamins	Occurrence	Recommended Dietary allowances	Deficiency Symptoms	Upper Intake Level (UL/Day)
Vitamin A (Retinol)	Vegetables, Fish, Milk etc.	900µg	Night Blindness	3000 µg
Vitamin B1 (Thiamine)	Cereals, Pulses, Green leafy vegetables, Wheat etc.	1.2 mg	Beriberi	ND
Vitamin B2 (Riboflavin)	Milk, Yeast, Liver, Green leafy vegetables etc.	1.3 mg	Ariboflavinosis	ND
Vitamin B3 (Niacin)	Yeast, Green leafy vegetables, Eggs etc.	5-10 mg	Gastrointestinal disorder	ND
Vitamin B5 (Pantothenic acid)	Milk, Eggs, Green leafy vegetables, Peas, Bean etc.	15-20 mg	Pellagra	ND
Vitamin B6 (Pyridoxine)	Cereals, Green leafy vegetables, Liver, Eggs etc.	1.3-1.7 mg	Anaemia	100 mg
Vitamin B9 (Folic acid)	Banana, orange, Green leafy vegetables, Yeast etc.	400 µg	Anaemia, Diarrhoea	1000 µg
Vitamin B12 (Cobalamine)	Liver, Eggs, Meat, Fish etc.	2.4 µg	Megaloblastic Anaemia	ND
Vitamin H (Biotin)	Fresh fruit, vegetables, Milk Egg etc.	150-300 mg	Scaly and itchy skin, Muscular pain	ND
Vitamin C (Ascorbic acid)	Citrus fruit, Tomato, Berries etc.	90 mg	Scurvy	2000 mg
Vitamin D (Calciferol)	Fish, Liver oil, Egg yolk, etc.	5-10 µg	Rickets and Ostomalacia	50 µg
Vitamin E (Tocopherol)	Green Vegetables, cereals, Egg yolk	15 mg	Destruction of RBCs, death of embryos.	1000 mg

(Source: International Food Information Council, 2005)

It therefore is important for consumers to select a variety of foods from all food groups in moderation.

Probiotics may have the greatest utility in the prevention and treatment of antimicrobial associated diarrhea, treatment of clostridial colitis, treatment of chronic diarrhea and prevention of nosocomial diarrhea, and prevention of acute infectious (especially rotaviral) diarrhea in foals. It is too early to determine whether probiotics will make a profound impact on the practice of veterinary medicine.

Functional foods should be viewed as part of an overall healthful diet and not as “magic bullets” to improve health and reduce risk of disease.

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