

ИННОВАЦИИ В ПРОИЗВОДСТВЕ ПРОДУКТОВ ПИТАНИЯ И ТОРГОВЛЕ  
INNOVATIONS IN FOOD PRODUCTION AND TRADE

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**Аннотация.** В статье представлен обзор литературы относительно функциональных продуктов питания в Европе. В начале двадцать первого века отмечается рост численности и старение населения, в связи с чем функциональные продукты питания становятся важным направлением в пищевой промышленности и сельском хозяйстве Европы. Польза функциональных продуктов заключается в том, что они могут поддерживать благополучие государства и здоровье человека и уменьшать риск патологических заболеваний. Однако прогресс в этой области должен базироваться на серьезной и солидной научной основе. Маркировка функциональных продуктов должна быть согласована и адаптирована к каждой национальной культуре для европейских потребителей.

**Ключевые слова:** функциональные продукты; здоровые продукты питания; маркировка функциональных продуктов.

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FUNCTIONAL FOOD PRODUCTS IN EUROPE

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**Abstract:** The article presents the results of literature review regarding the functional food products in Europe. The beginning of the twenty-first century is marked with growing and ageing population, thus functional food products will constitute a challenge for Europe's food and agricultural industry. The positive effects of functional food products can be either in maintaining a state of well-being and health and reducing the risk of pathologic diseases. However, this progress must be based on a sound scientific basis. The consensus on functional claims must be carefully evaluated and adapted to each culture so as to be adopted by conscious European consumers.

**Keywords:** functional food; healthy food, nutrients; functional claims

**Introduction.** Components in foods have a potential to modulate target functions in the body so as to enhance these functions and/or contribute to reduce the risk of diseases, and «functional food science» will contribute to human health in the future provided evidence is supported by sound scientific (mostly human) data.

Through the development of functional foods, nutritionists and food scientists have a possibility to offer beneficial opportunities related to well-being and health and reduction of risk of diseases. But the success of this new approach to nutrition will require the identification, characterization and development of methodologies to measure, and the validation of relevant markers being indicators or factors to be used in human nutrition studies. The design of such studies still needs to be analyzed carefully and be developed specifically by reference to, but differently from classical clinical studies that have been elaborated to help in the development of drugs, not food products.

Major target functions in the body that are or can be modulated by specific food products will have to be identified or characterized. The basic science to understand these functions and how they relate to the wellbeing and health or a particular pathological process needs to be developed so as to give the necessary scientific base to develop new functional food products.

**Functional food: defining the concept.**

Functional food cannot be a single well-defined/well characterized entity. Indeed, a wide variety of food products are, or will be in the future, characterized as functional foods, with a variety of components – both classified and not classified as nutrients – affecting a variety of body functions relevant to either a state of well-being and health and/or to the reduction of the risk of a disease.

Thus no simple universally accepted definition of functional food exists or will (ever) exist. Functional food has thus to be understood as a concept [13].

Moreover, if it is function-driven rather than product driven, the concept is likely to be more universal and not too much influenced by local characteristics or cultural traditions [4].

In the scientific as well as in more marketing-oriented literature functional food has as many definitions as the number of authors referring to it. These definitions go from simple statements, such as: 1) foods that may provide health benefits beyond basic nutrition [6] and 2) foods or food products

marketed with the message of the benefit to health [12], to very elaborate definitions such as:

a) food and drink products derived from naturally occurring substances consumed as part of the daily diet and possessing particular physiological benefits when ingested [5];

b) food derived from naturally occurring substances, which can and should be consumed as part of the daily diet and which serves to regulate or otherwise affect a particular body process when ingested [14];

c) food similar in appearance to conventional food, which is consumed as part of the usual diet and has demonstrated physiological benefit and/or reduces the risk of chronic disease beyond basic nutritional functions [3];

d) food that encompasses potentially helpful products, including any modified food or food ingredient that may provide a health benefit beyond that of the traditional nutrient it contains [15].

But whatever definition is chosen, «functional food» appears as a quite unique concept that deserves a category of its own, a category different from nutraceutical, f(ph)armafood, medifood, designer food or vitafood, and a category that does not include dietary supplements. It is also a concept that belongs to nutrition and not to pharmacology. Functional foods are and must be foods, not drugs. Moreover, their role regarding disease will, in most cases, be in «reducing the risk» rather than «preventing» it [13].

**Shifting the Paradigm for Health and Wellness.** A growing number of consumers perceive the ability to control their health by improving their present health and/or hedging against aging and future disease. These consumers create a demand for food products with enhanced characteristics and associated health benefits. Using foods to provide benefits beyond preventing deficiency diseases is a logical extension of traditional nutritional interventions. Nonetheless, such an extension requires changes in not only the foods themselves, but also in their regulation and marketing-truly a paradigm shift.

Creating a scientifically valid distinction between food and medicine has never been easy. Centuries ago, Hippocrates advised: «Let food be thy medicine and medicine be thy food». Early nutrition research resulted in cures for numerous widespread efficiency – based diseases. Recent scientific advances have further blurred the line between food and medicine, as scientists identify bioactive food components that can reduce the risk of chronic

diseases, improve the quality of life, and promote proper growth and development.

**Traditional paradigm.** Traditional fortification of foods with vitamins and minerals has been accepted by consumers and regulators, but consumers should recognize the clear distinction between the use and purpose of foods versus drugs.

Food has traditionally been viewed as a means of providing normal growth and development. Regulatory policies were established to replace nutrients lost during processing and, in some cases, to prevent nutrient deficiencies in the population. Federal policies have generally required that other diseases be treated and managed through the use of drugs.

A new self-care paradigm [2] recognizes that foods can provide health benefits that can co-exist with traditional medical approaches to disease treatment. Science has clearly demonstrated additional dietary roles in reducing disease risk, and consumers have learned that food has a greater impact on health than previously known. At the same time, consumers recognize problems with the current healthcare system, perceiving that it is often expensive, time-consuming, and impersonal.

Functional foods fit into a continuum that ranges from health maintenance/promotion to disease treatment. On one end of the continuum care public health programs aimed at reducing disease risk in a large segment of the population through self-directed lifestyle changes. At the other end of the continuum is individualized treatment of diseases by health care professionals using drugs and other medical interventions. Although the health professional involvement is low in self-directed treatment relative to individualized treatment, an important educational component remains. New functional foods will continue to expand the continuum, providing additional options for consumers.

There is a role for all aspects of this paradigm in our health care system. Functional foods should be integral components of established public health programs to reduce the risk of specific diseases [2].

The treatment and prevention of coronary heart disease (CHD) provides an example of this paradigm shift. In the past, recommendations for treating hypercholesterolemia, one of the risk factors for CHD, included dietary and lifestyle interventions along with education. The dietary and lifestyle interventions included reducing intake of saturated fat and cholesterol, quitting smoking, increasing regular physical activity, and maintaining a healthy body weight [9, 10]. These recommendations, often in conjunction with medication, have been effective strategies for managing heart disease.

The most recent clinical guidelines for treatment of coronary heart disease include therapeutic dietary options for reducing low density lipoproteins (LDL) by consuming specific foods, such as those that contain plant stanols/sterols, increasing intake of soluble fiber, and reducing the intake of trans fatty acids [11]. Several food components currently under study may provide additional dietary options in the prevention and treatment of CHD.

**Functional food: a European consensus.** The unique features of a «functional food» are [1]:

- 1) a conventional or everyday food;
- 2) consumed as part of the normal/usual diet;
- 3) composed of naturally occurring (as opposed to synthetic) components, perhaps in unnatural concentrations or present in foods that would not normally supply them;
- 4) having a positive effect on target function(s) beyond nutritive value/basic nutrition;
- 5) that may enhance well-being and health and/or reduce the risk of disease or provide health benefit so as to improve the quality of life including physical, psychological and behavioral performances;
- 6) have authorized and scientifically based claims.

It is in this general context that the European Commission's Concerted Action on Functional Food Science in Europe (FUFOSE), which actively involved a large number of the most prominent European experts in nutrition and related sciences, has been coordinated by the International Life Sciences Institute (ILSI) Europe. It developed in early 1996 to reach a European Consensus on «Scientific Concepts of Functional Foods», which was published in 1999 [4].

As already indicated above, and because functional food is a concept rather than a well-defined group of food products, that consensus document proposes 'a working definition': «A food can be regarded as functional if it is satisfactorily demonstrated to affect beneficially one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either improved stage of health and well-being and/or reduction of risk of disease. A functional food must remain food and it must demonstrate its effects in amounts that can normally be expected to be consumed in the diet: it is not a pill or a capsule, but part of the normal food pattern» [4].

The main aspects of that working definition are:

- 1) the food nature of functional food – not a pill, a capsule or any form of dietary supplement;
- 2) the demonstration of effects to the satisfaction of the scientific community;

3) the beneficial effects on body functions, beyond adequate nutritional effects, that are relevant to an improved state of health and well-being and/or reduction of risk (not prevention) of disease;

4) the consumption as part of a normal food pattern.

This definition encompasses all main features of functional foods identified above, and it is aimed at stimulating research and development in the field of nutrition so as to contribute adequately to the scientific knowledge that will be required to define optimum (optimized) nutrition by elaborating new dietary guidelines. But it should be emphasized that a functional food will not necessarily be functional for all members of the population, and that matching individual biochemical needs with selected food component intakes may become a key task as we progress in our understanding of the interactions between genes and diet [8].

From a practical point of view, a functional food can be:

- 1) a natural food;
- 2) a food to which a component has been added;
- 3) a food from which a component has been removed;
- 4) a food where the nature of one or more components has been modified;
- 5) a food in which the bioavailability of one or more components has been modified or
- 6) any combination of these possibilities.

**Food technology and its impact on functional food development.** From the point of view of food processing [4, 7], the development of functional foods will often require an increased level of complexity and monitoring of food processing because:

- 1) new raw materials including those produced by biotechnologies;
- 2) emerging thermal and non-thermal technologies;
- 3) new safety issues;
- 4) integration throughout the entire food chain, especially to ensure preservation and/or enhancement of functionality, will have to be considered carefully.

The following main areas for technological challenge have been identified:

1. The creation of new food components in traditional and novel raw materials that add or increase functionality. Examples of such challenges are genetic modification, the use of under-utilized or unconventional natural sources (e.g. algae, seaweed) and the development of bioreactors based on immobilized enzymes or live micro-organisms.

2. The optimization of functional components in raw material and in foods to ensure maximal preservation of the component(s), to modify their function, to increase their bioavailability, etc. The examples of such challenges include the development of membrane-processing techniques, the use of controlled and modified atmospheres, the use of high hydrostatic pressure, high-intensity electric field pulse technology and ultrasound treatments.

3. The effective monitoring, throughout the entire food chain, of the amount and functionality of the component(s) in raw materials and foods. The examples of such challenges include the monitoring of microbial viability and productivity for probiotic functions, the development of sensitive markers to record changes in speciation and the interactions with food components during processing, especially fermentation.

**Encouraging the Development of Functional Foods.** As research provides clear evidence of relationships between dietary components and health benefits, the challenge has just appeared. Scientific, regulatory, and business frameworks must be in place to evaluate the data for efficacy and safety, to ensure effective regulatory oversight, to communicate the findings to consumers, and to provide incentives that encourage research and development of these novel food products.

We recommend some modifications to the existing efficacy and safety evaluation process to ensure a sound scientific underpinning for each proposed functional food, while providing clear information to consumers. Corresponding improvements in the regulatory oversight of new functional components also are proposed. These changes must be implemented now to protect consumer confidence in the safety of the food supply and to encourage the food industry to invest in the development of new functional foods. Science is moving rapidly; the industry and government must also move rapidly to ensure that the results are translated into benefits for the consumer. The functional foods currently available represent only a fraction of the potential opportunities for consumers to manage health through diet.

Traditional definitions and arbitrary distinctions between food and medicine should not prevent consumer access to knowledge about the benefits of incorporating functional foods into their diets. Likewise, the framework for providing a strong regulatory oversight should not present unnecessary barriers to the development and marketing of functional foods. Where existing terminology and regulatory frameworks are inadequate to address the

full scope of benefits and opportunities for functional foods, the terminology and the frameworks must be modified.

Developing a new functional food is an expensive process. Food companies have traditionally funded research for new food product formulations but for functional foods, the stakes are higher – for both food companies and consumers.

Government investment in basic and applied research will promote the development of functional foods, but additional incentives are needed to reward private companies that pioneer new health claims. The research required for a functional food to meet scientific standards for efficacy and safety is a substantial investment, but currently the return on that investment is not exclusive to the company that conducted the research and developed the initial regulatory petition. As soon as the health claim is adequately documented, competing companies can use the claim. Incentives, such as a period of exclusivity or tax incentives, would encourage food companies to pursue functional food development by ensuring a profitable return on successful products.

**Conclusions.** Progress in food regulation, which is the means to guarantee the validity of the claims as well as the safety of the food, will have to be made. On the road to optimized nutrition that will be one of the major challenges of nutrition in the twenty-first century, functional foods have their own role to play. But the development of claims for already existing food products, as well as the development of new products and their own claims, should remain first a scientific challenge and not only a marketing challenge. This is the condition for success to the benefit of both human health and the food industry.

The positive effects of a functional food can be either maintaining a state of well-being and health or reducing the risk of pathologic consequences. Among the most promising targets for functional food science are gastrointestinal functions, redox and antioxidant systems, and metabolism of macronutrients. The ongoing research into functional foods will allow the establishment of health claims that can be translated into messages for consumers that will refer to either enhanced function or reduction of disease risk. Only a rigorous scientific approach that produces highly significant results will guarantee the success of this new discipline of nutrition. This presents a challenge for the scientific community, health authorities, and the food industry.

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