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Foreword

In Europe, the end of the twentieth century has seen an important event in the field of human nutrition; the so-called 'European Consensus on Concepts on Functional Foods'. This consensus was the culmination of a large EU-funded concerted action, coordinated by ILSI-Europe under the acronym of FUFOSE for 'Functional Food Science in Europe'. It is an important event in the field of nutrition because it is the first ever exercise aimed at defining the concept of functional food and its application in the scientific substantiation of health-related claims on foods.

Functional foods are recognized as being a key element in the improvement of consumers' well-being and health and the reduction of the risk of developing diseases. It is anticipated that in the very near future claims on functional foods will be authorized in order to communicate scientifically based messages to consumers.

One of the main targets for functional food development is the gastrointestinal tract and its miscellaneous physiological functions. These include digestion and absorption of nutrients, colonic fermentation, gut-associated immune activities, secretion of endocrine peptides, control of mucosal cell kinetics, secretion of mucins and stool production *inter alia*. One of the important aspects of the gastrointestinal tract is the presence in the large bowel of a substantial population of a wide variety of (mostly anaerobic) bacteria that live symbiotically with the host. This microbial population is not only large but it is also highly diversified since it is generally assumed that it contains a few hundred different genera, species and strains. Some of these can be classified as health-promoting whereas others are expected to represent a risk for the host's health if they overgrow. This microbial flora, as it is called, is known to play key physiological roles:

- Fermentation and salvation of energy from nutrients which are partly or totally resistant to digestion in the upper gastrointestinal tract (stomach and small intestine).
- Help in the absorption of vitamins and minerals.
- Establishment of a barrier to protect the organism from undesirable microbial invasion.
- Help in the establishment of effective gut-associated lymphoid tissue.
- Production of acetate, propionate and butyrate, the short-chain fatty acids that play key roles as modulators of cell turnover and cell differentiation in the colonic mucosa and which also act as regulators of the metabolism in systemic tissues like the liver or even the muscle.

To play such a beneficial role in the host's well-being and health, and/or to help reduce the risk of disease, it is recognized that the composition of the colonic microflora must be such that the bacteria known to be beneficial (mainly the Gram-positive lactobacilli and bifidobacteria) are dominant in number and particularly predominate over the potentially harmful or even potentially pathogenic bacteria. This concept of a 'balanced microflora' has recently been introduced to support the development of the 'colonic foods', essentially the probiotics, the prebiotics and the synbiotics.

Recent methodological developments based on the identification, the amplification and the use of specific 16S rDNA sequences have opened new perspectives to study colonic microflora composition and its modulation by functional foods.

This foreword is aimed at introducing the proceedings of an important and very stimulating research conference, which took place in London, UK in September 2001. This aimed to review the state-of-the-art on the 'functional' properties of the probiotics. There are many different definitions of 'probiotics', but the most appropriate one is the one recently released by the EU-supported group of European scientists working on the concept of functional foods. According to that definition: 'a probiotic is a live microbial food ingredient that is beneficial to health'. The major food products carrying the probiotics today are still the fermented dairy products, i.e. the yoghurts or the fermented milk preparations. There is, both in Europe and in Japan, a long tradition of dietary use of such products and they have been claimed to help improve health and even to facilitate long and healthier lives. But it is only recently that, as a result of both basic scientific research and nutritional studies, solid scientific data have started to accumulate that can be used to support health-related claims for probiotics according to the scientific concepts for functional foods discussed above. To have such a conference was thus a unique opportunity to discuss all the available data and eventually form a consensus on the nutritional properties of the probiotics.

One of the key messages that is becoming clearer is that it cannot be assumed that all probiotic strains of even a specific species have the same properties. Basic research as well as nutrition intervention studies must clearly identify the species as well as the strain of probiotic used and the conclusion of these studies will only apply to that species and strain.

Even if some 150 human studies are presently available on probiotics and even if experts have recently evaluated these data concluding that certain health effects of some probiotic bacteria could be considered to be scientifically proven, scepticism remains the usual attitude of most authors. One of the major difficulties is certainly the lack of robust validated markers of gastrointestinal well-being and health, which are necessary to help substantiate probiotic effects.

The current position remains that recent epidemiological data show that the consumption of fermented milks is associated with lower incidence of certain conditions (especially ulcers and bladder cancer) in specific populations. Moreover, well-designed human nutrition intervention studies tend to demonstrate that some strains of lactobacilli reduce the duration or even the risk of rotavirus diarrhoea in children receiving the probiotics. The same strains have also been shown to reduce the risk of atopic eczema in young children fed formulae containing these strains. Other data are available from experimental studies, especially in experimental cancer models, which show the potential of certain probiotic strains to reduce the incidence of chemically induced aberrant crypt foci, a recognized marker for colon cancer risk.

As indicated above, the concept of functional foods represents a unique opportunity to improve human diet based on a better understanding of all the properties of foods, food components and food ingredients. It is becoming more established that the highly varied food supply, which characterizes our society, is also a highly varied supply of products and components, which are able to modulate key functions in our body. These in their turn play key roles in maintaining or even improving well-being and health while helping to reduce the risk of disease. The concept of functional food is thus a unique concept to help to improve human health. Probiotics are among the oldest examples of food to which the concept 'functional' applies. We have recently entered the era of a more rigorous and more scientific approach to the development of probiotics. Methodologies are now available to characterize them at the molecular level. Protocols exist or are being developed to prove their health benefits and data are accumulating which confirm their 'functionality'.

Reading the proceedings of the 2001 London Conference on Probiotics is an excellent opportunity to review the state-of-the-art in the area. The organizers should be thanked for having made this high quality scientific publication available to us. It is hoped that it will convince the scientific community of the relevance of the probiotics to human nutrition and, at the same time, stimulate more research to develop new markers of gastrointestinal well-being and health and to confirm and expand the scientific knowledge of these exciting bacteria.

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