Probiotic Bacteria and Their Effect on Human Health and Well-Being
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Preface

Probiotic Bacteria and Their Effect on Human Health and Well-Being provides an update on probiotics which is directed at physicians, biologists biotechnologists, and researchers working in the food industry, agriculture, and the environmental, basic sciences and in health care.

Each human inhabitant of the planet belongs to 1 of 3 distinct enterotypes. Enterotypes are defined by the predominant bacterial phyla located in the intestine. Therefore, our microflora may be regarded as an individual personal feature like a blood group, providing a distinct tag to individuals. However, our intestinal microbiome is strongly affected by genetic, nutritional, and other external factors. The microbiome evolves with age and is modified by nutritional habits. Children on a fiber-rich diet in Africa harbor an intestinal microflora different from their age-matched peers in Florence (Italy) who eat the typical Western style diet of a wealthy European country. Whether the different microbial patterns have an effect on health is not conclusively known, but appears very likely. Several recent papers have described specific changes of intestinal microflora in association with inflammatory bowel diseases, atopy, intestinal functional disorders, and obesity. The pattern of microflora aberrations is often age-specific or condition-specific.

These findings are important for our understanding of the pathophysiology and risk factors of human diseases. The structure of the intestinal microflora may be exploited for practical diagnostic purposes, and thus several titles of papers describing the microflora composition in several diseases use the word ‘signature’. The concept of a ‘microbial signature’ of a given disease indicates a role of a specific pattern of microflora with that disease although there is often no direct evidence of a cause-effect link. The novel concept is that we may use specific microbial tags as biomarkers of a disease, to diagnose it, to monitor its evolution, and eventually to predict its response to treatment.

This scenario opens the opportunity for targeting the intestinal microflora with the use of probiotics. Clinical indications for probiotics include prevention and treatment of an increasing number of conditions. Probiotics are used as drugs, usually in lyophilized preparations, or in addition to foods, as additives, modifiers, or functional foods. While the prototype of such food is yogurt, the food market is filled with
probiotic-enriched products. In contrast to lyophilized preparations, however, the claims of the effects on health by probiotic-enriched foods are rarely supported by solid evidence.

Probiotics are given as therapy both as an adjunct to other treatments and as primary therapy. Conclusive proof of efficacy by probiotic therapy has been reached in acute childhood gastroenteritis. In other conditions, such as obesity, the role of probiotics is less clear or limited to specific settings. However, evidence of efficacy is accumulating in several conditions, affecting either the intestine or nonintestinal organs.

Finally, the concept that the benefits of probiotics are only effective for minor conditions is changing and today neonatologists are challenged with recommendations to use probiotics in preterm babies with the aim of reducing the incidence of necrotizing enterocolitis as well as death, independent of necrotizing enterocolitis in very-low-birth-weight newborns. This indication is paralleled by data indicating the role of the mother’s microflora during pregnancy in the immune programming of the child and the risk of atopy.

Overall, probiotics appear capable of affecting a number of functions and conditions, which is not without major commercial consequences. The risk is – on one hand – to regard probiotics as ‘generally good and able to produce mild beneficial effects to virtually everyone with any disease’. Actually, however, the opposite is true, i.e. ‘selected probiotic preparations are effective in selected conditions among specific populations’. Further high-level research along this path and rigorous information to interested parties (physicians, patients, customers) will ultimately result in a major benefit for everybody.

This is exactly the purpose of this book: to provide unbiased, updated information on several exciting developments in biology, pharmacology, and medicine in this rapidly evolving scenario which is progressively having major consequences on our knowledge and actions.

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