Where do we stand with the probiotics?

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Probiotics are defined "Live microorganisms which when administered in adequate amounts confer a health benefit on the host" (WHO/FAO definition 2001, 2009). Probiotics are available as dairy products or in lyophilized form as capsules or sachets, and are on the market as nutrients, supplements or drugs. More than 100 years after the initial concept of probiotics has been published by Prof. Metchnikow (1), the field has developed enormously – not only because of trials testing the effects of probiotics in humans, but also because of the huge progress made in the fields of microbiology, immunology, and clinical medicine. At present, more than 6000 publications are indicated by PubMed, a most relevant medical database (see http://www.ncbi.nlm.nih.gov/pubmed), upon “probiotics”, of which approximately 3/4 are original articles and 1/5 are human trials. Despite this number of publications, we are far away of knowing and understanding fully the relevant bacterial strains and combinations, the optimal doses, the spectrum of effects, and the underlying mechanisms of action. On the other hand, we now know definitively that some probiotic strains exist which have beneficial effects in order to support health, to prevent or even to treat diseases or body dysfunctions.

For example, in the field of gastroenterology, four disease entities have been identified for which systematic reviews based on randomized controlled trials including more than 1000 volunteers in total exist that show a beneficial effect of probiotics for prevention or treatment. The four disease entities are the acute infectious gastroenteritis, the C. difficile-associated diarrhea caused by antibiotics, the irritable bowel syndrome, and the necrotizing enterocolitis afflicting preterm infants (2). Even though some of the trials might have methodological limitations and also meta-analyses are never without pitfalls, such data are considered most valuable by the scientific community according to the principles of evidence-based medicine. In pharmacology, such meta-analyses generally result in grade A recommendations and reimbursement of the drug by health insurances.

Some argue, however, most probiotics are not drugs administered to patients but nutrients claiming health benefit in broader populations. Although it is challenging to conduct valuable prevention studies with representative populations over longer time periods and with accepted readouts, a few of them exist yielding promising results. For example, it could be shown in randomized controlled studies that selected probiotics are capable of enhancing antibody titers following vaccination both in children (3,4), adults (5), and elderly (6,7). This effect is generally accepted as equivalent for enhanced immunoprotection otherwise difficult to measure (8). Moreover, randomized controlled trials revealed that selected probiotics reduce episodes and/or duration of cold and influenza-like symptom in children (9) and adults (10) at risk. Also this readout is accepted by the authorities (8). Nevertheless, probiotics are still judged to be ineffective or even harmful by some people, because study numbers or study quality is thought to be insufficient. Interestingly, even experts of the food authorities such as EFSA seem to misunderstand the data, likely because of methodological ambiguities in the evaluation process. Otherwise, the fact that of
several hundred applications for health claims not one was accepted so far, is difficult to understand.

Possibly, the documented effectiveness of probiotics is questioned because of limited information about the underlying mechanisms of action. This is surprising, because health claims and medical recommendations should be based only on effectiveness and safety, possibly also on costs, but not on mechanisms of action. For example, for acetylsalicylic acid and several other most effective drugs the mechanism of action is also unclear. Therefore, we must require convincing data about efficiency and safety, also for probiotic products, but we must also require acknowledgement of such data. We should aim a fruitful dialogue between authorities, researchers and companies and we should avoid becoming even more demanding regarding food than regarding drugs. Most importantly, despite some limitations and unclearness, we cannot ignore anymore the large amount of data showing effectiveness and safety of selected probiotics in health and disease.

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