

Towards personalized prebiotics: opportunities and challenges

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Abstract

Over the past two decades it has become clear that the gut microbiota is heavily involved in health and disease. Not only for the gut itself, but also for the rest of the body. Correlations have been found between the presence/absence of certain bugs and many diseases and disorders. One of the major activities of the gut microbiota is the fermentation of carbohydrates, including dietary fibre and prebiotics. Prebiotics are defined as non-digestible carbohydrates that specifically stimulate one or a few members of the gut microbiota, leading to improved health. However, it is the phrase 'specifically' in that definition that usually is not met. Although previously e.g., inulin and fructooligosaccharides were thought to specifically increase bifidobacteria, with the advent of new and better molecular tools to study the gut microbiota, this bifidogenic concept has been challenged. Besides, other members of the microbiota have been identified as beneficial, such as *Faecalibacterium prausnitzii* and *Akkermansia muciniphila*. Moreover, even other bugs may need to be stimulated when dysbiosis occurs, such as in inflammatory bowel disease, obesity, etc. In addition, every individual has his/her own microbiota composition, and hence other species and strains, each with their own (carbohydrate degrading) enzyme machinery. Due to next generation sequencing methods we have access to a tremendous amount of information, either from single strain sequencing, or from metagenomic samples. Genes encoding glycosylhydrolases and other carbohydrate active enzymes (CAZy) can be identified in these sequences. Attempts and challenges to use this information for the development of strain-specific prebiotics will be highlighted. Moreover, the concept of personalized prebiotics will be discussed.

Biography

Prof. Koen Venema is i) Associate Professor at University Maastricht - campus Venlo, ii) project leader within the Top Institute Food & Nutrition, iii) founder and CEO of the company Beneficial Microbes® Consultancy, iv) the organizer of the Beneficial Microbe Conference-series, and v) editor-in-chief of Beneficial Microbes.

Prof. Venema studied Chemistry at the University of Groningen, The Netherlands in 1990. He received his PhD in Natural Sciences from the same university, on the antimicrobial activity of bacteriocins produced by lactic acid bacteria (LAB) in 1995. He pursued the health-beneficial activity of these microbes as a Post-Doc at North Carolina State University, Raleigh, USA, where he studied the potential of LAB to function as carrier for vaccines. Thereafter, in 1998 he was employed by TNO for > 15 years, where he used the sophisticated, dynamic, computer-controlled *in vitro* models of the gastrointestinal tract developed by TNO (nick-named TIM) to study the effect of functional foods and drugs on bioavailability and effects on the colonic microbiota.