

Original Article

Influencing health through intestinal microbiota modulation and probiotics

Introduction to the NSA Probiotic Symposium, Nov/Dec 2006

Andrew Sinclair PhD¹ and Seppo Salminen PhD²

¹ School of Exercise & Nutrition Sciences, Deakin University, Burwood, Australia

² Functional Foods Forum, University of Turku, Turku, Finland

Science has progressed fast in providing answers to probiotic health benefits to the consumers. This symposium also proves that progress is fast. However, several challenges still need to be solved and more effective strains and strain combinations discovered. This will pave the way from good probiotics to specific products for clearly identified target populations. The intestinal microbiota and its interaction(s) with probiotics challenges researchers to turn to the next new page to discover new approaches and treatment modalities that utilize probiotics as means of providing good nutrition with clear health benefits to all consumers.

Key Words: probiotics, microbiota, probiotic bacteria, safety, clinical trials, intestinal microbiota, genomics, nutrition

The healthy human microbiota is a metabolic organ which provides a defence system against harmful environmental exposures. This active complex community consists of more cells than can be found in our body and contains about 1.5 kg of viable microbes. Deviations in composition can be related to multiple disease states within the intestine but also beyond it. Similarly, components of the human intestinal microbiota or organisms entering the intestine may have both harmful and beneficial effects on human health.

A probiotic has been defined by the ILSI Europe (International Life Sciences Institute Europe) working group as “a viable microbial food supplement which beneficially influences the health of the host”.¹ This definition has been refined by the FAO/WHO expert group in 2002² to include the required dose. Both definitions require scientifically demonstrated efficacy and safety. Selection criteria for future probiotics have been developed towards target-specific criteria, but they also include adhesion to intestinal mucosa, and acid and bile tolerance as the key selection factors. The benefits of probiotics have been analysed in meta-analysis studies published elsewhere.¹

In order to demonstrate health effects and benefits, research has been conducted on mechanisms of action and clinical intervention studies with human subjects belonging to the target groups. As an example, a meta-analysis of effects in acute diarrhoea has been published recently.³ The issues covered in this symposium include studies of well-established probiotic strains and strain combinations which have been demonstrated to have additive and synergistic *in vitro* properties, discussion of the issue of safety of probiotics for use in foods, the best methods for delivering probiotics to the gut, and clinical studies on use of

probiotics in inflammatory bowel disease. The future target is to increase the genomic information on both probiotics and microbiota to improve the understanding of specific intestinal diseases. Thereafter, the goal is to apply the knowledge of microbiota composition and aberrancies on selecting the right probiotic combinations for defined target populations to maintain healthy gut microbiota and to improve human health and well-being.

Probiotic science has developed rapidly during the last decade. In this issue we again see a variety of scientific studies, both intervention and other studies, on probiotics. Data on potential health effects is accumulating and facilitates the understanding of interactions of specific probiotics and intestinal microbiota. There are still several unanswered questions including the following:

1. Could smaller probiotic doses be administered to infants and children with a less complex microbiota than for adults with a stable, diverse and more complex microbiota?
2. Are larger doses, longer treatment times and perhaps specific probiotic combinations required for elderly subjects or subjects with specific intestinal microbiota deviations?
3. How important is the viability of the probiotics for health effects? These are among the key issues for future research.

Correspondence address: Prof Andrew Sinclair, School of Exercise & Nutrition Sciences, Deakin University, Australia
andys@deakin.edu.au

Accepted 30th August 2006

Genome and function studies of current probiotics will increase our understanding on the biological mechanisms in cases where clinical efficacy has been demonstrated. Clinical data on the beneficial role of specific probiotic strains, and combinations has increased significantly and is accumulating at a rapid pace. Combining together the genomic data with host-microbe interaction studies will enable us to develop future probiotics using metabolomic approaches. This will facilitate development of probiotic preparations which are more specific for both maintaining healthy intestinal microbiota and designed for particular target populations to promote health and to reduce the risk of specific diseases. Such information will redefine the way we select, characterize and assess future probiotics and especially probiotic combinations in a scientifically valid manner.⁴

References

1. Salminen S, Bouley C, Boutron-Ruault MC, Cummings JH, Franck A, Gibson GR, Isolauri E, Moreau MC, Roberfroid M, Rowland I. Functional food science and gastrointestinal physiology and function. *Br J Nutr* 1998; Aug 80 Suppl 1: S147-71.
2. WHO 2001. http://www.who.int/foodsafety/publications/fs_management/en/probiotics.pdf
3. Sazawal S, Hiremath G, Dhingra U, Malik P, Deb S, Black RE. Efficacy of probiotics in prevention of acute diarrhoea: a meta-analysis of masked, randomised, placebo-controlled trials. *Lancet Infect Dis* 2006; 6: 374-82.
4. De Vos WM, Castenmiller JJ, Hamer RJ, Brummer RJ. Nutridynamics: studying the dynamics of food components in products and in the consumer. *Curr Opin Biotechnol*. 2006 ; 17: 217-25.

Original Article

Influencing health through intestinal microbiota modulation and probiotics

Introduction to the NSA Probiotic Symposium, Nov/Dec 2006

Andrew Sinclair PhD¹ and Seppo Salminen PhD²

¹ *School of Exercise & Nutrition Sciences, Deakin University, Burwood, Australia*

² *Functional Foods Forum, University of Turku, Turku, Finland*

透過腸道菌群調整及益生菌來影響健康

NSA 益生菌研討會引言, Nov/Dec 2006

科學已經快速進步提供關於益生菌健康益處的答案給消費者，這個研討會同樣證明那個快速進步。然而，有好幾個挑戰仍待解決，而更多的有效菌株及菌株結合體也有待發現。這個將為從好的益生菌產品到清楚定義的目標族群鋪路。腸道菌群及其與益生菌的交互作用挑戰研究者，轉向去發現利用益生菌以提供好的營養及清楚的健康益處給所有的消費者的新方法及治療形式的新頁。

關鍵字：益生菌、菌群、益生菌細菌、安全、臨床試驗、腸道菌群、基因體學、營養