The 'good' bacteria – healthy gut foods

The idea of ingesting beneficial bacteria in order to maintain a healthy microbial balance in the gut was first proposed by Elie Metchnikoff in 1907, although fermented milk products have been consumed by humans for perhaps thousands of years.

The term 'probiotics' was coined relatively recently (1957) to describe these health promoting microorganisms. These bacteria, which at present consist predominantly of members of the *Lactobacillus* and *Bifidobacterium* genera, are now often added to yoghurts in addition to the traditional yoghurt bacteria. Additionally, there are fermented milk products and dried live culture powders and capsules containing exclusively probiotics.

It is known that major perturbations to the ecosystem of the gut can be brought about by factors such as drugs, alcohol, antibiotics, diet, ageing , infections, and stress. Modulation of this ecosystem by probiotic bacteria and by dietary carbohydrates aims to correct such perturbations.

The link oligosaccharides and other dietary carbohydrates have with these probiotic bacteria is that they can stimulate their growth in the colon. In particular, they promote the proliferation of bifidobacteria (bifidogenic effects). They achieve this by acting as a selective food source that these organisms can utilise but potentially harmful residents of the colon such as Enterobacteriaceae and clostridia generally cannot.

As a result, in 1995 the oligosaccharides and other food carbohydrates that have similar effects were termed 'prebiotics'. A number of products are now appearing in Japan and Europe that include both probiotics and prebiotics. Foods containing this combination are often now referred to as 'synbiotics'.

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The functional food market is growing rapidly. In Europe the market has grown from an estimated $US7 billion in 1999 to $US8.9 billion in 2002, with Germany and France accounting for over half of these totals. Probiotic and prebiotic products account for about 60% of the functional food market at present in Europe and Australia, but for a lower proportion in the American market. Probiotics and oligosaccharides account for the majority of the 271 approved FOSHU products in Japan.

This issue of *Microbiology Australia* places emphasis on the available evidence for beneficial health effects from consumption of probiotic bacteria (Playne & Crittenden), and on explaining the observed health effects through immunological studies (Gill). Shorter articles explore further microbial interactions in the gut (Tannock) and the use of modern molecular methods to explore these microbial communities.

Hospital studies on the use of probiotics to control *Clostridium difficile* diarrhoea (Riley & Golledge), and the less-known use of probiotics in aquaculture (Moriarty) are also included. Four practically oriented papers complete our special issue on probiotics – papers on encapsulation to protect cultures (Kailasapathy), suitable media used to enumerate bifidobacteria and lactobacilli (Haynes), development of new LAFTI probiotic cultures (Harvey, Henriksson & Dunn), and safety issues surrounding the use of probiotics (Donohue).

We have attempted to present a balanced cross-section of current Australian and New Zealand research on probiotics. Space has prevented us from including all probiotic research in Australasia, and the use of prebiotic carbohydrates to modulate gut flora and effect gut health has not been covered, despite its commercial importance.

I sincerely hope that this issue will go some way towards addressing the concerns of skeptical readers, and that an ongoing dialogue will develop to enable us all to better understand how microorganisms may beneficially affect our health and well-being.

Further reading

Falk P. Exploring the molecular basis of host-microbial interactions in the GI tract. *Bioscience Microflora* 2002; 21:83-97.

Young J. The market for functional foods in Europe. In: Angus F & Miller C (Eds). *Functional Foods 2000 Conf. Proc.* Surrey, UK: Leatherhead Food RA Publishing, 2000, p.14-22.