

# Prebiotics For Improved Gut Health

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## Abstract

Prebiotics are those substances that promote the growth or activity of a limited number of bacterial species in the gut known as probiotics. The ingredients that fall into the prebiotic category have some chemical similarities, but also very different fermentation profiles as well as application advantages. In this review we discuss the issues relating to Prebiotics.

## INTRODUCTION

The human intestinal tract is often described as a complex ecosystem that is populated by as many as 500 microbial species. Many bacteria, which are helpful to humans, exist in harmony with their human hosts. There are two categories of beneficial ingredients for gut health - prebiotics and probiotics. A prebiotic is defined as a non-digestible food ingredient that beneficially affects the host by selectively stimulating the growth or activity of one or a limited number of bacteria in the colon. <sup>1</sup> A probiotic is defined as a live microbial food supplement, which benefits the host by improving its intestinal microbial balance. <sup>2</sup> This summary will focus on probiotics and their role in human health. Supplementation with probiotics offers an opportunity to restore the gut flora to its normal composition, which may have been adversely affected by dietary and environmental stresses. <sup>3</sup>

Well known examples of probiotics include *Lactobacillus acidophilus* and *Bifidobacterium longum*. Probiotics are thought to bind the intestinal surface or they might bind to certain harmful bacteria on the intestinal wall therefore blocking harmful bacteria from entering the gut and possibly causing diarrhea. <sup>4</sup> It is through this mechanism that probiotics are believed to contribute to the prevention of diarrhea. The dietary administration of *Bifidobacteria*, preferably in conjunction with *L. acidophilus*, helps in the regeneration of the normal gut flora. <sup>5</sup>

*Bifidobacteria* and *Lactobacillus* live in great concentrations at the lower region of the small intestine and predominantly in the large intestine. These beneficial bacteria take a role as guards against harmful microbes living in the large intestine, keeping them from invading the small intestine. The small

intestine functions to digest and absorb the majority of nutrients. When the body's immunity declines the risk of infection increases, it is essential to keep the immune capacity high for preventing or decreasing infection. *Bifidobacteria* and *Lactobacillus* have recently been shown to increase gut and overall immunity.

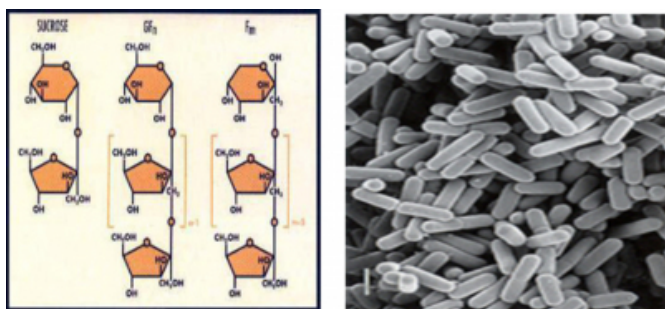
There are several aspects of an individual's health and diet that can adversely affect the gut microflora. High levels of fat in the diet can negatively affect the level of *Bifidobacteria* in the gut, as these beneficial bacteria are sensitive to increased levels of faecal bile acids, which are directly related to the amount of fat in the diet. Fatty diets may increase the amounts of bile acids in the faeces, and consequently increase their inhibitory effect to *Bifidobacteria*. The nature of the diet may also indirectly influence the gut conditions, which affect the activity of *Bifidobacteria*. Disorders of gastric function or intestinal motility may disturb the normal microbial balance. Antibiotic therapy has also been shown to.

Numerous studies have shown that an imbalance of friendly to unfriendly gut bacteria (too few friendly bacteria) can cause or aggravate various health conditions. Moreover, supplements aimed at increasing the number of friendly bacteria have been shown to help combat many types of diarrhea, irritable bowel syndrome, eczema, ulcerative colitis; reduce the incidence of canker sores and vaginal yeast infections; and exert positive effects on the immune system. Friendly gut bacteria consist of *Lactobacillus acidophilus*; *L. bulgaricus*; *L. reuteri*; *L. plantarum*; *L. casei*; *B. bifidus*; *S. salivarius*; *S. thermophilus*; and the yeast *Saccharomyces boulardii*.

### GENERAL FEATURES OF PREBIOTICS

“Prebiotics” refers to short-chain polysaccharides (carbohydrates), not completely digested by the human intestinal tract, that serve as a food supply for the friendly bacteria of the large bowel (bifidobacteria and lactobacilli), enhancing their growth and cell division rate.<sup>3,4</sup> The official definition of prebiotics is: “Nondigestible food ingredients that beneficially affect the host by selectively stimulating the growth and activity of one species or a limited number of species of bacteria in the colon.”<sup>5</sup>

**Figure 1**



An important feature of prebiotics is their potential impact on reducing the risk of colorectal cancer, the second leading cause of cancer death in North America (combining statistics for men and women). Human studies demonstrate that both pre- and probiotics encourage the growth of lactic acid bacteria (LAB). Experimental data and some epidemiological evidence indicate that increased LAB protects against colon cancer development. Experimental data demonstrates that increased proliferation of LAB, through fermentation of prebiotics and other fiber sources, also gives rise to the production of short-chain fatty acids and lowers the pH of the colon, making it a more acidic environment. In various studies, lower colonic pH has been associated with a reduced risk of colon cancer, apparently related to an inhibition of certain enzymes known to produce bowel carcinogens.<sup>6</sup>

### PREDICTIONS FOR THE FUTURE

In the future, prebiotic fibers will have a strong position in the nutraceuticals industry. As people increasingly seek simple solutions to wellness issues, they will become even more scrupulous in their choices. The move toward products that provide a combination of benefits with ingredients that have sound, scientific support will explode. For the interests of consumers to be served, the food industry and the scientific community must provide accurate information in

order to promote good choices. Communication through all avenues, especially the food label, will be critical for the necessary transfer of knowledge to take place.

Health conscious consumers have been the first to realize the many benefits of prebiotics. A growing population is seeking out and using products that contain prebiotics. These are the consumers that will buy a product for the health benefits and are the easiest target for functional foods.

The larger segment, the group that does not buy primarily for health reasons, will go through a shift based on a new environment that is being created in the market. The FDA's recognition of the need for increased label communications is resulting in new opportunities for food producers to broadcast the health benefits of their products in a responsible, but highly accessible way. This, combined with the most recent reports of soaring obesity and degenerative disease rates and the threat of litigation against the food industry, has created an environment of formulating for health previously unknown.

Prebiotic enhancement is a valuable tool for food companies looking for a competitive edge in this changing playing field. The best players will ensure their products are fortified with a prebiotic that is effective, while also adding to the sensorial enjoyment of everyday foods.

### CONCLUSION

Given that the human gut is such a complex ecosystem, there may often be a need to maintain or restore gut health due to the stressful effects of environmental and dietary factors. Compromised gut health may result in a higher susceptibility to traveler's diarrhea and a compromised immune system. Beneficial microorganisms such as *Lactobacillus* and *Bifidobacteria* have been demonstrated to have a positive effect on gut health and have also been shown to exert a range of positive effects related to overall health.

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