Dynamic Chiropractic

Prebiotics: A More Reliable Way to Increase Gut-Friendly Bacteria

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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 acidophilu; L. bulgaricus; L. reuteri; L. plantarum; L. casei; B. bifidus; S. salivarius; S. thermophilus;* and the yeast *saccharomyces boulardi*.

Recent studies, however, have shown that taking probiotic supplements (those containing friendly bacteria) may not be reliable: Random tests performed on probiotic supplements taken from the shelves of retail outlets indicated that most products contain no live bacteria by the time they reach the marketplace. These bacteria can only divide and replicate themselves a finite number of times before the final bacteria dies off. As such, it is very difficult for any manufacturer of probiotic supplements to guarantee the number of live bacteria in a supplement at the time of purchase (as opposed to at the time of manufacturing, which is what is usually claimed on the label).

In recent years, prebiotics have demonstrated an ability to increase the concentrations of friendly gut bacteria, and there is a suggestion that supplementation with these may be the more reliable method to favorably influence the ratio of friendly to unfriendly gut bacteria. Health practitioners should be aware of the physiology and clinical studies that pertain to the use of prebiotics in clinical practice, as they represent a viable alternative to the use of probiotic supplementation.

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 (bifodobacteria and lactobacilli), enhancing their growth and cell division rate.[1-3] 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."[4]

Human studies show that fructo-oligosaccharide (FOS) supplements increase bifodobacteria and lactobacilli populations in the flora of the large intestine, while simultaneously reducing the colonies of detrimental bacteria. The same has been shown for supplementation with two other prebiotics: inulin and galacto-oligosaccharides (GOS).[5-9]

FOS and inulin consist of short chains of fructose molecules. GOS consist of short chains of galactose molecules.[1-3] The estimated average daily intake of FOS from food sources (mostly vegetables) is 800 mg.[10] Supplement studies demonstrate that 2,000-3,000 mg a day of additional

FOS can favorably alter the bacteria populations of the large bowel.[5-9] Higher doses may help to lower cholesterol, triglycerides and better regulate blood glucose in type II diabetics.[11,12]

From a standpoint of general wellness, both prebiotic and probiotic supplements have been shown to improve digestion and absorption of some nutrients; enhance detoxification by intestinal mucosal cells; reduce the concentrations of large bowel mutagens and carcinogens; aid elimination processes; and favorably affect the immune system of the gut and the systemic immune system. These benefits are related to favorable changes in the concentrations of friendly gut bacteria resulting from pre- and probiotics. In regards to immune modulation, these positive effects include reduced hypersensitivity reactions secondary to food sensitivities, improved control of autoimmune conditions, and a lessening of skin reactions secondary to food-induced hypersensitivity reactions.[4,13,14]

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.

Human studies have shown that prebiotics reduce concentrations of components that are genotoxic in human colon cells. Butyrate has been shown to increase the proliferation of normal cells, while inhibiting the proliferation of cancerous cells. This short-chain fatty acid also induces apoptosis (programmed cell death) of colon cancer cells under experimental conditions. It is an important fuel for colon cells, and evidence suggests that these cells, when exposed to various carcinogens, are less inclined to be transformed into malignant cells in the presence of adequate butyrate supply. Butyrate has also been shown to increase the concentrations of glutathione transferase enzyme in colon cells. It has been reported that "enzyme induction by butyrate, or by the microflora and increased activity by Prebiotics, may be an important mechanism or protection against carcinogen-enhanced colon cancer."[15]

Clinical Application and Mechanism of Action

1. Digestive disorders, food sensitivity and intolerances, autoimmune conditions, rheumatoid arthritis and skin conditions: Prebiotics may be used to increase friendly gut bacteria (bifidobacterium, bifidum and longum, and Lacto bacillus acidophilus). In these conditions, a therapeutic dosage of 2,000-3,000 mg of FOS per day and/or other prebiotics (inulin, GOS) is commonly utilized.[5-9]
2. Lipid-lowering prebiotics are metabolized by large bowel bacteria, yielding short-chain fatty acids like butyrate. Butyrate is known to inhibit liver cholesterol synthesis and provide a source of energy for human colon epithelial cells. Some studies demonstrate that supplementing with 8-15 gms of prebiotics can significantly lower blood cholesterol and triglycerides; however, this is not a consistent finding at this time.[11,12,16]
3. Type II diabetes: Some evidence suggests that prebiotic supplementation at 8-15 gm per day can help regulate blood glucose in type II diabetics; other studies have not shown this beneficial effect. Therefore, more research is required before any conclusive statements can be made.[12,16]

4. General Wellness: For health promotion purposes (e.g., to reduce concentrations of carcinogens in the large bowel and improve digestion, elimination and immune function), a daily dosage of 500-1,000 mg is often recommended.

Adverse Side-Effects and Toxicity

Generally, oligosaccharides are well-tolerated. Some individuals report increased flatulence initially. At very high levels, (40 gm), FOS and other oligosaccharides may induce diarrhea.[1]

Drug-Nutrient Interactions

There are no well-known drug interactions with FOS or other prebiotics.[17]

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