Fructo-oligosaccharides (FOS) and Other Oligosaccharides

The term “oligosaccharide” refers to a short chain of sugar molecules (“oligo” means “few” and “saccharide” means “sugar.”) Fructo-oligosaccharides (FOS) and inulin, which are found in many vegetables, consist of short chains of fructose molecules. Galacto-oligosaccharides (GOS), which also occur naturally, consist of short chains of galactose molecules. These compounds can be only partially digested by humans.1,2,3,4 When oligosaccharides are consumed, the undigested portion serves as food for “friendly” bacteria, such as Bifidobacteria and Lactobacillus species. Clinical studies have shown that administering FOS or inulin can increase the number of these friendly bacteria in the colon while simultaneously reducing the population of harmful bacteria.5,6,7,8 Other benefits noted with FOS or inulin supplementation include increased production of beneficial short-chain fatty acids such as butyrate, increased absorption of calcium and magnesium, and improved elimination of toxic compounds.9,10

Experimental studies with FOS in animals suggest a possible benefit in lowering blood sugar levels in people with diabetes and in reducing elevated blood cholesterol and triglyceride levels.11 In a double-blind trial of middle-aged men and women with elevated cholesterol and triglyceride levels, supplementation with inulin (10 grams per day for eight weeks) significantly reduced insulin concentrations (suggesting an improvement in blood-glucose control) and significantly lowered triglyceride levels.12 In a preliminary trial, administration of FOS (8 grams per day for two weeks) significantly lowered fasting blood-sugar levels and serum total-cholesterol levels in patients with type 2 (non-insulin-dependent) diabetes.13 Other trials have found no effect on blood glucose or lipid levels.14,15 More research is needed to conclusively determine the effect of FOS and inulin on diabetes and lipid levels.

Where is it found? FOS and inulin are found naturally in Jerusalem artichoke, burdock, chicory, leeks, onions, and asparagus. FOS products derived from chicory root contain significant quantities of inulin,16 a fiber extensively distributed in plants, fruits, and vegetables.17 In fact, inulin is a significant part of the daily diet of most of the world’s population.18 FOS can also be created by enzymes of the fungus Apergillus niger acting on sucrose. GOS is naturally found in soybeans and can be synthesized from lactose (milk sugar). FOS, GOS, and inulin are available as nutritional supplements in capsules, tablets, and as a powder.

How much is usually taken? The average daily intake of oligosaccharides by people in the United States is estimated to be about 800 to 1,000 mg. For the promotion of healthy bacterial flora, the usual recommendation for FOS, GOS, or inulin is 2,000 to 3,000 mg per day with meals. In the studies on diabetes and high blood lipids, amounts ranged from 8 to 20 grams per day.

Are there any side effects or interactions? Generally, oligosaccharides are well tolerated. Some people reported increased flatulence in some of the studies. At higher levels of intake, that is, in excess of 40 grams per day, FOS and the other oligosaccharides may induce diarrhea. There has been one report of an allergic reaction after consuming a high amount of inulin and FOS.19 However, such sensitivities are extremely rare. People with a confirmed sensitivity to inulin should probably avoid FOS.


9 Tomomatsu H. Health effects of oligosaccharides. *Food Technology* 1994;October:61–5 [review].


