**THE BENEFIT OF PREBIOTIC FIBERS FOR YOUR HEALTH**

**MATCHING TODAY’S EXPECTATIONS: CONSUMERS DIGESTIVE HEALTH AND PREBIOTIC FIBERS.**

With the pace of life continuously accelerating, the global trend towards easy-to-prepare and on-the-go food continues. At the same time, market research has shown that today’s consumers are increasingly realizing the positive effect nutrition can have on their well-being. People today are looking for food and snacks that support a healthy lifestyle from an early age.

When it comes to the importance of dietary fiber intake for a healthy nutrition, public awareness has been steadily growing over the last decades. Although vast parts of the world’s population are still lacking a sufficient fiber intake, many consumers are already actively asking for convenient food and drinks that include dietary fibers. In general, consumers look for convenient solutions and Brazilians spontaneously associate fibers with digestive health, bowel regularity and weight control.

More than six out of ten consumers in Brazil actively look for food and beverages that can help with weight management. **Over 70% of Brazilians associate fiber with weight management.**

**More than eight out of ten consumers in Brazil associate fiber with digestive health.** Two thirds of Brazilians are concerned about maintaining a healthy digestion and 80% of these people confirm this plays a very important role in their purchase decisions. Eight out of ten Brazilian consumers try to get at least a certain amount of fiber in their food and more than half checks product labels for fiber content.

**The importance of microorganisms (prebiotics)**

The world of microorganisms is somewhat mysterious for most consumers. Too small to be visible but powerful enough to make you ill. Hygiene is part of everyone’s daily life in an effort to prevent the organisms that can make you sick from taking over. While pathogens and antibiotic drugs are in the consumer’s focus, the fact that there are beneficial or even essential microorganisms for the production of some vitamins, is hardly known.

Microorganisms are everywhere, outside and inside the body. Inside us, they create their own universe and live together with us. They may harm us, they may do good… we may depend on them.

**Microorganism accompany food as it passes through the gastrointestinal tract:**

Microorganisms in the gastrointestinal tract eat the nutrients available to them in the specific environment they live, i.e. in the mouth or in the various sections of the digestive tract.

The stomach hosts only a small number of microorganisms due to its low pH value. In the small intestine, a higher bacterial density is possible due to the higher pH value. However, the density is still limited because of the rapid transit time and secretions with microbiostatic effects such as bile acids and pancreatic juices. The large intestine is a favorable organ for bacterial growth because of its slow transit time, readily available nutrients and a favorable pH. The microbial density is high (1011 to 1012 cfu/g). The physiology of the colon is controlled to a large degree by the gut flora and their fermentation of indigestible nutrients, their secondary metabolites, their interaction with the host as well as by internal competition against each other.

**Composition of the colonic micro biota - the healthy micro biota concept**

Our knowledge about the composition of the bacterial flora in healthy people comes largely from fecal analysis as the colonic lumen is rarely accessible. Knowledge of micro flora continuously improves with advances in microbial methods.

Meanwhile, around 1000 different bacterial species have been reported in the human gut. In terms of characterization of metabolism, direct microbe-host interactions and other relevant properties for host health need to be considered (See fig. 1).



Characteristics of a beneficial microorganism:

* Should contribute to the stabilization of a balanced microbiota
* Produce short chain fatty acids and prefer non-digestible carbohydrates as their food
* Should not have negative effects like being pathogen or producing toxins, stimulate diseaserelated inflammatory responses

Bifidobacteria and lactobacilli clearly fulfil these criteria; other microbes fulfilling these criteria may be identified in future. **Bifidobacteria represent valid markers today for a healthy gut microbiota and a balanced colonic ecosystem.**

**Maintaining and optimizing a balanced microbiota supports gut health and is therefore part of maintaining a healthy lifestyle.** In other words supporting bacterial metabolism results in beneficial effects and a reduced toxic load for the host.

It is not only the composition of the microbiota but also its activity in total which contributes to a healthy gut function and to the integrity of the gut barrier.

**How prebiotics support the healthy flora concept**

Around 20 years ago researchers started looking for nutrients that can support the growth of the beneficial microorganisms which occur naturally in the large intestine. This new research direction was based on the knowledge that certain microorganisms can potentially harm the host whilst other microorganisms were known to e.g. produce vitamins and short chain fatty acids that positively influence the environment in the gut.

**It was assumed that with this smart choice of an ingredient in the normal diet, a consumer would apply to “help yourself by eating smart” approach, therefore supporting healthy flora in a natural way.** Such anutrient would need to reach the colon intact, escaping the digestion process. On reaching the largeintestine, this nutrient would be the preferred substrate for those specific beneficial microorganisms, i.e. thebifidos would just love that food and eat it quickly. With the advantage of a privileged nutrient supply the*Bifidobacteria* would benefit more than any other microorganism and would grow faster than others. Thenumber of good bacteria in the large intestine would increase. This increase would logically go hand inhand with an increase in the beneficial functions and thus would support a healthy microbiota. The prebiotic term was born then in order to have one term to describe the physiological characteristic: "*Prebiotics are non-digestible food ingredients that selectively stimulate the growth and/or activity of one or a limited number of bacteria in the colon which improve host health”*

The definition was further developed in the course of the following years and today is defined as: “A dietary prebiotic is a selectively fermented ingredient that results in specific changes, in the composition and/or activity of the gastrointestinal microbiota, thus conferring benefit(s) upon host health”.

Proven prebiotics today are inulin-type fructans from chicory, such as Orafti® Inulin and Oligofructose (FOS, fructo-oligosaccharides) which are dietary fibers and found in many fruits and vegetables and which are added to food for fiber enrichment. For classification as “proven prebiotic”, the microbiota modulation and health benefits were demonstrated in vitro, with animal studies and with human intervention studies. GOS (galacto-oligosaccharides) and lactulose are regarded as “proven” as well. Some other non-digestible carbohydrates have been identified as potential candidates, i.e. in vitro fermentation indicates a prebiotic effect, whilst the effect still needs to be confirmed in animal and human studies.

**Health benefits and main physiological targets for prebiotic effects by** Orafti® **Inulin and Oligofructose**

The metabolic and health benefits of prebiotics, such as Orafti® Inulin and Oligofructose are linked today’s key diet-related challenges and could be a tool for consumers to achieve a more healthy status over time. Where most of the physiological health effects listed below are already well established, others will be reinforced by current ongoing research:

DIGESTIVE HEALTH

* Improvement and /or stabilization of gut microbiota composition.
* Improvement of intestinal functions (stool regularity, bulking, consistency).
* Reduction of the risk of intestinal infections.
* Initiation and modulation of immune response.
* Improvement of intestinal barrier functions and reduction of metabolic endotoxemia.

BONE HEALTH

* Increase in mineral absorption and improvement of bone health (bone calcium content, bone mineral density).
* The Oligofructose-enriched Inulin Orafti® Synergy1 has been found to be particularly efficient in enhancing the bioavailability of calcium in the diet.



**WEIGHT MANAGEMENT**

* Reduction of the risk of obesity, type 2 diabetes mellitus, metabolic syndrome.
* Modulation of GI peptide production, energy metabolism and satiety.

During the 10th Vahouny Dietary Fiber Symposium, March 26-28, 2014, Bethesda, Maryland, Dr. Stephan Theis, Head of Beneo’s nutrition research team, highlighted the latest developments on prebiotic fibers.

The systematic review and meta-analysis of Kellow et al. (2014) demonstrated a significant reduction in postprandial glucose and insulin concentrations when inulin was taken as a supplement in the daily diet. Further, a significant improvement in subjective satiety measurements was assessed.

Intriguing new experimental data on the action of prebiotic inulin-type fructans and associated production of short chain fatty acids via the gut-brain axis has brought new insights into the mechanism underlying the metabolic benefits.

A series of human intervention studies on the effects of inulin-type fructans on energy homeostasis, glycemic control, inflammation and blood lipids demonstrated the metabolic benefits of these dietary fibers. Prebiotic research has been ongoing for the past 20 years resulting in thousands of publications and several hundred human intervention studies.

**The gut bacteria-host relationship – an area of key interest in research!**

The interest in the gut bacteria-host relationship has grown significantly in the last few years with numerous research projects underway.

More knowledge needs to be created on the role of the gut flora and its influence on many aspects of host health and diseases. People are realizing that the role of the microorganism in our gut has been significantly underestimated. The gut micro flora has to be seen as an organ in itself that communicates with the many other organs in us, the host. Research is related to the metabolites that some microorganisms produce and their cross talks with the host.

Today’s research is investigating the role an unbalanced microbiota might have in the development of irritable bowel syndrome (IBS), into the link between gut flora and obesity development, the development of gut flora with age, the influence on insulin resistance, the influence on liver and kidney problems and more.

Prebiotics, inulin-type fructans from chicory, such as Orafti® Inulin and Oligofructose, play a significant role in these fascinating developments, demonstrated by more than 1000 research articles published over the past 5 years.

**Always at your side: Profit from our interdisciplinary expertise.**

Our experts offer valuable insights. No matter if your question concerns physiology or process technology, if it is marketing-related or if it is about legislation and regulations. With nutritionists, marketers, regulatory professionals, technical food engineers and a competent sales force team throughout the world, there is always a Beneo expert that can help you. It’s the combination of advanced ingredients and specialist knowledge together with access to a global network of experts which makes Beneo a unique business partner.

The Beneo range of food ingredients includes specialty rice ingredients, functional carbohydrates, prebiotic fibers and vital wheat gluten.

**References**

Abrams, Griffin, Hawthorne, Liang, Gunn, Darlington, Ellis (2005): A combination of prebiotic short- and long-chain inulin-type fructans enhances calcium

absorption and bone mineralization in young adolescents. In: Am J Clin Nutr, 82(2), S. 471-476

Anastasovska, Jelena; Arora, Tulika; Sanchez Canon, Gina J.; Parkinson, James R.C.; Touhy, Kieran; R. Gibson, Glen et al. (2012): Fermentable Carbohydrate Alters

Hypothalamic Neuronal Activity and Protects Against the Obesogenic Environment. In: Obesity 20 (5), S. 1016–1023.

Beneo Consumer research on fibers and fiber benefits in Brazil; conducted by Health Focus International; October 2013

Binns (2013): Probiotics, prebiotics and the gut microbiota. In: ILSI Europe Concise Monograph Series.

Cani, Lecourt, Dewulf, Sohet, Pachikian, Naslain, De Backer, Neyrinck, Delzenne (2009): Gut microbiota fermentation of prebiotics increases satietogenic and

incretin gut peptide production with consequences for appetite sensation and glucose response after a meal. In Am J Clin Nutr 90(5), S. 1236-1243.

Delzenne, Neyrinck, Cani (2013): Gut microbiota and metabolic disorders: how prebiotic can work? In: Br. J Nutr 109(2), S.81-85.

De Vadder, Filipe; Kovatcheva-Datchary, Petia; Goncalves, Daisy; Vinera, Jennifer; Zitoun, Carine; Duchampt, Adeline et al. (2014): Microbiota-Generated

Metabolites Promote Metabolic Benefits via Gut-Brain Neural Circuits. In: Cell 156 (1-2), S. 84–96.

Dehghan, Parvin; Gargari, Bahram Pourghassem; Jafar-Abadi, Mohammad Asghari; Aliasgharzadeh, Akbar (2014a): Inulin controls inflammation and metabolic

endotoxemia in women with type 2 diabetes mellitus: a randomized-controlled clinical trial. In: Int J Food Sci Nutr 65 (1), S. 117–123.

Dehghan, Parvin; Pourghassem Gargari, Bahram; Asghari Jafar-abadi, Mohammad (2014b): Oligofructose-enriched inulin improves some inflammatory markers

and metabolic endotoxemia in women with type 2 diabetes mellitus: a randomized controlled clinical trial. In: Nutrition 30 (4), S. 418–423.

Dehghan, Parvin; Pourghassem Gargari, Bahram; Asgharijafarabadi, Mohammad (2013): Effects of high performance inulin supplementation on glycemic status

and lipid profile in women with type 2 diabetes: a randomized, placebo-controlled clinical trial. In: Health Promot Perspect 3 (1), S. 55–63.

Gibson and Roberfroid (1995): Dietary modulation of the human colonic microbiota: introducing theconcept of prebiotics. In J Nutr 125 (6), S. 1401-1412

Gibson, Scott, Rastall, Tuohy, Hotchkiss, Dubert-Ferrandon, Gareau, Murphy, Saulnier, Loh, Macfarlane, Delzenne, Ringel, Kozianowski, Dickmann, Lenoir-

Wijnkoop, Walker, Buddington (2010): Dietary prebiotics:current status and new definition. In: Food Sci Technol Bull Functional Foods 7 (1): S.1-19

Kellow, Nicole J.; Coughlan, Melinda T.; Reid, Christopher M. (2014): Metabolic benefits of dietary prebiotics in human subjects: a systematic review of

randomised controlled trials. In: Br J Nutr 111 (07), S. 1147–1161.

Parnell, Reimer (2009): Weight loss during oligofructose supplementation is associated with decreased ghrelin and increased peptide YY in overweight and

obese adults. In: Am J Clin Nutr 89(6), S. 1751-1759.

Roberfroid, Marcel; Gibson, Glenn R.; Hoyles, Lesley; McCartney, Anne L.; Rastall, Robert; Rowland, Ian et al. (2010): Prebiotic effects: metabolic and health

benefits. In: Br. J. Nutr. 104 Suppl 2, S. S1-63.

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