FACT SHEET

Supporting normal blood glucose levels

How smart carbohydrate and dietary fibre choices can make a difference

Keeping blood glucose levels low and balanced is in everyone's interest. Irrespective of age and metabolic status, reducing blood glucose levels contributes to health from early on, and helps prevent conditions like overweight, diabetes mellitus and cardiovascular health.[1] Managing blood glucose levels becomes even more relevant, when the body's own regulation gets out of balance with age or exhaustion. Raised blood glucose levels, a precursor of diabetes, affect about 1 in 10 people globally (541 million people or 10.6 % of global population), as well as 537 million (10.5 %) who already have diabetes.[2]

Carbohydrate foods play a key role as they directly impact blood glucose levels. Making smart choices with respect to starch and starch-based foods, sugars and dietary fibres can therefore make a difference. Carbohydrate foods also act as an important energy source with glucose as fuel. Global dietary guidelines suggest that about half of our daily energy intake should come from carbohydrates found in a variety of foods like cereals, bread and baked goods, pasta, potato products, legumes etc. Those foods can vary considerably in their potential to raise blood glucose levels, depending on the type of carbohydrates and food they are consumed with.[3] Also food preparation like baking or extrusion processing plays a role. Evidence shows that foods with slowly available carbohydrates and those with reduced glycaemic properties should be the preferred choices to achieve a lower blood glucose profile throughout the day.

Smart carbohydrates and fibres for a lower blood glucose response

Today, various carbohydrate foods with reduced glycaemic properties are available, thanks to smart ingredient choices, which are often highlighted on food labels with corresponding claims (Figure 1). Some products replace traditional sugars with a slow release alternative. Other strategies include reducing sugars with prebiotic fibres, or replacing sugars with polyols like isomalt. Additionally, the blood glucose rise due to starch in foods has been lowered by smart processing, or by adding beta-glucan fibres with whole-grain barley flour.

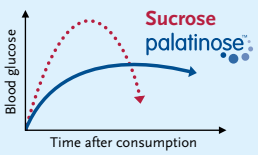
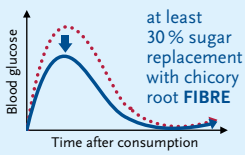
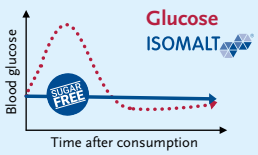
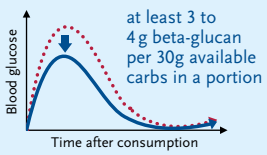
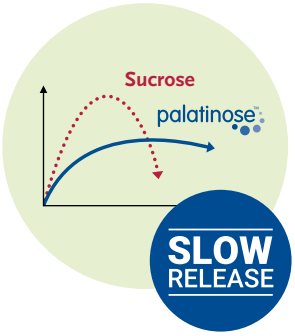
	Palatinose™	BENEO Fibres Inulin & Oligofructose	Isomalt	Orafti® β-Fit Beta-Glucan
Mode of action	Reduced blood glucose response of available carbs to *MODIFY* the glucose supply	Partially replace sugars to *REDUCE* the blood glucose supply	Fully replace sugars to *REDUCE* the blood glucose supply	Add thickening fibre to *MODIFY* carbohydrate passage and glucose supply
Food category and nutrient approach	Foods with sugars: Smart sugar choice SLOW RELEASE	Foods with sugars: Sugar reduction with fibre MORE FIBRE, LESS SUGAR	Sugar-free candy and confectionary SUGAR FREE	Foods with starch MORE FIBRE
Physiological response				
Food application aspects	• Sugar-like taste • Good flowability • High stability (acidic, thermal, microbial) • Sugar	• Sugar-like sweetness profile • High solubility • Excellent texture • Fibre enrichment	• Sugar-like taste • Low hygroscopicity • High process stability • Bulk sweetener	• Clean taste • Soluble, thickening property • pH and temperature stable • Fibre enrichment

Figure 1.

Smart approaches to reduce the blood glucose response to foods.

Palatinose™ – the slow release carbohydrate and sugar alternative

Palatinose™ (isomaltulose) is a slow release carbohydrate and alternative sugar with a low effect on blood glucose levels. Its slower digestion and absorption allows for a steady glucose release and an overall lower and more balanced blood glucose response.[4] With a Glycaemic Index (GI) of 32, Palatinose™ has a significantly lower GI compared to sucrose (GI: 65) or glucose (GI: 100).[5]



The balanced blood glucose supply from Palatinose™ is more gentle to the body's hormonal and metabolic responses, causing less insulin release and more favourable incretin responses, such as lower GIP and higher GLP-1 release. Recent research indicates that Palatinose™ stimulates GLP-1 release in overweight adults, with effects even lasting beyond the next meal.[6] Carbohydrate energy supply is improved as well, promoting higher fat burning levels. Such beneficial effects of Palatinose™ contribute to maintaining normal body weight[7], blood glucose control, and cardiovascular health.[8]

Palatinose™ is a valuable alternative to traditional sugars in foods and drinks, including sports nutrition, meal replacements and special nutrition. Its low glycaemic potential was proved in practice, for instance, when Palatinose™ drinks were part of normal diet and lifestyle habits[9], or with the successful development of low GI cookies.[10] Such products can significantly contribute to a lower and more balanced blood glucose profile throughout the day.[11]

ISOMALT – sugar replacement with polyol

Isomalt is a polyol used in traditional sugar replacement, i. e. it substitutes sugars on a gram by gram basis in sugar-free foods, confectionary and snack foods. Isomalt is made from beet sugar and has a sugar-like sweet taste. Physiologically, isomalt is a low-digestible carbohydrate and as such releases very little glucose into the bloodstream. This explains why isomalt has a minimal effect on blood glucose levels and insulin release.[5] While providing only half the calories of sugar, non-digested isomalt is fermented by the colon microbiota and supports digestive health.[12]

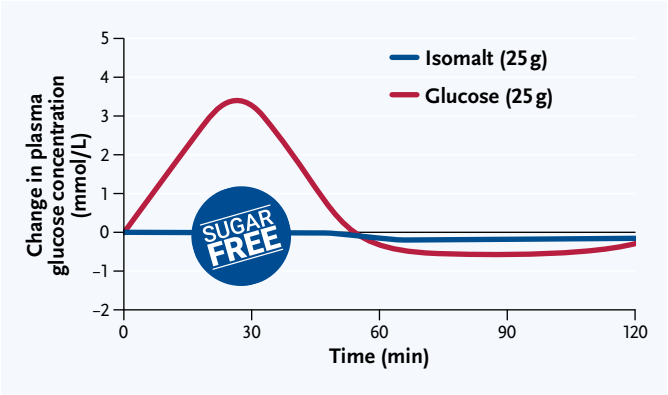


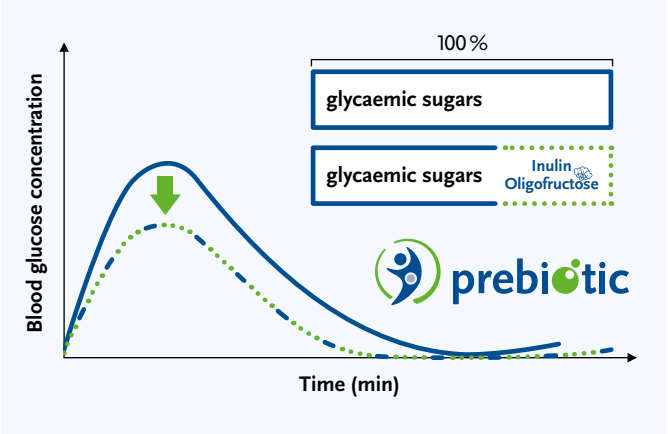
Figure 2.

Blood glucose response to isomalt.

When isomalt replaces sugars in foods like jam, candies or mints, it can significantly lower the blood glucose response.[13] Even though such foods are typically consumed in small amounts, they still make a contribution. The replacement of only 30 g sucrose with isomalt in several products over 12 weeks led to significant improvements in long-term blood glucose parameters like HbA_{1c} and insulin resistance in type-2 diabetics.[14]

Inulin and Oligofructose – sugar reduction with prebiotic fibre

Inulin and oligofructose from the chicory root are dietary fibres and, even better, they are proven prebiotics in accordance with the high standards of ISAPP.[15,16] These fibres do not contribute to a rise in blood glucose levels themselves, as they are non-digestible in the small intestine. When chicory root fibres replace 20 % or more of the sugars in a food, this can significantly lower blood glucose and insulin profiles. Studies show that the more sugar is replaced with chicory root fibres, the lower the blood glucose and insulin responses will be.[17] Besides contributing to blood glucose management, chicory root fibres increase the fibre content in foods. They are widely used in baked goods, breakfast cereals, cereal bars, dairy products, dairy alternatives, and meal replacements.



Chicory root fibres may also support blood glucose management via an active prebiotic effect, i.e. by selectively increasing health-promoting gut bacteria.[18,19] Researchers demonstrated that chicory root fibres can improve blood glucose control and promote a selective change in the gut microbiota, under real-life conditions; and they observed lower variations in the blood glucose response as a synergistic effect of chicory root fibres and Palatinose™.[9]

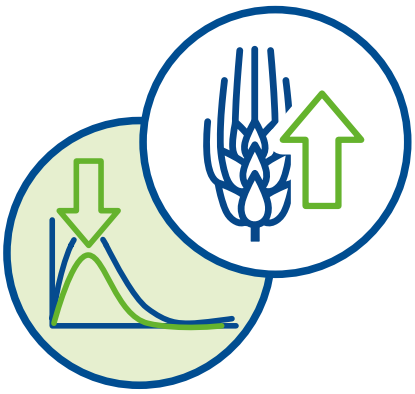
Figure 3.

Lower blood glucose with chicory root fibres replacing glycaemic carbohydrates (sucrose) in recipes.

Beta-Glucans – adding fibre to lower the blood glucose response

Beta-glucans are soluble fibres found naturally in cereals like barley or oats. **Orafti® β-Fit**, a whole-grain barley flour, contains about 20 % beta-glucans. When added to carbohydrate-rich foods such as bread, pasta or cereals, beta-glucans increase the food's viscosity. This delays its passage through the digestive system and the glucose uptake in the small intestine, resulting in a lower blood glucose response. Additionally, beta-glucans reduce blood cholesterol and support heart health.

A systematic review and meta-analysis confirms the properties of barley beta-glucan, when consumed with a variety of foods, to lower the blood glucose and insulin responses, as well as the Glycaemic Index.[20] Adding 3 to 4 g of beta-glucans to about 30 g of available carbohydrates per portion can significantly reduce blood glucose responses.[21,22] Adding beta-glucans also increases dietary fibre intake. Foods enriched with beta-glucans, like those containing chicory root fibre, are excellent sources of dietary fibre, helping to bridge the fibre gap.



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