A New Carbohydrate from PALATINIT
Providing the Better Energy
What is PALATINOSE™?

PALATINOSE™ is a pure, white, crystalline, sweet carbohydrate derived from the natural source of sucrose. It can be found in e.g. honey and sugar cane extract and was discovered by the R&D Department of Südzucker in 1957. The generic name of this sucrose-isomer is isomaltulose (chemical name: 6-O-α-D-glucopyranosyl-D-fructose).

PALATINOSE™ is made from sucrose by enzymatic rearrangement of the alpha 1,2 linkage between glucose and fructose to an alpha 1,6 linkage, still combining the glucose and the fructose molecule. Thus, sucrose becomes PALATINOSE™.

The difference of the molecular linkage of sucrose compared to PALATINOSE™ makes PALATINOSE™ more stable than sucrose with respect to pH-induced hydrolysis and enzymatic splitting in the mouth or in the intestine, resulting in physiological and technological benefits as described below.

Physiology

The key physiological characteristic of PALATINOSE™ is the combination of a low blood glucose response and the fact that it is fully digested and absorbed in the small intestine as glucose and fructose.

PALATINOSE™ Provides Longer Lasting Energy

Most interesting is that although hydrolysis and absorption is complete, it is much slower in comparison to sucrose. This leads to a lower increase of blood glucose and insulin level compared to glucose or sucrose. In consequence, the energy of PALATINOSE™ appears in the blood more slowly and with an extended duration which is reflected by a curve that is lower but longer than that of sucrose, glucose or highly digestible starches.

For muscles and brain this means a constant stream of energy over a longer period of time compared to quickly absorbed carbohydrates.

PALATINOSE™ is Very Low Glycemic

The resulting glycaemic index of PALATINOSE™ is only 32, making it a very low glycemic carbohydrate.

Glycemic Index (GI)...

...is a quantitative measure for ranking foods according to their effect on blood glucose levels.

<table>
<thead>
<tr>
<th>GI Level</th>
<th>Values</th>
</tr>
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<tbody>
<tr>
<td>High GI</td>
<td>≥ 70</td>
</tr>
<tr>
<td>Low GI</td>
<td>≤ 55</td>
</tr>
<tr>
<td>Medium GI</td>
<td>56–69</td>
</tr>
<tr>
<td>Very low GI</td>
<td>&lt; 40</td>
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</tbody>
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No Blood Glucose Overreaction with PALATINOSE™

The intake of regular sugars often leads to a hypoglycemic undershoot. In contrast, the curve of the blood glucose response of PALATINOSE™ does not fall below baseline as known from instantaneously available carbohydrates, e.g., sucrose and maltodextrins. A hypoglycemic undershoot known with high glycemic carbohydrates may lead to earlier meal initiation. A low glycemic diet may therefore be considered useful to reduce the risk of overweight and obesity.

Blood Glucose Level of PALATINOSE™ Does Not Fall Below Baseline

PALATINOSE™ is Very Low Insulinemic

Similar to the lower blood glucose response also the insulin response to PALATINOSE™ is very low. Studies have shown an insulin index of 30 for PALATINOSE™.

PALATINOSE™ – a Good Way of Energy Supply

As PALATINOSE™ is slowly but fully digested and absorbed in the small intestine it provides the same calories as most other sugars (4kcal/g). After absorption, glucose and fructose from PALATINOSE™ are metabolized following the same classical routes as glucose and fructose from sucrose. As PALATINOSE™ cleavage and absorption is slow but complete, gastrointestinal tolerance of PALATINOSE™ is comparable to that of sucrose even at high intake levels.

PALATINOSE™ – a Low Insulinemic Carbohydrate

PALATINOSE™ – a Good Way of Energy Supply

PALATINOSE™ is Kind to Teeth

As another consequence of the more stable glucose-fructose linkage compared to sucrose, PALATINOSE™ is hardly fermented by oral microbes and can even inhibit the formation of insoluble glucans. pH-telemetry tests confirmed the non-cariogenicity of PALATINOSE™ – thus it is an ideal alternative to sucrose, glucose, maltodextrin and other highly digestible and highly fermentable carbohydrates.

PALATINOSE™ Supports Weight Control

High insulinemic diets with regular sugars favor fat storage and may lead to insulin resistance (pre-diabetic state), overweight and obesity. Low insulinemic diets might promote the mobilization of fat and the use of fatty acids as energy source. With its low insulin index PALATINOSE™ can support fat oxidation.

- Reduced storage of fat
- Reduced storage of glucose
- Use of glucose as energy source

Influencing factors in prevention and weight management
Sensory Profile

Taste and appearance of PALATINOSE™ are similar to sucrose providing a natural sweet perception without any aftertaste. Its sweetening power, in comparison to a 10% sucrose solution, is about 50% — increasing in sweetening power as the concentration is increased.

PALATINOSE™ displays a mild sweetness providing volume and texture for a food or beverage. Depending on the application, a combination of PALATINOSE™ with other carbohydrates or high intensive sweeteners can result in an improved sweetness, taste and texture of the final product. In combination with other functional ingredients like omega-3-fatty acids, soy and others, a masking effect on taste and odor of those ingredients can be observed.

Technological Applicability

In an aqueous solution the viscosity of sucrose and PALATINOSE™ is similar.

Solubility

The solubility of PALATINOSE™ is 29% (20°C; aqueous solution) and the melting temperature is lower (120°–128°C) compared with sucrose (160°–185°C).

Stability

PALATINOSE™ shows a very good stability under acidic conditions for instance in beverages. As a reducing sugar — it tends to undergo a maillard reaction resulting in coloration only at around 140°C. The reducing power of PALATINOSE™ is ~ 50% of glucose.

PALATINOSE™ is not hygroscopic and the powder has an excellent flowability. It therefore is an ideal ingredient e.g. for instant beverages. Moreover, as PALATINOSE™ is not fermented by environmental microbes and lactobacilli it can be used as an fermentable carbohydrate e.g. in dairy applications.

The shelf life of PALATINOSE™ is comparable to that of sucrose. PALATINOSE™ should be stored under dry conditions and moderate temperatures. Overall, the physicochemical properties of PALATINOSE™ permit the substitution of sucrose or fructose in most foods and beverages.
Conclusion

As low glycemic food is expected to be one of the three most profitable hotspots in the near future, PALATINOSE™ seems to be the ideal substance for a “healthy and better” energy supply.

PALATINOSE™ may replace the “sweetener or carbohydrate-part” in a product or can be combined with other carbohydrates to provide a product with nutritional benefits; either prolong its glucose and energy release and/or to provide a low glycemic property. As shown in a scientific review (Livesey), studies in overweight or obese adults and children show that under ad libitum conditions low-GI diets are associated with marked weight benefits, loss of adiposity and reduced food intake.

Looking at technological properties and considering the nutritional benefits, PALATINOSE™ allows and optimizes the development of wellness and functional drinks, be it in instant formulas or as ready-to-drink beverages. But also sports drinks that aim at extending and completing their energy supply from “fast and instantaneously available” to “slow release” carbohydrates can benefit from this new ingredient. For the convenient and on-the-go-breakfast new energy and cereal bars or dairy drinks can be developed, as well as instant tea and coffee specialties seeking a wellness positioning.

The basic physiological and technological parameters of PALATINOSE™ are summarized below.

**Physiology**
- Prolonged energy release
- Energy = 4.0 kcal/g
- Low insulin reaction
- Kind to teeth
- Good digestibility = sucrose
- Low blood glucose response = very low glycemic

**Technology**
- Not hygroscopic
- Very pH stable in solution
- Mild sweetness
- Taste profile = sucrose
- Good solubility
- Reactivity > sucrose

PALATINOSE™ is a food that is marketed in Asia, in Europe, the United States and other countries. It’s food status was recently confirmed by its novel food approval for use as food or food ingredient in foodstuffs in the European Union. We will be happy to provide details on the legislative situation in the country you are interested in.

**References**
