connecting nutrition and health

Palatinose™
The next generation sugar

Palatinose™ …
… perfectly fits trend platforms

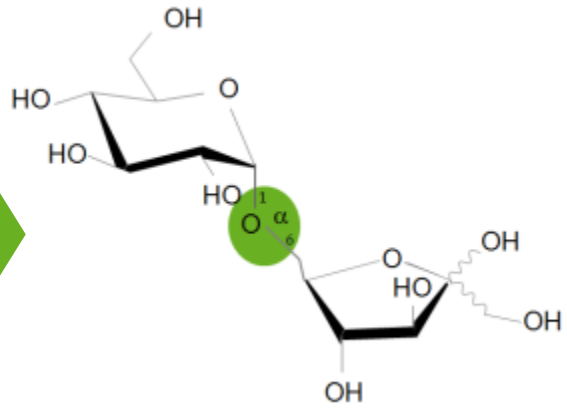
Source: 12 Key Trends in Food, Nutrition & Health 2014 by Julian Mellentin, New Nutrition Business

Palatinose™
The next generation sugar

- Generic name: isomaltulose
  (6-0-α-D-glucopyranosyl-D-fructofuranose)
- Sucrose isomer (disaccharide) composed of glucose and fructose
  (Total molecular formula: $C_{12}H_{22}O_{11}$ x H_2O; Molecular weight: 360.32)
- A natural sweet constituent of honey and sugar molasses
- Non-GMO, kosher & halal

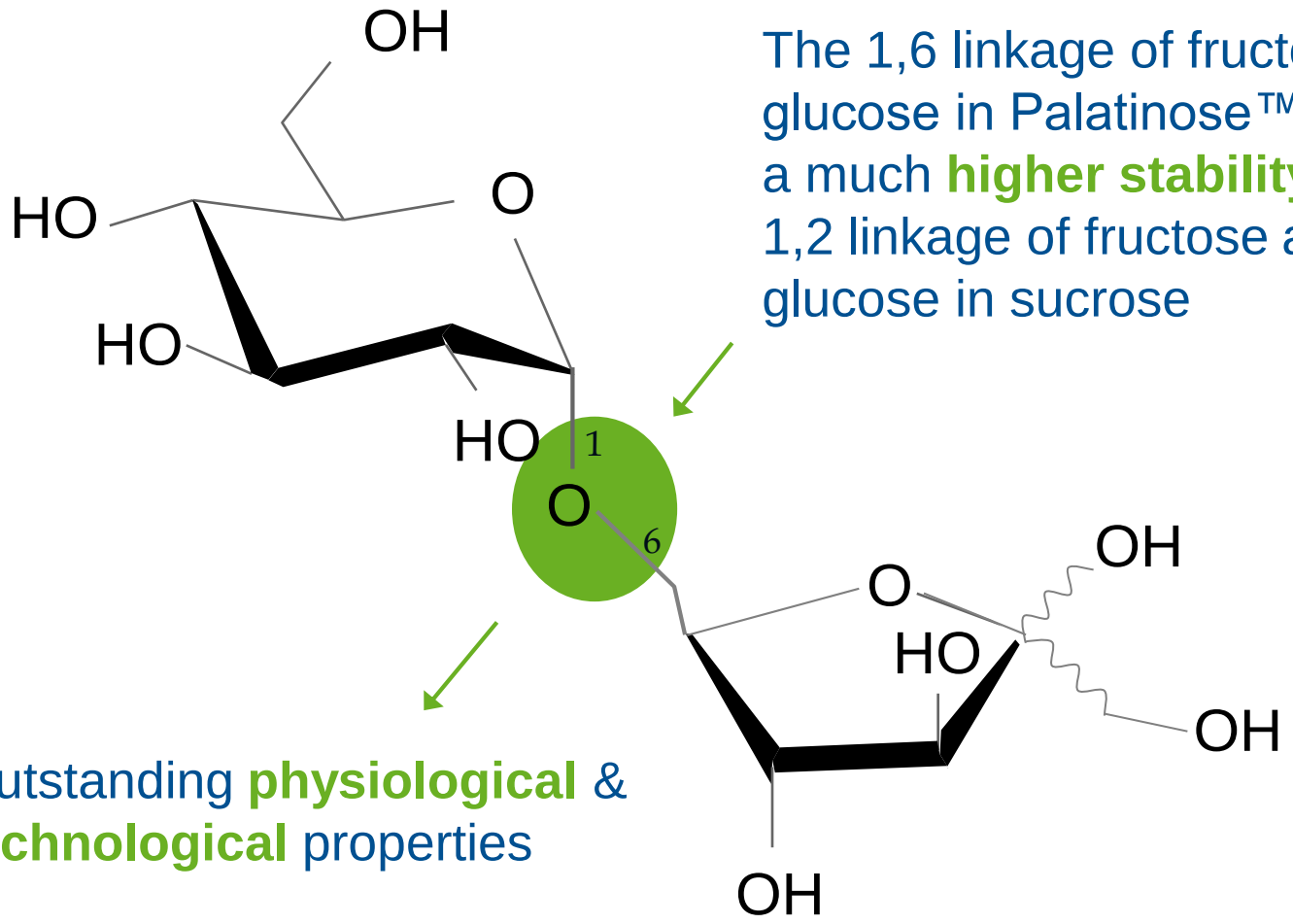
Sugarbeet

Sugar



Palatinose™ (isomaltulose)

Palatinose™
Exhibits a stronger molecular bond



The 1,6 linkage of fructose and glucose in Palatinose™ exhibits a much **higher stability** than the 1,2 linkage of fructose and glucose in sucrose

Outstanding **physiological** & **technological** properties

Palatinose™
Unique physiological & technical benefits

Physiological Benefits

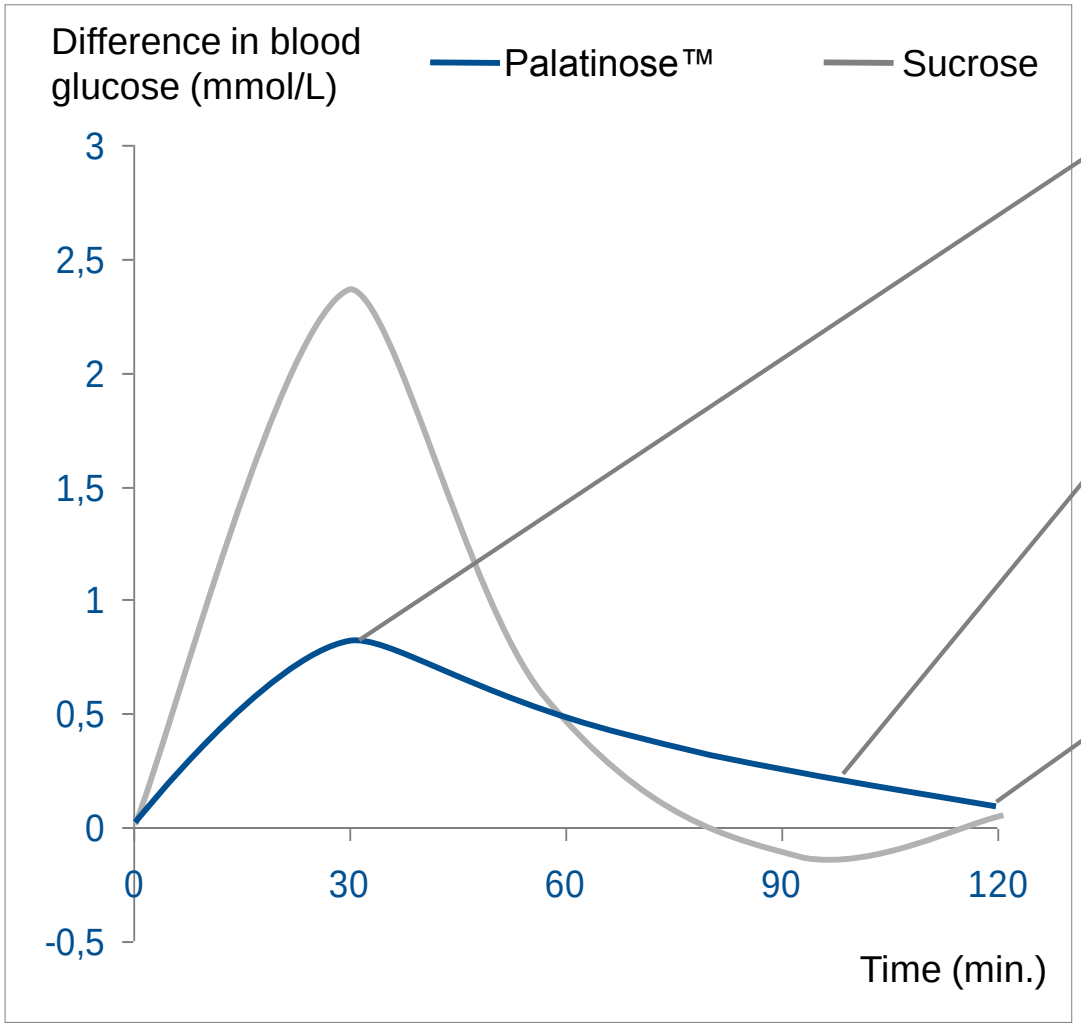
- Slowly yet fully digestible
- Reduced glycemic response [1, 2]
- Reduced insulinemic response
- Balanced and sustained energy release in the form of glucose [2]
- Improved fat oxidation [2]
- Kind to teeth [1, 2]
  (does not promote tooth decay)

Technical & Sensorial Benefits

- Very low hygroscopic
- Highly stable at acidic conditions (stable isotonicity / osmolarity)
- Highly stable in UHT and pasteurization processes
- Enhanced microbiological stability (cannot be converted by many yeasts and bacteria)
- Sugar-like taste, mild sweetness

[1] Approved Health Claims in Europe
[2] Claims possible outside Europe

Palatinose™ - Balanced & sustained energy release in form of glucose



With Palatinose™: little increase in blood glucose level → *lower glycaemic response*

With Palatinose™: no substantial drop of blood glucose level below the base line → *more balanced*

With Palatinose™: prolonged energy release in the form of glucose → *sustained*

Blood glucose response to Palatinose™ in comparison to other carbohydrates in healthy adults.
The curves are generated from different studies and represent the response to 50g oral carbohydrate in drinks solution (Livesey)

Palatinose™
Regulatory status for isomaltulose

- **Novel Food** in the EU since 2005

  - Is an **ingredient** for the use in food in general,
    whereas product specific legislation may provide specific compositional requirements (e.g. “milk”, or “fruit juice”)

  - Is a **carbohydrate** and accounted to ***sugars*** in the EU

    ‘sugars’ means all monosaccharides and disaccharides present in food, but excludes polyols (Regulation (EU) 1169/2011)

- **GRAS** notified in the US

- **NOT a food additive** on international (CODEX) level,
  - thus, there is NO acceptable daily intake (ADI) established

Palatinose™
Strong health claims in EU

Conditions of Use	EFSA's proposed wording reflecting the scientific evidence	Product focus	Region
30 % replacement of other sugars	Consumption of foods/drinks containing ISOMALTULOSE instead of other sugars induces a lower blood glucose rise after meals compared to sugar-containing foods/drinks.	All food applications	EU approved * 
Other sugars should be replaced in foods or drinks by isomaltulose in amounts such that consumption of such foods or drinks does not lower plaque pH below 5.7 during and up to 30 minutes after consumption (…)	Consumption of foods/drinks containing ISOMALTULOSE instead of other sugars contributes to the maintenance of tooth mineralization.	All food applications	EU approved * 

* Reference: Regulation (EU) 432/2012

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Palatinose™ - Recommendations for blood glucose related claims (outside EU)

Benefit Category	Addressed health effect – wordings to be adjusted to product positioning and food legislation	Recommended usage level	Product focus
Reduced post-prandial glycemic response	• Low effect on blood glucose levels • Low glycemic • More balanced blood glucose supply	10g per intake occasion*	All foods & beverages
Sustained energy	• Sustained energy release • Longer-lasting energy release • Palatinose™ provides energy (in form of blood glucose) over a longer period of time	15g per intake	Beverage applications
Sports nutrition	• Promotes fat burning during exercise • Provides carbohydrate energy while it allows a higher rate of fat burning	25g per intake	Sports-type beverage applications
Fat oxidation	Potential claims currently being evaluated	20g (10g)**	All foods & beverages

* Palatinose™is a low glycemic carbohydrate and is ideal for foods formulated for blood sugar control. Glycemic testing requires a minimum of 10 grams of available carbohydrate content. Therefore, the minimum substantiated quantity of Palatinose™ for confirming postprandial glycemic response is 10 grams.
** Fat oxidation is related to the low glycemic response for which 10g per intake occasion is recommended. Beneo measured fat oxidation with 20g as the lowest dose.

Palatinose™
Opportunities in food & beverages

Palatinose™ fits a multitude of applications:

- RTD beverages
  - Sports & functional beverages
  - Energy drinks
  - Malt beverages
  - Fruit juice beverages
- Powder based drinks
- Confectionery
- Clinical & infant nutrition
- Baked goods, glazings & icings
- Breakfast cereals & cereal bars
- Dairy products & frozen desserts






Palatinose™
Product portfolio

Palatinose™ PST-N	**Crystalline: 90% < 0,71 mm**	• Functional Beverages • Sports Nutrition • Dairy Products • Beer and beer specialties • Meal Replacement • Clinical & Special Nutrition • Chocolate, Cereals & Bars
Palatinose™ PST-PF	**Powder: 90% < 0,1 mm**	• Powder Drinks & Blends • Coated Products • Granulates & Agglomerates
Palatinose™ PST-PA	**Powder: 90% < 0,05 mm**	
Palatinose™ PAP	**Available as above, with advanced profile for dental claims**	• Toothfriendly Products (Chocolate, Drinks, Coating, Confectionery)






Palatinose™
Platforms

Energy & Performance

Weight Management

Blood Glucose Management

Dental Health

Technical

Palatinose™
Trend Platform: Energy & Performance

- Palatinose™ provides **balanced and sustained energy** in the form of glucose
- Palatinose™ promotes **fat oxidation** for endurance activities

- Applicable e.g. in energy drinks, sports & functional nutrition, dairy, cereals, baked goods …

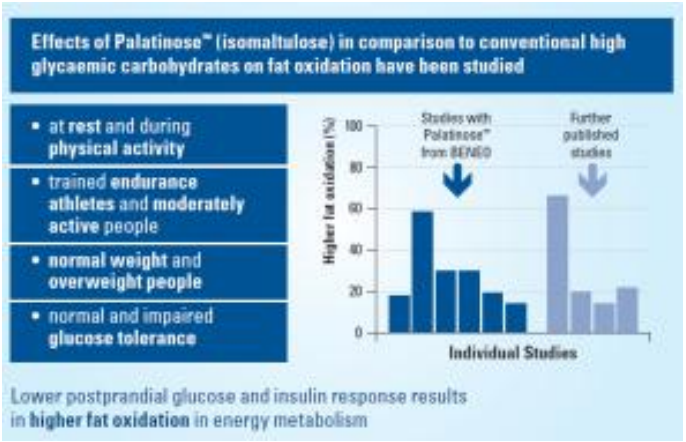
Power Chews

Sports Performance Instant Drink

Power Müsli

Palatinose™
Trend Platform: Weight Management

- Palatinose™ promotes **fat oxidation**
  - More balanced and prolonged energy supply
    → improved metabolic profile
    → higher fat oxidation
    → long term benefits on body fat accumulation



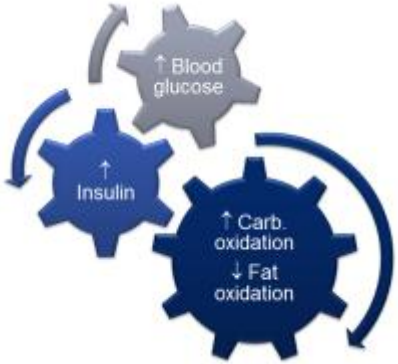


Figure 7: window to science 1|2012 – 2nd European BENEO Scientific Symposium

- EU: Indirect communication via "low GI message"; no direct claim in place
- Ex EU: Direct communication via BENEO's recommendations for fat ox
- Applicable e.g. in beverages, special nutrition, meal replacement products…

Palatinose™
Trend Platform: Blood Glucose Management

- Palatinose™ is **low glycemic (GI: 32)** and low insulinemic
- Solid scientific evidence (> 30 human studies)
- **Strong Health Claim** on blood glucose response in Europe
- Applicable e.g. in beverages, sports and special nutrition, cookies, confectionery …

Power Cookies

Low GI chocolate drink

Low GI chocolate

Palatinose™
Trend Platform: Dental Health

- Palatinose™ is **the only fully available sugar** scientifically proven to be non-cariogenic (tooth friendly)
  - EFSA approved Health Claim in Europe
  - Approved Health Claim in the US
  - Safe for children (no laxation disclaimers needed!)
- Applicable in infant tea & kids confectionery
  e.g. chocolate (lentils), bubble gum, chewy candies …

Tooth friendly chocolate lentils

Tooth friendly bubble gum

Tooth friendly chocolate

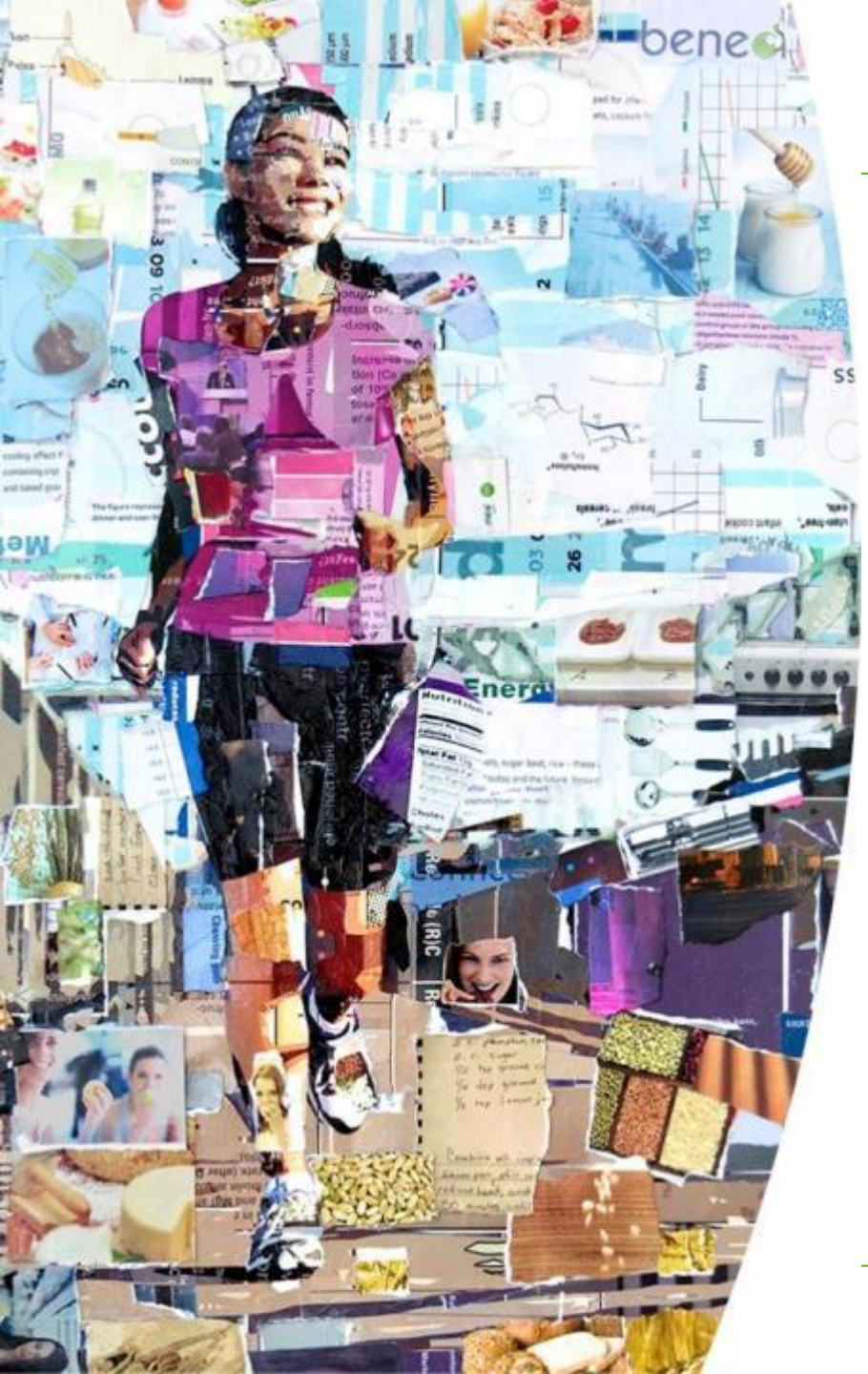
Palatinose™
Technical Platform

- **Shelf life and quality improvement** of glazed and iced bakery products
  - Extended shelf life stability in freshly packed donuts
  - Maintained transparency in freshly and frozen packed donuts, even after defrosting
  - Reduced stickiness of the glaze during freezing and after defrosting

- **Improved stability, mouth-feel** and **taste** in (alcohol free) malt beverages

Palatinose™
Medical & Infant Nutrition

- **Improved metabolic profile** in senior adults and infants (> 6 months)
- **Low glycemic properties may support "early programming" in children,** playing a part in **obesity prevention** during later life
- Helps to **reduce peak postprandial blood glucose response** and glycemic variability in people with diabetes
  - Suitable for patients with diabetes with impaired glucose tolerance
  - Can be used in sole source nutrition
- Suitable for oral and tube feeding



Palatinose™

The unique carbohydrate for your Trend & Technical Innovations