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Clinical studies of Good Idea®

This document provides a brief summary of studies underlying Good Idea® dietary supplement.
The final formula is based on a series of clinical studies with different doses of the active ingredients, *ie* five free amino acids (leucine, isoleucine, valine, lysine, threonine) and chromium (as Cr-picolinate).
The latter are blended in carbonated and lightly flavored water and consumed in conjunction with meals rich in carbohydrates. With few exceptions, the meal studies have been performed in non-diabetic, normal to overweight subjects.

For more details about the research and clinical studies, please contact
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Proof of concept studies of Good Idea®

1. Proof of concept North America (completed in 2017, submitted for publication)

- **Study design:** Double-blind, randomized, placebo controlled, cross-over study
- **Study locations:** London, ON, Canada and Orlando, FL, USA
- **Subjects:** 48 non-diabetic, overweight men (25) and women (23)
    - Mean BMI: 27.4 kg/m^2 (24-30)
    - Mean age: 35.5 years (20-50)
- **Meal:** White bread, butter and ham. In total 46 g carbohydrates, 14 g protein and 14 g fat (total 372 kcal). Good Idea® or placebo was consumed 3 min before (175 ml) and then during the meal (180 ml). The latter was divided in 4 servings à 50 ml at times 3 min (after first bite), 7 min and 11 min, as well as the remaining 30 ml at time 14 min.
- **Test product:** 355 ml Good Idea® LemonLime (2.6 g AA + 250 µg CrPic) or placebo
- **Main results:** Acute consumption of Good Idea™ with a standardized meal elicited a significant 29% reduction in post-prandial blood glucose $iAUC_{0\text{-}120min}$, as well as a 6% decrease in C_{max} compared to placebo (ITT-population, n=60). The observed reduction in post-prandial blood glucose was associated with significantly elevated insulin concentrations at the 30-minute time point relative to baseline, while there was no significant difference in overall insulin after Good Idea® compared to placebo.

2. Proof of concept Europe (completed in 2016, unpublished data)

- **Study design:** Double-blind, randomized, placebo controlled, cross-over study
- **Study location:** Lund, Sweden
- **Subjects:** 25 non-diabetic, normal weight, men (12) and women (13).
    - Mean BMI: 21.9 kg/m^2 (19-25)
    - Mean age: 26.8 years (19-52)
- **Meal:** White bread, butter and ham. In total 50 g carbohydrates and 14 g protein.
  Good Idea® or placebo was consumed before (110 ml) and during the meal (220 ml) in 6 servings à 55 ml at time - 3 min, -1.5 min, 0 min (start of meal), 3 min, 6 min and 9 min.
- **Test products:** Good Idea® LemonLime (2.6 g AA + 250 µg CrPic)
  GI_{half} (1.3 g AA + 250 µg CrPic)
  $GI_{quarter}$ (0.65 g AA + 250 µg CrPic)
- **Main results:** Acute consumption of Good Idea® with a standardized meal elicited a significant 24% reduction in the post-prandial blood glucose $iAUC_{0\text{-}180min}$, as well as a 25% decrease in C_{max} compared to placebo. No other statistical differences were found for glucose responses between the different GI-doses and the placebo. There was no significant difference in $iAUC_{0\text{-}180min}$ for insulin after Good Idea® or any of the other GI-doses, compared to placebo.

Pilot trials with Good Idea®

3. Pilot study of Good Idea served without a meal (completed in 2018, unpublished data)

- **Study design:** Single-blind, randomized, placebo controlled, cross-over study
- **Study location:** Lund, Sweden
- **Subjects:** 9 non-diabetic, overweight, men and women.
    - Mean BMI: 28.1 kg/m^2 (25.8-32.4)
    - Mean age: 34 years (23-47)
- **Meal:** No meal was served
- 175ml of Good Idea® or placebo was consumed at 0 min and then 3 servings of 50 ml each were consumed after 3, 7 and 11 min and a final dose of 30 ml was consumed at 14 min.
- **Test product:** Good Idea® LemonLime (2.6 g AA + 250 µg CrPic)
- **Main results:** There was no overall difference in insulin concentrations between treatments over 120 minutes ($p=0.362$, RM 2-way Anova), but there was a statistically significant ($p<0.001$) interaction between the time x treatment effect. A post hoc test revealed that there was a small, but statistically significant increase of insulin after consuming Good Idea at 15 minutes ($p=0.010$) and at 30 minutes ($p<0.001$), compared to placebo.
  For capillary glucose there was a statistically significant overall difference between the investigational product and placebo over 120 minutes ($p=0.040$) and a significant interaction between treatment and time ($p=0.006$). A post hoc statistical comparison revealed statistically significant lower glucose values after Good Idea at time points 45 and 120 minutes ($p= 0.027$ and $p<0.001$ respectively). Important to note is that all capillary glucose levels measured were well within the range of normal fasting glucose values for both Good Idea and placebo.

4. Pilot trial with Good Idea and a commercial meal (completed in 2017, unpublished data)

- **Study design:** Single-blind, randomized, placebo controlled, cross-over study
- **Study location:** Lund, Sweden
- **Subjects:** 11 non-diabetic, overweight, men (4) and women (7).
    - Mean BMI: 27.1 kg/m^2 (24.8-30.9)
    - Mean age: 28 years (19-52)
- **Meal:** Commercial thick crust pizza served with iceberg lettuce. In total 36 g carbohydrates and 10 g protein (total 243 kcal)
- Good Idea® or placebo was consumed before (175ml at 0 min) and during the meal (175 ml) in 3 servings of 50 ml (at 3, 7 and 11 min) and one serving of 30 ml at 14 min.
- **Test product:** Good Idea® LemonLime (2.6 g AA + 250 µg CrPic)
- **Main results:** Acute consumption of Good Idea® with the standardized pizza meal elicited a 37% reduction in the post-prandial blood glucose $iAUC_{0\text{-}180min}$, as well as a 35% decrease in C_{max} compared to placebo. None of the results were statistically significant but that was expected since this pilot trial was not powered to reach statistical differences. There was no significant difference in $iAUC_{0\text{-}180min}$ for insulin after Good Idea® compared to placebo.

5. Pilot study in pre-diabetic and type 2 diabetic patients

(Completed in 2016, data presented at German Diabetes congress, Berlin, Germany, 2016)

- **Study design:** Double-blind, randomized, controlled, cross-over pilot study
- **Study location:** Heidelberg, Germany
- **Subjects**: Diabetic (13) and Pre-diabetic (7) patients
    - Mean BMI: 34 kg/m^2
    - Mean age: 52 years
- **Meal:** White bread, butter & jam. In total 50 g carbohydrates. 100 ml of carbonated, flavored water without (placebo) or with 1.75 g 5AA+125 µg CrPic was taken before the meal. Another 230 ml of the drink was consumed with the meal.
- **Main results:** There was no reduction of post-prandial plasma glucose in either diabetic or pre-diabetic patients by the 5AACrPic drink *vs*. placebo. The diabetic patients had an early increase of serum insulin, whereas the pre-diabetics had not.

Studies to optimize recipe and timing of intake

Please note that the test products included in the studies below vary somewhat as to their contents of the 5AA and CrPic compared with Good Idea®.

6. Two doses study

(Data presented at American College of Nutrition conference, San Diego, CA, 2016)

- **Study design:** Single-blind, randomized, placebo controlled, cross-over study
- **Study location:** Lund, Sweden
- **Subjects:** 19 non-diabetic, normal and overweight men (9) and women (10)
    - Mean BMI: 24.1 (18.6-31.9)
    - Mean age: 26.2 (21-43)
- **Meal:** White bread, butter and strawberry jam. In total 50 g carbohydrates and 7 g protein. Carbonated, flavored water without (placebo) or with two different doses of 5AA+CrPic were consumed as half the bottle (165 ml) before the meal and the other half (165 ml) during the meal.
- **Test products:** 2.6 g AA+186 µg CrPic (5AACrPic_2.6)
  5.2 g AA+186 µg CrPic (5AACrPic_5.2)
- **Main results:** Glucose $iAUC_{0\text{-}180\ min}$ was significantly reduced by 31% for 5AACrPic_2.6 compared to placebo, with only a non-significant trend of reduction (26%) for 5AACrPic_5.2. The overall insulin responses were not significantly increased by any dose of 5AACrPic compared to placebo.

7. Timing study (unpublished data)

- **Study design:** Single-blind, randomized, placebo controlled, cross-over study
- **Study location:** Lund, Sweden
- **Subjects**: 20 non-diabetic, normal men (11) and overweight (9)
    - Mean BMI 27.6 (22.9-30.8)
    - Mean age 33.5 (19-59)
- **Meal:** 125 g cod, 250 g mashed potatoes (44 g powder + 200 ml Boiled water), 20 g melted butter, 50 g lingonberry jam, 50 g cucumber. In total 49 g carbohydrates and 34 g protein.
- **Test product:** Carbonated flavored water without (placebo) or with 2.6 g 5AA+186 µg CrPic (5AACrPic)
- **Timing of product intake:**
    1. Placebo, ½ serving consumed before the meal (and the rest together with the meal).
    2. 5AACrPic, ½ serving consumed before the meal (and the rest together with the meal).
    3. Placebo, together with the meal (no drink before eating).
    4. 5AACrPic, together with the meal (no drink before eating).
- **Main results:** No differences in glucose responses (iAUC) were found between any products or intake regimes. C_{max} for glucose was significantly lower after taking 5AACrPic in the "pre-meal" regimen compared to the same product taken "during" the meal. No statistical differences were found in the overall insulin response ($iAUC_{0\text{-}120min}$). The insulin iAUC for 0-15 min was significantly higher after the 5AACrPic taken in the "pre-meal" regimen compared to all other test meals. For iAUC 0-30 min the insulin iAUC was significantly higher for 5AACrPic, both in the "during" and "pre-meal" regimens.

8. Breakfast study

(Data presented at German Diabetes congress, Berlin, Germany, 2016)

- **Study design:** Single-blind, randomized, controlled, cross-over
- **Study location:** Lund, Sweden
- **Subjects:** 20 non-diabetic, normal-overweight men (11) and women (9)
    - Mean BMI: 24 (20-31)
    - Mean age: 42 (22-59)
- **Meal:** White wheat bread, butter and jam. In total 63 g carbohydrates, 9 g protein and 12 g fat (total 380 kcal)
- **Test product:** Carbonated, flavored water without (placebo) or with 1.75 g 5AA + 125 µg CrPic. Subjects were instructed to take a couple of sips before starting the meal.
- **Main results:** When having 5AACrPic with the meal, a 41% reduction in blood glucose response was observed compared to placebo, without a reduction in C_{max}. No statistical increase in the insulin response was observed.

9. Dose-response study (Data presented at IDF Congress, Vancouver, Canada, 2015)

- **Study design:** Single-blind, randomized, placebo controlled, cross-over trial
- **Study location:** Lund, Sweden
- **Subjects:** 16 non-diabetic, normal-overweight men (9) and women (7)
    - Mean BMI: 27.5 kg/m^2 (23-32)
    - Mean age: 54 years (37-66)
- **Meal:** Mashed potato, oven cooked fish (cod), melted butter, cucumber, lingonsylt.
  In total 50 g carbohydrates, 27 g protein and 17 g fat (total 472 kcal).
  100 mL of the drink taken within 3 min before starting the meal and the rest during the meal.
- **Test products:** Carbonated and flavored water without (placebo) or with:
    a) 6.9 g 5AA + 500 µg CrPic (5AACrPic-high)
    b) 3.5 g 5AA + 250 µg CrPic (5AACrPic-medium)
    c) 1.75 g 5AA + 125 µg CrPic (5AACrPic-low)
- **Main results:** All three doses of 5AACrPic reduced the blood glucose response significantly by 21-28%, compared to placebo. C_{max} of glucose was reduced by 15-20%. By reducing the dose of the 5AACrPic mix, less insulin was required to obtain the reduction in postprandial glycemia compared with the highest dose. The overall insulin response was not significantly increased for 5AACrPic-medium and 5AACrPic-low, compared to placebo. GLP-1 tended to increase for all 5AACrPic containing meals (+39% (high), +55% (med), +65% (low)) but did not reach significance.

10. Juice study (unpublished data)

- **Study design:** Single-blind, randomized, controlled, cross-over trial
- **Study location:** Lund, Sweden
- **Subjects**: 13 non-diabetic, overweight men (6) and women (7)
    - Mean BMI: 27.8 kg/m^2 (24-30)
    - Mean age: 54 years (40-60)
- **Meal:** White bread, butter & orange jam – Totally 78 g available starch (50 g from the bread), 9 g protein and 10 g fat (total 448 kcal)
- **Test product:** Water (110 ml), orange juice concentrate (48 g), aroma, malic acid and without (placebo) or with 6.9 g 5AA+500 µg CrPic
- **Main results:** The 5AA+CrPic juice lowered blood glucose iAUC 0-120 min significantly by 22% and C_{max} by 25%. The postprandial insulin responses were significantly higher for the 5AA+CrPic juice compared to placebo.

11. Single or combined active ingredients

(Data published in *Functional Foods in Health and Disease*, Feb 2017)

- **Study design:** Single-blind, randomized, controlled, cross-over trial
- **Study location:** Lund, Sweden
- **Subjects:** 19 non-diabetic, overweight med (11) and women (8)
    - Mean BMI: 27.3 kg/m^2
    - Mean age: 51 years
- **Meal:** White bread, butter & orange jam. In total 64 g carbohydrates (50 g from the bread), 9 g protein and 12 g fat (total 380 kcal)
- **Test product:** Carbonated, flavored water without (placebo) or with 6.9 g 5AA alone or in combination with 500 µg CrPic, taken together with the meal.
- **Main results:** 5AA+CrPic significantly lowered C_{max} (called iPeak) by 27% compared to placebo, and tended to reduce glucose response $iAUC_{0\text{-}120\ min}$ by 20% (non-significant). Early insulin increase did not reach significance after 5AA+CrPic, although the overall iAUC for insulin was significantly higher by about 30% for 5AA+CrPic compared with placebo. Compared with the 5AA drink, the 5AA+CrPic reduced the insulin release by about 50%, indicating an improved insulin economy by combining 5AA with CrPic.