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High or low glycemic index (GI) meals at dinner results in greater postprandial glycemia compared with breakfast: a randomized controlled trial

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Supplementary Table 1: Detailed composition of the test meals (TM), standardized meals (SM) and subsequent standardized meals (SSM).

| | Quantity (g) | Energy (kcal) | Protein (g) | Fat (g) | CHO (g) | Fiber (g) | Available CHO (g) |
|------------------------|-------------------------|--------------------------|--------------------|--------------------|--------------------|----------------------|------------------------------|
| TM High GI (92) | | | | | | | |
| Glutinous rice | 100.7 | 356.6 | 7.7 | 2.3 | 76.1 | 1.0 | 75.1 |
| Chicken seasoning | 2.0 | 4.5 | 0.3 | 0.1 | 0.7 | 0 | 0.7 |
| Green leafy vegetables | 20.0 | 6.9 | 0.6 | 0.4 | 0.3 | 0.1 | 0.2 |
| TOTAL | 122.7 | 368.0 | 8.5 | 2.7 | 77.1 | 1.1 | 76.0 |
| TM Low GI (55) | | | | | | | |
| Parboiled Basmati rice | 99.8 | 349.1 | 9.4 | 0.7 | 76.4 | 1.4 | 75.0 |
| Chicken seasoning | 2.0 | 4.5 | 0.3 | 0.1 | 0.7 | 0 | 0.7 |
| Green leafy vegetables | 20.0 | 6.9 | 0.6 | 0.4 | 0.3 | 0.1 | 0.2 |
| TOTAL | 121.8 | 360.5 | 10.2 | 1.1 | 77.4 | 1.5 | 75.9 |
| SM | | | | | | | |
| Shrimp wanton soup | 145.0 | 132.0 | 8.1 | 3.0 | 18.0 | 2.8 | 15.2 |
| Soya milk | 300.0 | 162.0 | 6.3 | 3.3 | 26.4 | 1.8 | 24.6 |
| Soybeans-based snack | 27.0 | 111.0 | 4.3 | 5.5 | 11.0 | 2.5 | 8.5 |
| Almond nuts | 40.0 | 233.0 | 9.2 | 19.5 | 5.3 | 4.3 | 1.1 |
| Banana | 125.0 | 110.0 | 1.0 | 0.0 | 30.0 | 3.0 | 27.0 |
| TOTAL | 637.0 | 748.0 | 28.9 | 31.3 | 90.7 | 14.4 | 76.4 |
| SSM | | | | | | | |
| Fried rice | 270.0 | 395.0 | 8.0 | 9.0 | 72.0 | 12.0 | 60.0 |
| Kiwi | 148.0 | 90.0 | 2.0 | 1.5 | 22.0 | 4.0 | 18.0 |
| Cashew nuts | 30.0 | 185.0 | 5.3 | 14.8 | 7.7 | 1.1 | 6.6 |
| Tofu | 160.0 | 110.4 | 11.2 | 5.6 | 3.6 | 0.6 | 3.0 |
| Light soy sauce | 15.0 | 8.9 | 1.1 | 0.0 | 1.1 | 0.0 | 1.1 |
| Oil | 1.0 | 8.2 | 0.0 | 0.9 | 0.0 | 0.0 | 0.0 |
| TOTAL | 624.0 | 797.5 | 27.6 | 31.8 | 106.4 | 17.7 | 88.7 |

The meals immediately prior to the test meals were standardized, i.e. the dinner prior to the breakfast test sessions and the lunch prior to the dinner test sessions. In the breakfast sessions, the 'subsequent standardized meal' (standard lunch, SSM) was consumed 3.5 hr following the test breakfast. While in the dinner sessions, the same SSM was consumed at the following breakfast approximately 14.5 hr following the test dinner. CHO: carbohydrate; GI: glycemic index; TM: test meal; SM: standard meal; SSM: subsequent standardized meal

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Supplementary Table 2: Baseline substrate and hormone concentrations before test meals (TM) and subsequent standardized meals (SSM).

| | Hi-Br | Lo-Br | Hi-Di | Lo-Di | P-value | | | |
|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|-------------------|-------------------|
| | | | | | Hi-Br vs Lo-Br | Hi-Di vs Lo-Di | Hi-Br vs Hi-Di | Lo-Br vs Lo-Di |
| TM | | | | | | | | |
| Glucose (mmol/L) | 4.81 ± 0.07 | 4.82 ± 0.07 | 4.98 ± 0.08 | 4.83 ± 0.09 | 0.8888 | 0.0823 | 0.0408 | 0.8613 |
| Insulin (mU/L) | 2.98 ± 0.26 | 3.34 ± 0.24 | 3.35 ± 0.41 | 3.42 ± 0.38 | 0.2705 | 0.6115 | 0.2552 | 0.5867 |
| Glucagon (pmol/L) | 6.16 ± 0.45 | 6.42 ± 0.49 | 7.69 ± 0.73 | 7.33 ± 0.74 | 0.7129 | 0.6104 | 0.0319 | 0.1995 |
| TG (mmol/L) | 1.09 ± 0.07 | 1.03 ± 0.07 | 1.99 ± 0.23 | 2.16 ± 0.39 | 0.8553 | 0.8687 | 0.0002 | <0.0001 |
| FFA (µmol/L) | 498.05 ± 28.88 | 466.98 ± 22.45 | 489.64 ± 26.35 | 520.38 ± 26.93 | 0.3415 | 0.3236 | 0.8176 | 0.0877 |
| SSM | | | | | | | | |
| Glucose (mmol/L) | 5.31 ± 0.19 | 5.74 ± 0.19 | 4.84 ± 0.07 | 4.89 ± 0.07 | 0.0100 | 0.7751 | 0.0046 | <0.0001 |
| Insulin (mU/L) | 15.05 ± 2.80 | 11.78 ± 1.57 | 3.28 ± 0.19 | 3.72 ± 0.30 | 0.0992 | 0.8489 | <0.0001 | 0.0001 |
| Glucagon (pmol/L) | 2.45 ± 0.23 | 3.37 ± 0.34 | 5.87 ± 0.32 | 6.15 ± 0.47 | 0.0221 | 0.4800 | <0.0001 | <0.0001 |
| TG (mmol/L) | 0.97 ± 0.08 | 0.93 ± 0.08 | 1.11 ± 0.08 | 1.29 ± 0.09 | 0.4983 | 0.0073 | 0.0024 | <0.0001 |
| FFA (µmol/L) | 62.82 ± 10.05 | 94.77 ± 11.83 | 562.54 ± 27.33 | 471.54 ± 21.87 | 0.2056 | 0.0004 | <0.0001 | <0.0001 |

A Linear Mixed model was used to compare the baseline concentrations before TM, using the within subject variability as a random factor. A sensitivity analysis was done on the log-transformed data to check for the robustness if some data were skewed. All results presented here are on non-transformed data, as the transformation was not necessary. Data are expressed as mean ± SEM, N=34 except for FFA, N=29 due to missing samples. $p < 0.05$ was considered as statistically significant. FFA: free fatty acid; Hi-Br: High-Glycemic Index Breakfast; Hi-Di: High-Glycemic Index Dinner; IL-6: interleukin-6; LO-Br: Low-Glycemic Index Breakfast; Lo-Di: Low-Glycemic Index Dinner; N: number of subjects; NT: nitrotyrosine; SSM: Subsequent Standardized Meal, TG: triglycerides; TM: test meal

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Supplementary Table 3: Main effects including interactions for test meal (TM) and for subsequent standardized meals (SSM) incremental areas under curve (iAUCs).

| Measurement | Effects | TM | TM | SSM | SSM |
|-------------------------|---------------------|---------|-------------------|---------|-------------------|
| | | F-value | p-value | F-value | p-value |
| Glucose | Glycemic index (GI) | 25.99 | <0.0001 | 8.92 | 0.0035 |
| | Meal time (MT) | 77.83 | <0.0001 | 43.01 | <0.0001 |
| | GI:MT interaction | 1.93 | 0.168 | 1.03 | 0.3130 |
| Insulin | Glycemic index (GI) | 73.18 | <0.0001 | 0.42 | 0.5185 |
| | Meal time (MT) | 7.40 | 0.0077 | 63.92 | <0.0001 |
| | GI:MT interaction | 1.23 | 0.2698 | 6.25 | 0.0141 |
| Triglycerides | Glycemic index (GI) | 0.11 | 0.7445 | 4.50 | 0.0363 |
| | Meal time (MT) | 16.66 | <0.0001 | 15.62 | 0.0001 |
| | GI:MT interaction | 0.07 | 0.7917 | 1.05 | 0.3079 |
| Free Fatty Acids | Glycemic index (GI) | 1.16 | 0.2850 | 2.85 | 0.0952 |
| | Meal time (MT) | 6.54 | 0.0123 | 446.82 | <0.0001 |
| | GI:MT interaction | 2.36 | 0.1283 | 9.63 | 0.0026 |
| Glucagon | Glycemic index (GI) | 3.05 | 0.0838 | 4.73 | 0.0318 |
| | Meal time (MT) | 3.46 | 0.0656 | 67.56 | <0.0001 |
| | GI:MT interaction | 0.14 | 0.7047 | 19.98 | <0.0001 |

Linear Mixed Models were applied explaining the iAUCs following test meals (TM) and following subsequent standardized meals (SSM) according to the Glycemic Index (GI), the meal time (MT, either breakfast or dinner) as well as the interaction between the 2 factors. The baseline concentrations immediately prior to TM were used to calculate the respective the TM iAUCs. The baseline concentrations immediately prior to SSM were used to calculate the respective the SSM iAUCs. $p < 0.05$ was considered as statistically significant (in **bold**).

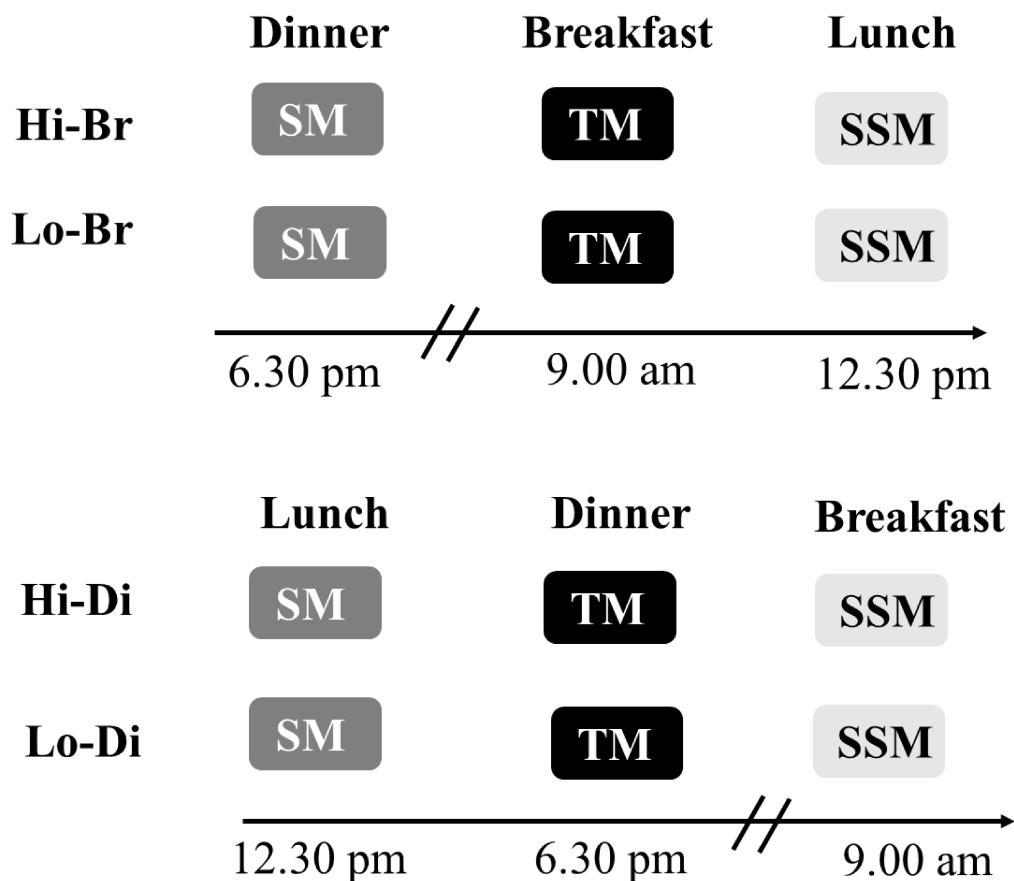
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Supplementary Table 4: Main effects including interactions for combined total areas under curve (tAUCs) for test meals (TM) and subsequent standard meals (SSM).

| Measurement | Effects | TM+SSM F-value | TM+SSM p-value |
|-------------------------|---------------------|-------------------|-------------------|
| Glucose | Glycemic index (GI) | 29.51 | <0.0001 |
| | Meal time (MT) | 79.26 | <0.0001 |
| | GI:MT interaction | 11.18 | 0.0012 |
| Insulin | Glycemic index (GI) | 31.43 | <0.0001 |
| | Meal time (MT) | 10.81 | 0.0014 |
| | GI:MT interaction | 2.62 | 0.1089 |
| Triglycerides | Glycemic index (GI) | 0.01 | 0.9110 |
| | Meal time (MT) | 28.83 | <0.0001 |
| | GI:MT interaction | 0.97 | 0.3261 |
| Free Fatty Acids | Glycemic index (GI) | 0.47 | 0.4929 |
| | Meal time (MT) | 192.57 | <0.0001 |
| | GI:MT interaction | 1.95 | 0.1659 |
| Glucagon | Glycemic index (GI) | 2.05 | 0.1554 |
| | Meal time (MT) | 13.73 | 0.0003 |
| | GI:MT interaction | 6.07 | 0.0153 |

Linear Mixed Models were applied explaining the combined tAUCs (6 hr) following TM and SSM according to the Glycemic Index (GI), the meal time (MT, either breakfast or dinner) as well as the interaction between the 2 factors. $p < 0.05$ was considered as statistically significant.

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**Supplementary Figure 1**

Experimental design of the study. Each volunteer completed 4 separate intervention sessions for the study, in a random order, consisting of High-Glycemic Index Breakfast (Hi-Br), Low-Glycemic Index Breakfast (Lo-Br), High-Glycemic Index Dinner (Hi-Di) and Low-Glycemic Index Dinner (Lo-Di) sessions.

The meals immediately prior to the test meals (TM) were standardized (Standard Meal, SM). For the two breakfast intervention sessions, the volunteers consumed the test breakfast (Hi-Br or Lo-Br) at 9.00 am, followed 3.5 h later by a standardized lunch (subsequent standardized meal, SSM). Similarly, during the dinner intervention sessions, the volunteers consumed a SM at 12.30 pm prior to the TM (consumed at 6.30 pm). The following morning at 9.00 am, volunteers consumed the SSM for breakfast. Blood measurements undertaken during 3 h postprandial periods following TM and SSM during each session.

Hi-Br: High-Glycemic Index Breakfast; Hi-Di: High-Glycemic Index Dinner; LO-Br: Low-Glycemic Index Breakfast; Lo-Di: Low-Glycemic Index Dinner; SM: standard meal, SSM: subsequent standardized meal; TM: test meal