Posters

Calcium bioavailability from dairy and non-dairy sources: possible suppression by paracetamol (Acetaminophen)

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Background - Dietary calcium is now being linked to the control of adiposity. We have previously shown that a high dairy breakfast meal resulted in a greater postprandial fat oxidation. It was important to establish whether a greater calcium bioavailability was the key to this finding.
Objective -To determine the bioavailability of 3 test meals, using 3 standard approaches: serum ionised calcium (iCa) (Method 1), intact parathyroid hormone (iPTH) suppression (Method 2) and urinary excretion of calcium (UC) (Method 3).
Design - 16 subjects (6 F, 10 M), (mean $\pm$ SEM, age 54.1 $\pm$ 1.7 yr, BMI 33.5 $\pm$ 1.0 kg/m^2) participated in a randomised, single blind, 3-way crossover design over 6 h. Subjects were provided a low calcium-low vitamin D meal (LD), a high dairy calcium-high vitamin D meal (high dairy, HD) and a high calcium (calcium citrate) meal with orange juice (high calcium, HC). 8 of these subjects co-ingested 1000 mg Paracetamol with every meal, as a marker of gastric emptying. Data was expressed as percent change from baseline, and analysed as a repeated measures ANOVA with the use of paracetamol as a between-subject factor.
Outcomes - Gastric emptying was similar between meals. Methods 2 (P=0.009) and 3 (P=0.02), but not Method 1 (iCa), detected a significant difference between the 3 test meals. However, the rank order of effects was similar across all the 3 methods with LD<HD<HC (iCa 1.4 $\pm$ 3.3, 3.6 $\pm$ 6.0, 9.6 $\pm$ 4.2 %; iPTH 52.9 $\pm$ 29.8, 6.4 $\pm$ 40.6,-70.5 $\pm$ 37.2 %; urinary calcium 58.5 $\pm$ 25.7, 154.1 $\pm$ 74.8, 243.8 $\pm$ 73.8 %). There was no significant effect of paracetamol, nor a diet x paracetamol interaction. However, a consistent trend with all 3 methods suggested that co-administration of paracetamol may have suppressed calcium bioavailability.
Conclusions - Bioavailability of non-dairy calcium was better relative to dairy calcium. This may indicate the involvement of other bioactive components in dairy which influence fat oxidation. Paracetamol may interfere with calcium bio-availability.
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Postprandial lipid metabolism and insulin sensitivity following sequential meals: effect of dairy calcium and vitamin D

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Background - Insulin sensitivity varies within the day in relation to meal composition, and influences substrate utilization accordingly. It is lower following a second meal, with a rapid release of chylomicrons into circulation. A high calcium, high vitamin D breakfast increased fat oxidation and thermogenesis following lunch.
Objectives - (1) To document the effect of sequential meal ingestion on insulin sensitivity, triacylglycerol (TG) and chylomicron concentrations and, (2) to examine whether higher calcium and vitamin D at breakfast modified the response to lunch.
Design - Eight subjects (mean $\pm$ SEM, age 55.5 $\pm$ 1.2 yr and BMI 28.9 $\pm$ 1.6 kg/m^2) participated in a single blind within-subject study. Subjects were randomised to high dairy calcium, high vitamin D breakfast (**HCB**) or low dairy calcium, low vitamin D breakfast (**LCB**). The same very low calcium standard lunch (**SL**) was ingested four hours after each breakfast. Glucose, insulin, TG and apolipoprotein B_{48} were measured at baseline and on the hour for eight hours. HOMA-R was calculated for each time point. Postprandial responses were calculated as % change from fasting values (Δ). A 2x2 repeated measures design, for diet effects (HCB+SL vs. LCB+SL), meal effects (breakfast vs. lunch) and diet x meal interaction was used for statistical purposes.
Outcomes - The change in glucose, insulin and HOMA-R scores were significantly higher after lunch compared to breakfast (P <0.05). There was no statistical difference in ΔTGs between diets, but a doubling of the breakfast response was observed after lunch. ΔapoB_{48} was significantly higher after lunch compared to breakfast (P <0.05). The TG:apoB48 ratio was similar between meals, but overall was 50% lower following the HCB+SL diet.
Conclusions - The study confirmed that greater TG and chylomicron concentrations accompanied the deterioration of insulin sensitivity after lunch. Calcium and vitamin D intake at breakfast may affect chylomicron size by modulating the amount of TG within the particle.
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