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Inulin propionate ester increases satiety and decreases appetite but does not affect gastric emptying in healthy humans

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The short chain fatty acid (SCFA) propionate stimulates free fatty acid receptors 2 and 3 (FFAR2, FFAR3) found on enteroendocrine L-cells and increases the release of the anorectic gut hormones glucagon like-peptide-1(GLP-1) and peptide YY (PYY) *in vitro*[(1)]. Infusion of GLP-1 and PYY significantly delays gastric emptying in humans[(2,3)]. Furthermore, *in vivo* data shows that intestinal infusions of SCFA significantly inhibits gastrointestinal motility via an increase in PYY release from the gastrointestinal tract [(4)]. Dietary supplementation with an inulin propionate ester (propionate bound to inulin through an ester linkage) significantly increases the postprandial release of GLP-1 and PYY, whilst significantly decreasing food intake (unpublished findings). It is unknown whether the mode of action of inulin propionate ester on appetite and food intake is through a central action of PYY and GLP-1 or via a direct effect on gastric emptying.

We hypothesized that dietary supplementation with inulin propionate ester would lead to a reduction in appetite by delaying gastric emptying through the release of GLP-1 and PYY.

Fourteen healthy men and women (Mean ± SEM age 31 ± 2 years; body mass index (BMI) 24.0 ± 0.9 kg/m^2) were recruited and completed two study visits in a randomized, double-blind, crossover manner. On the study days, subjects attended having fasted overnight and were given 10 g inulin propionate ester or 10 g inulin control in a standard breakfast (641 kcal; 113 g CHO, 15 g fat, 16 g protein). At 300 min volunteers were served a standard lunch (354 kcal; 47 g CHO, 12 g fat, 12 g protein) together with 100 mg ^{13}C-octanoic acid. Breath CO_2 was collected serially for 480 min after the standard lunch by exhaling alveolar breath samples. $^{13}CO_2$ enrichment was determined by isotope ratio mass spectrometry (IRMS). Subjective hunger, satiety, and nausea were monitored with the use of 100 mm visual analog scales (VAS). This study was completed in accordance with the Declaration of Helsinki.

Ingestion of 10 g of inulin propionate ester significantly increased subjective '*fullness*'($\Delta AUC_{0-540min}$ 24 296 ± 2554 min × mm inulin control *vs.* 27573 ± 1898 min × mm propionate ester; $p < 0.05$), and decreased '*desire to eat*' ($\Delta AUC_{0-540min}$ 20 044 ± 2873 min × mm inulin control *vs.* 17 404 ± 2881 min × mm propionate ester; $p < 0.05$) throughout the study period.

The time to 50% AUC excretion of ^{13}C in breath ($T_{1/2}$), a proxy for gastric emptying rate, was not significantly different between acute propionate ester and control trials ($T_{1/2}$ 180 min [95% CI, 163 to 198] control *vs.* 185 min [95% CI, 168 to 204] control, $P = 0.51$). These data demonstrate that acute ingestion of 10 g of inulin propionate ester increases satiety and reduces appetite in humans but this is not through an effect on gastric emptying, and it is most likely to be a centrally mediated action of GLP-1 and PYY.

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