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## The effect of short-term dietary supplementation with fructose on gastric emptying of glucose and fructose

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Previous research has indicated that gastric emptying in humans may be influenced by patterns of previous dietary intake. Furthermore, there is evidence to suggest that these adaptive changes are nutrient specific and rapid; occurring in as little as 3 days. Short-term dietary supplementation with 400 g/day of glucose for 3 days in healthy subjects has been shown to accelerate gastric emptying of a hyperosmotic glucose solution but not a protein solution<sup>(1)</sup>, but the specificity of these high-glucose diet effects was not extended to different monosaccharides. Accelerated emptying of a hyperosmotic fructose solution has also been shown following short-term supplementation with glucose solutions<sup>(2)</sup>. Whether these effects are reciprocated with short-term dietary supplementation of fructose is unknown. The purpose of this study was to investigate the effect of 3 days dietary fructose supplementation on the rate of gastric emptying of glucose and fructose solutions in humans.

Following Ethical approval, six healthy non-smoking men with no history of gastrointestinal symptoms or disease completed four experimental trials in a randomised order; fructose with supplementation (FS), fructose with water control (FC), glucose with supplementation (GS) and glucose with water control (GC). Experimental trials were separated by a minimum of 7 days. Each experimental trial was preceded by a 3-day dietary and activity maintenance period where participants were asked to record their diet and activity in their first trial and then replicate them in the remaining three trials. In addition to their normal dietary intake, participants were asked to consume either four 500 mL bottles of water or four 500 mL solutions each containing 30 g fructose per day over the 3 days. Furthermore, participants were asked to refrain from alcohol consumption and strenuous physical activity in the 24 h preceding each experimental trial as well as to fast from 9 pm with the exception of 500 mL of water approximately 90 minutes before arrival at the laboratory. Upon arrival at the laboratory, participants were asked to completely empty their bladder before body mass was recorded. A baseline breath sample was then collected and visual analogue scales (VAS) asking subjective feelings of hunger, fullness, prospective food consumption, bloatedness and nausea completed. Participants then ingested 595 mL of either a 6% glucose solution or 6% fructose solution containing 100 mg [<sup>13</sup>C]sodium acetate within two minutes. Further breath samples were collected and VAS completed at 10 minute intervals for 60 minutes after ingestion. Breath samples were analysed for C<sup>13</sup> enrichment using non-dispersive infrared isotope spectroscopy. Results are presented as Mean (SD).

Preliminary results show half-emptying time ( $T_{1/2}$ ) was 61 (13), 50 (7), 83 (32), and 82 (35) minutes for FC, FS, GC and GS, respectively. Two factor repeated ANOVA showed no preliminary main effects of monosaccharide ( $P = 0.096$ ), a significant main effect of supplementation ( $P < 0.05$ ) and no interaction effect ( $P = 0.327$ ). Time of maximal excretion rate ( $T_{lag}$ ) was 39 (6), 33 (7), 49 (15), and 46 (18) minutes for FC, FS, GC and GS, respectively. Two factor repeated ANOVA showed no preliminary main effects of monosaccharide ( $P = 0.160$ ), a main effect tending to significance of supplementation ( $P = 0.066$ ) and no interaction effect ( $P = 0.585$ ). Two factor repeated ANOVA on breath delta over baseline (DOB) data for fructose emptying revealed no main effect of supplementation ( $P = 0.694$ ), a main effect of time ( $P < 0.001$ ) and an interaction effect tending to significance ( $P = 0.064$ ). Breath DOB data for glucose emptying no main effect of supplementation ( $P = 0.859$ ), a main effect of time ( $P < 0.001$ ) and no interaction effect was found ( $P = 0.345$ ). No significant differences were observed in any subjective feelings measurements.

Preliminary results of this study suggest that 3 days of dietary supplementation with 120 g/day fructose may induce acceleration of gastric emptying of fructose but not glucose. This tendency of monosaccharide specificity contrasts findings of previous studies. Further participants will be recruited to increase power of this study.

1. Cunningham KM, Horowitz M, Read NW (1991) *Br J Nutr* **65**, 15–19.
2. Horowitz M, Cunningham KM, Wishart JM, Jones KL and Read NW (1996) *Diabetologia* **39**, 481–486.