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Can pre-feeding of a whey protein affect the glucoregulatory response to an oral glucose tolerance test?

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The stimulating effect of a co-ingestion of carbohydrate and protein and/or amino acids on endogenous insulin release is well known. To this effect, the co-ingestion of protein with carbohydrate is known to improve glucose homeostasis in patients with type-II diabetes[1]. In the absence of carbohydrate, the insulinotropic effect of whey protein induces a rise in plasma insulin and lowering of blood glucose within 30 min of ingestion[2]. Pre-feeding protein may, therefore, be a worthwhile strategy to improve postprandial glucoregulatory control.

The present paper reports on the effect of pre-feeding whey protein isolate on subsequent glucose response to an oral glucose load. With ethical approval and informed consent eight healthy young subjects (♂, $n = 4$, age 21.8(0.5) years, BMI 22.5(3.7) kg/m^2; ♀, $n = 4$, age 23.5(2.4) years, BMI 24.3(2.5) kg/m^2) undertook a randomised control trial of two treatments, either protein solution (whey protein isolate (WPI); 0.3 g/kg, 8 % (w/v) water) or control (CON; equivalent volume of water), each treatment separated by 7 d. Following an overnight fast subjects were fed either protein or water 30 min prior to ingestion of glucose (75 g; 28 % (w/v) in water; OGTT). Blood glucose was measured prior to feeding and every 15 min for 2 h post-glucose ingestion. The area under the curve for blood glucose ($AUC_{0–120}$) was calculated by trapezoidal integration. The difference in the mean response was analysed by paired Student's *t*-test.

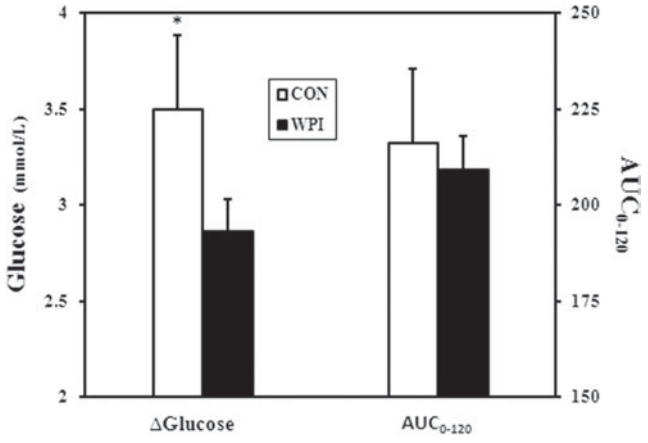

Figure. 1 Change in blood glucose and AUC_{0-120}.
Data are mean (SE) * represents P < 0.1 WPI *vs.* CON.

Peak glucose occurred 30 min following glucose ingestion. Pre-feeding of WPI resulted in 22 % lower mean rise in peak glucose (3.50(0.38) *v.* 2.86(0.17) mmol/l; $P = 0.076$) and a 7 % lower mean peak blood glucose (8.25 (0.42) v. 7.66 (0.35) mmol/L; $P = 0.109$) than in the CON trial. However, no difference in effect was observed when blood glucose was calculated as the integrated $AUC_{0–120}$ (216(32) *v.* 209(26) mmol/min/l; $P = 0.429$; Figure 1).

Measured by change in the glucose response to an oral glucose tolerance test, the data from this study show that pre-feeding of approximately 25 g of a soluble whey protein timed to coincide with the peak rise in protein-induced endogenous insulin secretion produced a modest reduction in the post-ingestion increase and peak blood glucose concentration, but no change in $AUC_{0–120}$ for blood glucose, in healthy young subjects. As a nutrient intake, the amount of protein used in this study is low. Further study will confirm whether this pre-feeding glucoregulatory effect follows a similar dose-dependent insulinotropic response to whey protein ingestion[3].

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2. Power O, Jakeman P & Hallihan A (2009) Human insulinotropic response to oral ingestion of native and hydrolysed whey protein. *Amino Acids* **37**, 333–339.
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