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/m²; ♀, n = 4, age 23.5(2.4) years, BMI 24.3(2.5) kg/m²) 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 (AUC0–120) was calculated by trapezoidal integration. The difference in the mean response was analysed by paired Student’s t-test.

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 AUC0–120 (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 AUC0–120 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).