

# Abstract

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## Effects of oral L: -carnitine supplementation on insulin sensitivity indices in response to glucose feeding in lean and overweight/obese males.

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**OBJECTIVE:** Infusion of carnitine has been observed to increase non-oxidative glucose disposal in several studies, but the effect of oral carnitine on glucose disposal in non-diabetic lean versus overweight/obese humans has not been examined. This study examined the effects of 14 days of L: -carnitine L: -tartrate oral supplementation (LC) on blood glucose, insulin, NEFA and GLP-1 responses to an oral glucose tolerance test (OGTT).

**METHODS:** Sixteen male participants were recruited [lean (n = 8) and overweight/obese (n = 8)]. After completing a submaximal predictive exercise test, participants were asked to attend three experimental sessions. These three visits were conducted in the morning to obtain fasting blood samples and to conduct 2 h OGTTs. The first visit was a familiarisation trial and the final two visits were conducted 2 weeks apart following 14 days of ingestion of placebo (PL, 3 g glucose/day) and then LC (3 g LC/day) ingested as two capsules 3×/day with meals. On each visit, blood was drawn at rest, at intervals during the OGTT for analysis of glucose, insulin, non-esterified fatty acids (NEFA) and total glucagon-like peptide-1 (GLP-1). Data obtained were used for determination of usual insulin sensitivity indices (HOMA-IR, AUC glucose, AUC insulin, 1st phase and 2nd phase  $\beta$ -cell function, estimated insulin sensitivity index and estimated metabolic clearance rate). Data were analysed using RMANOVA and post hoc comparisons where appropriate.

**RESULTS:** There was a significant difference between groups for body mass, % fat and BMI with no significant difference in age and height. Mean (SEM) plasma glucose concentration at 30 min was significantly lower ( $p < 0.05$ ) in the lean group on the LC trial compared with PL [8.71(0.70) PL; 7.32(0.36) LC; mmol/L]. Conversely, plasma glucose concentration was not different at 30 min, but was significantly higher at 90 min ( $p < 0.05$ ) in the overweight/obese group on the LC trial [5.09(0.41) PL; 7.11(0.59) LC; mmol/L]. Estimated first phase and second phase  $\beta$ -cell function both tended to be greater following LC in the lean group only. No effects of LC were observed on NEFA or total GLP-1 response to OGTT.

**CONCLUSIONS:** It is concluded that LC supplementation induces changes in blood glucose handling/disposal during an OGTT, which is not influenced by GLP-1. The glucose handling/disposal response to oral LC is different between lean and overweight/obese suggesting that further investigation is required. LC effects on gastric emptying and/or direct 'insulin-like' actions on tissues should be examined in larger samples of overweight/obese and lean participants, respectively.

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