Abstract: 48O

Preliminary results from an investigation of exercise timing to mitigate postprandial hyperglycaemia and vascular dysfunction in healthy adults.

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Background: Postprandial hyperglycaemia contributes to vascular dysfunction independent of age or health status Loader *et al.* (2015). Solomon *et al.* (2020) found that immediate post-meal exercise blunts postprandial hyperglycaemia more so than exercise before-, 30 and 60 min after. Whilst Zhu *et al*. (2007) found that exercise immediately after an oral glucose tolerance test (OGTT) restores endothelial dysfunction, they did not compare to other exercise times around a meal. Timing exercise after a meal may be an effective strategy to curb postprandial cardiometabolic dysfunction. However, further research is needed.
Objective: To determine if exercising 30 minutes before (30pre), immediately post (IP), 30 min post (30post) or 60 min post (60post) an oral carbohydrate challenge (OCC) mitigates postprandial hyperglycaemia and vascular dysfunction compared to no exercise (Control).
Methods: 12 healthy males (n=4) and females (n=8) were randomised into the five-arm crossover study. Each participant's lean mass (LM) was determined using a dual-energy absorptiometry x-ray (DEXA) to calculate the OCC (1.5g of carb per 1 Kg of LM). Next, an accredited exercise physiologist determined the training weight (30% of one repetition maximum (1RM)) for the whole-body resistance exercise protocol. After 72 hours, participants completed a familiarisation session using the training weight (8x exercises, 3 sets, 25 reps/set, 30% of 1RM). The following week the participants began the five conditions, each with at least 48h wash out. Table 1 outlines the timing of the measures collected during each condition. The exercise was performed 30 minutes before, immediately after, 30 min after and 60 min after the meal. A control was included where no exercise was performed to indicate the effect of the OCC. Shapiro-Wilk and Q-Q plots were used to indicate normality, and a univariate repeated measures ANOVA was used to determine any time and condition interactions. This abstract reports on the preliminary analysis of a subsample (n=12) who have completed the study to date.

Table1. Timings of measures taken in each condition.

	Fasting	30 min pp	60 min pp	90 min pp	120 min pp
FMD	○		○		○
PWA/PWV	∿		∿	∿	∿
BG	●	●	●	●	●
Blood sample	💉		💉		

pp- postprandial, FMD- flow-mediated dilation, PWA- pulse wave analysis, PWV – pulse wave velocity, BG- blood glucose.

Results: There were no statistically significant differences in any cardiometabolic postprandial measure between exercise conditions. IP exercise blunted BG by 1.3 mmol, and FMD improved by 2% at 60 min postprandial compared to the no-exercise control. Compared to the control, 30post blunted postprandial BG by 0.6mmol and improved FMD by 1% at 60 min. Premeal exercise did not differ from the control. 60post exercise did not blunt BG compared to the control but reduced at 90 min by 2.2 mmol and returned to fasting levels at 120 min.

Discussion: Preliminary results show a trend toward immediate and 30 min post-meal exercise as being effective, compared to the control, pre-meal and 60 min post-meal exercise. However, this study has low statistical power, with 50% of the sample size achieved thus far. Findings align with Solomon *et al.* (2020) that IP blunts BG more so than other timings. Additionally, Zhu *et al.* (2007) findings are being replicated by IP. This is the first study to measure both FMD and glucose responses; exercising immediately following a meal resulted in clinically significant improvements in both glucose and endothelial function following an OCC. This suggests that timing exercise to blunt peak glucose can improve vascular responses. However, results are only preliminary, and further results are pending.

Loader, J., Montero, D., Lorenzen, C., Watts, R., Meziat, C., Reboul, C., Stewart, S. and Walther, G. (2015) 'Acute Hyperglycemia Impairs Vascular Function in Healthy and Cardiometabolic Diseased Subjects: Systematic Review and Meta-Analysis', *Arterioscler Thromb Vasc Biol,* 35(9), pp. 2060-72. / Solomon, T. P. J., Tarry, E., Hudson, C. O., Fitt, A. I. and Laye, M. J. (2020) 'Immediate post-breakfast physical activity improves interstitial postprandial glycemia: a comparison of different activity-meal timings', *Pflugers Arch,* 472(2), pp. 271-280. / Zhu, W., Zhong, C., Yu, Y. and Li, K. (2007) 'Acute effects of hyperglycaemia with and without exercise on endothelial function in healthy young men', *Eur J Appl Physiol,* 99(6), pp. 585-91