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Investigation into the influence of food timing around exercise training and the effects on energy and metabolic health: Is it better to eat before or after exercise?

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Exercise induces changes to skeletal muscle, leading to numerous long-term adaptations, which result in enhanced metabolic health. However, given the obesogenic environment we live in[1] the general (non-athletic) population may not be obtaining maximal benefits from exercise training. As well as exercise duration and intensity, consumption of carbohydrate (CHO) immediately before or after an exercise session may influence beneficial adaptations at the molecular, metabolic and physiological level[2].

The aim of this study was to investigate the effect CHO intake timing around High-Intensity-Interval-Training (HIIT) sessions on resting and postprandial metabolism in untrained men, and how this compared to data previously collected on untrained females.

Ten healthy, untrained males (age 22 ± 1·5 years) Participants undertook 6 sessions of HIIT over two weeks at 95% VO2 peak and consumed either a CHO (1 g/kg of body weight maltodextrin) or a placebo drink before and after each session. Participants were randomized into two groups. The "FED" group (n = 5) exercised following CHO ingestion and recovered following placebo ingestion, whereas the "FAST" group (n = 5) exercised in a fasted state and recovered following CHO ingestion. Resting energy expenditure (REE), fasted Respiratory Quotient (RQ), postprandial energy expenditure, and postprandial RQ were measured at baseline and after 2 weeks of training. An identical protocol was previously completed in women allowing for comparison.

A trend towards a decreased fasted RQ was observed from baseline to post training in the "FASTED" group ($p = 0{\cdot}0625$) only. Furthermore, fasting RQ was significantly lower ($p = 0{\cdot}0397$) in the "FAST" group compared to the "FED" following training, suggesting greater fat oxidation. No significant changes in postprandial energy expenditure or RQ were observed in either group following training. Contrastingly in previous data on women, while baseline fasted RQ and average postprandial RQ were significantly higher in the "FED" group than in the "FAST" group ($p = 0{\cdot}032$ and $p = 0{\cdot}0238$, respectively) these differences disappeared following HIIT.

To our knowledge, this was the first study to compare the effects of CHO ingestion immediately before or immediately after exercise on metabolic health within a non-athletic population. Our results suggest that men may elicit greater benefits on resting and postprandial metabolism by exercising in a fasted state and ingesting CHO during recovery, compared to the opposite feeding regime. Conversely, CHO ingestion during exercise recovery in women may result in lesser metabolic adaptations compared to recovering in a fasting state. Future research is however warranted in order to establish the best feeding regime for maximal training adaptations to exercise.

1. Jackson RJ (2003) 'The Impact of the Built Environment on Health: An Emerging Field', *Am J Public Health*, **93** (9), 1382–1384.
2. Hawley JA, Burke LM, Phillips SM and Spriet LL (2011) 'Nutritional modulation of training-induced skeletal muscle adaptations', *Journal of applied physiology (Bethesda, Md.: 1985)*, **110**(3), 834–845.