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A preliminary investigation into the effect of continuous vigorous exercise and lifestyle-embedded physical activity upon acute glycaemic regulation

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Background and Purpose

Continuous glucose monitoring (CGM) has recently emerged as a new tool for patients with diabetes mellitus to monitor glucose levels and aid maintenance of euglycaemia. CGM provides information on ambulatory, postprandial and nocturnal glucose excursions. Extant research has thus far focused upon charting glucose excursions in diabetic patients, with limited normoglycaemic comparative data available. Additionally little is known upon how physical activity affects acute blood glucose regulation. The purpose of this study was to investigate the effect of continuous exercise and lifestyle-embedded physical activity upon glucose regulation, and assess the feasibility of prolonged CGM data collection in a normoglycaemic individual.

Method

One physically active non-diabetic male [age: 22 y; mass: 71.5 kg; height: 181 cm] underwent 7 days CGM, performing 3 trial conditions: a sedentary control (< 2500 steps, pedometer controlled), a continuous exercise condition (2 x 30 min treadmill running at 70% HR_{max}), and a lifestyle-embedded physical activity condition (100 min fractionalized moderate activity). Diet was standardised and physical activity levels were monitored via accelerometry throughout.

Results

Descriptive results displayed lower whole day mean blood glucose levels in both the continuous (Mean \pm SD: 5.2 \pm 0.3 mmol.L⁻¹) and lifestyle conditions (5.3 \pm 1.1 mmol.L⁻¹), compared to sedentary control (5.6 \pm 0.5 mmol.L⁻¹). A post exercise decrease in glucose levels (2 h pre-6 h post (5.3 – 5.1 mmol.L⁻¹)) with a carryover effect for the following day (reduced mean glucose 24 h pre-post (5.5 \pm 0.5 - 5.2 \pm 0.3 mmol.L⁻¹)) was identified in the continuous exercise condition. In addition a significant correlation (R= 0.75, P = 0.02) was found between physical activity counts and CGM glucose values (mmol.L⁻¹) during the continuous bout of vigorous exercise.

Discussion and Conclusions

It was concluded that day to day glucose homeostasis may be optimised through bouts of continuous vigorous exercise. The utilisation of CGM in exercise protocols and prolonged data collection is deemed a feasible proposition; however larger scale studies may pose logistical problems. This study was limited by its single subject design and specificity to normoglycaemic populations, future studies should look to include a greater sample size and characterise glycaemic regulation in pre-diabetic and diabetic populations.