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The effect of glycaemic index of high-carbohydrate diets consumed for a period of 5 d on exercise energy metabolism and endurance running capacity in healthy males

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Several studies have suggested that the glycaemic index (GI) of a single high-carbohydrate (CHO; HC) meal consumed a few hours before endurance exercise modifies energy metabolism and in some cases also influences exercise performance[1,2]. At the same time, limited evidence suggests that energy substrate selection and performance during endurance-type exercise are not influenced by the GI of HC diets consumed for a period of 3 d[3]. The aim of the present study was to expand understanding of the role of the GI of HC diets consumed on a more habitual basis and therefore to investigate the impact of consumption of HC diets with high GI (HC-HGI) and low GI (HC-LGI) for 5 d on energy substrate utilisation and endurance capacity during running conducted in the fasted state.

Nine healthy males (age 23 (SD 4) years; percentage body fat 10.3 (SD 3.5); BMI 22.9 (SD 2.1) kg/m^2; VO_{2max} 60.9 (SD 4.1) ml/kg per min) in randomized counterbalanced order performed three treadmill runs to exhaustion at 65 % VO_{2max}: (1) after being on habitual diet (control); (2) after 5 d on a HC-HGI diet; (3) after 5 d on a HC-LGI diet. Every 15 min during running and at exhaustion a blood sample was withdrawn, expired air was collected and heart rate (HR) and ratings of perceived exertion (RPE) were recorded. Results are presented as means and standard deviations. Statistical analyses were conducted using one-way and two-way ANOVA with a Tukey *post hoc* test to allocate the differences.

Both HC diets were isoenergetic with the habitual diet and provided significantly more ($P<0.05$) energy from CHO than the habitual diet. Compared with the GI of the control diet (56 (SD 3)) that of the HC-HGI diet (71 (SD 2)) was significantly higher ($P<0.01$) and that the HC-LGI diet (36 (SD 1)) was lower ($P<0.01$). The GI of the HC-HGI diet was significantly higher ($P<0.01$) than that of the HC-LGI diet. There were no significant differences between the three dietary trials in relation to plasma glucose, insulin and NEFA responses during 90 min of running and at the point of exhaustion. During 90 min of running plasma glycerol concentrations in the HC-HGI and HC-LGI trials were lower ($P<0.05$) than that in the control trial, but at exhaustion there were no differences between the three trials. No differences were found for glycerol concentration between the HC-HGI and HC-LGI trials. During 90 min of running the rate of fat oxidation in both the HC-LGI and HC-LGI trials was significantly lower ($P<0.05$) and the rate of CHO oxidation significantly higher ($P<0.05$) than that in the control trial, but the rate of fat and CHO oxidation was not different between the HC-HGI and HC-LGI trials. At exhaustion, the rate of CHO oxidation was significantly higher ($P<0.05$) in the HC-LGI trial than in the control trial. No difference was found between the HC-HGI and HC-LGI trials. HR and RPE during 90 min of running and at the point of exhaustion were not different between trials. Time to exhaustion (min) was not significantly different between trials (control 114 (SD 14), HC-HGI 107 (SD 18); HC-LGI 110 (SD 18).

The extent by which HC diets consumed for 5 d reduce the rate of fat oxidation and increase the rate of CHO oxidation during subsequent running exercise in the fasted state is not influenced by the GI of the diets.

1. Wu CL, Nicholas C, Williams C, Took A & Hardy L (2003) *Br J Nutr* **90**, 1049–1056.
2. Wu CL & Williams C (2006) *Int J Sport Exerc Metab* **16**, 510–527.
3. Chen Y, Wong SHS, Xu X, Hao X, Wong CK & Lam CW (2007) *Int J Sports Med* (Epublication ahead of print version).