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Effect of high and low glycemic index recovery diets on intramuscular lipid oxidation during aerobic exercise

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Background – Intra-myocellular triglyceride and plasma free fatty acids (FFA) are important skeletal muscle fuel sources. By raising blood insulin concentrations, carbohydrate ingestion inhibits lypolysis and reduces circulating FFA.

Objective – We tested the hypothesis that differences in the postprandial glycemic and insulin response to carbohydrates (ie glycemic index [GI]) alter FFA availability and intramuscular lipid use during subsequent exercise. All data presented are mean ± SE.

Design – Seven endurance-trained male cyclists (30 ± 6 yrs of age, 80 ± 8 kg body weight) cycled for 90 min at 70% VO2peak and then consumed either high GI or low GI meals over the following 12 h. Mean work rate at 70% VO2peak was 216 ± 8W. At the end of the first 90 min cycle, participants were provided with food for the following 24 h containing either a high or low GI carbohydrate component. Carbohydrate was provided at 8 g·kg body mass with 11% protein and 17% fat content. The GI of the high GI diet was 73 and the low GI diet 34. The following day after a 10 hour fast, the 90 min cycle was repeated and metabolic parameters measured. Intra-myocellular triglyceride content of the vastus lateralis was quantified using magnetic resonance spectroscopy before and after exercise. Blood samples were collected at 15 min intervals throughout exercise and analysed for FFA, glycerol, glucose, insulin, and lactate. Substrate oxidation was calculated from expired air samples.

Outcomes – The 90 min cycle resulted in >2-fold greater reduction in intra-myocellular triglyceride in the high GI trial (3.5 ± 1.0 mM·kg wet wt) than the low GI trial (1.6 ± 0.3 mM·kg wet wt, P < 0.05). During exercise, FFA availability was reduced in the high GI trial compared to the low GI trial (area under curve 2.36 ± 0.14 mEq·L·h vs 3.14 ± 0.28 mEq·L·h, P < 0.05 respectively). No other differences were significant.

Conclusions – The findings reveal that consumption of high GI carbohydrates in recovery from exercise reduce FFA availability during exercise and increase reliance on intra-myocellular triglyceride as a substrate source during moderate intensity exercise. It is possible that these findings hold implications for exercise performance in both health and disease.

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Formulation and evaluation of a muesli bar with low glycaemic index

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Background – Muesli bars are construed and promoted as healthy snacks. However, a large proportion of the bars in the market are high in sugar, and/or fat, and only few make claims about glycaemic potency, as measured by glycaemic index (GI) and glycaemic load (GL).

Objective - To formulate a muesli bar with low GI, and evaluate in addition to glycaemic impact, its nutritive value, texture, and shelf life.

Design - The development process involved idea generation and screening techniques to gather consumer driven ideas, formulation of a low glycaemic binding syrup with polydextrose and fructose, and the actual bars incorporating chick pea (Cicer arietinum L.) processed by two methods, namely, extrusion or boiling and roasting, as the main low glycaemic ingredient. A total of four formulations, in two replicates, without and with chocolate were evaluated. Standard tests were carried out to determine the GI, nutritional potential, texture, acceptability and shelf life stability of the formulations.

Outcome – All the formulations were determined to have a GI of less than 55 and a GL of less than 15. Nutritionally, the products (per 50 g serving) ranged from low to moderate in fat content (1.5 – 2.8g); high in fibre (3.5 – 4.0g); good in protein (3.2 – 3.7g) and very low in sodium (55mg). The water activity ranged from 0.60 – 0.63 at 18.7 °C and a shelf life of at least 6 months as determined by yeast, mould and standard plate counts, and no coliforms during the testing period.

Conclusion – In addition to low GI and shelf life stability, the bars conferred overall nutritional benefits.