Effect of quantity and quality of pre-exercise carbohydrate meals on central fatigue

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Abstract

Both the quantity and quality of pre-exercise carbohydrate (CHO) meals have been shown to improve endurance performance. However, their role in attenuating central fatigue (CF) is inconclusive. This use of neuropsychological techniques, such as voluntary activation (VA) and the central activation rate (CAR), alongside maximum voluntary contraction (MVC) and sustained MVC (SMVC) can provide information on CF. Hence, the objective of this study was to investigate the effects of isoenergetic pre-exercise meals: 1) a high versus low quantity of CHO and 2) a high quantity of CHO with a high versus low glycemic index (GI) on MVC, VA, and CAR following a 90-min run. The high and low quantity of CHO was 3.5 and 0.9 g/kg body wt, respectively, and high and low GI was ~75 and ~40, respectively. Blood insulin, lactate, triacylglycerol, and glucose exchange were also measured. High CHO preserved MVC, VA, and CAR and, conversely, reductions in lower CHO oxidation and insulin response, whereas in low CHO, greater reductions in MVC, VA, and CAR were accompanied by higher lactate and fat oxidation with lower insulin response. These observations indicate central involvement. Meanwhile, high GI CHO better preserved force (MVC), CAR, and triacylglycerol with greater CHO oxidation and insulin response compared with low GI. The findings of this study suggest that pre-exercise meals with varying quantity...