Effect of Carbohydrate Ingestion During Exercise on Post-exercise Substrate Oxidation and Energy Intake

Christopher L. Melby, Kristen L. Osterberg, Alyssa Resch, Brenda Davy, Susan Johnson, and Kevin Davy

Published: International Journal of Sport Nutrition and Exercise Metabolism, 2002, 12, 294-309

Thirteen physically active, eumenorrheic, normal-weight (BMI ≤ 25 kg/m²) females, aged 18-30 years, completed 4 experimental conditions, with the order based on a Latin Square Design: (a) CHO/Ex: moderate-intensity exercise (65% VO_{2peak}) with a net energy cost of ~500 kcals, during which time the subject consumed a carbohydrate beverage (45 g CHO) at specific time intervals; (b) CHO/NoEx: a period of time identical to (a) but with subjects consuming the carbohydrate while sitting quietly rather than exercising; (c) NoCHO/Ex: same exercise protocol as condition (a) during which time subjects consumed a non-caloric placebo beverage; and (d) NoCHO/NoEx: same as the no exercise condition (b) but with subjects consuming a non-caloric placebo beverage. Energy expenditure, and fat and carbohydrate oxidation rates for the entire exercise/sitting period plus a 90-min recovery period were determined by continuous indirect calorimetry. Following recovery, subjects ate ad libitum amounts of food from a buffet and were asked to record dietary intake during the remainder of the day. Total fat oxidation (exercise plus recovery) was attenuated by carbohydrate compared to placebo ingestion by only ~4.5 g. There was a trend (p = .08) for a carbohydrate effect on buffet energy intake such that the CHO/Ex and CHO/NoEx energy intakes were lower than the NoCHO/Ex and NoCHO/NoEx energy intakes, respectively (mean for CHO conditions: 683 kcal; NoCHO conditions: 777 kcal). Average total energy intake (buffet plus remainder of the day) was significantly lower (p < .05) following the conditions when carbohydrate was consumed (CHO/Ex = 1470 kcal; CHO/NoEx = 1285 kcal) compared to the noncaloric placebo (NoCHO/Ex = 1767 kcal; NoCHO/NoEx = 1660 kcal). In conclusion, in young women engaging in regular exercise, ingestion of 45 g of carbohydrate during exercise only modestly suppresses total fat oxidation during exercise. Furthermore, the ingestion of carbohydrate with or without exercise resulted in a lower energy intake for the remainder of the day.