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Effect of Preexercise Meals With Different Glycemic Indices and Loads on Metabolic Responses and Endurance Running

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This study examined the effect of ingesting 3 isocaloric meals with different glycemic indices (GI) and glycemic loads (GL) 2 hr before exercise on metabolic responses and endurance running performance. Eight male runners completed 3 trials in a randomized order, separated by at least 7 days. Carbohydrate (CHO) content (%), GI, and GL were, respectively, 65%, 79, and 82 for the high-GI/high-GL meal (H-H); 65%, 40, and 42 for the low-GI/low-GL meal (L-L); and 36%, 78, and 44 for the high-GI/low-GL meal (H-L). Each trial consisted of a 1-hr run at 70% VO_{2max}, followed by a 10-km performance run. Low-GL diets (H-L and L-L) were found to induce smaller metabolic changes during the postprandial period and during exercise, which were characterized by a lower CHO oxidation in the 2 trials ($p < .05$) and a concomitant, higher glycerol and free-fatty-acid concentration in the H-L trial ($p < .05$). There was no difference, however, in time to complete the preloaded 10-km performance run between trials. This suggests that the GL of the preexercise meal has an important role in determining subsequent metabolic responses.

Keywords: glycemic index, glycemic load, carbohydrate, preexercise diet

It has become widely accepted for athletes undergoing strenuous daily training or competition to eat a moderate-size high-CHO meal 2–4 hr before exercise for optimal restoration of liver and muscle glycogen (Brooks & Trimmer, 1996; Schabort, Bosch, Weltan, & Noakes, 1999). Any large glycemic and insulinemic perturbation accompanying such ingestion, however, might reduce plasma free-fatty-acid (FFA) availability and oxidation (Coyle, Jeukendrup, Wagenmakers, & Saris, 1997; Horowitz, Mora-Rodriguez, Byerley, & Coyle, 1997) during subsequent exercise. Regarding the limitations of carbohydrate (CHO) stores, increasing the oxidation of fat at the expense of CHO oxidation has important implications for endurance-trained athletes (Stevenson, Williams, Mash, Phillips, & Nute, 2006). A body of research has examined different ways to increase the contribution of FFA in exercise fuel metabolism.

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