

# Effect of CHO Loading Patterns on Running Performance

## Authors

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## Key words

- glycemic index
- glycemic load
- run performance
- metabolism

## Abstract

This study examined the influence of 3-day isoenergetic carbohydrate (CHO) loading with different glycemic index (GI) and glycemic load (GL) meals on running performance and metabolic responses. With a randomized crossover design, nine male runners performed a 1-h run at 70%  $\dot{V}O_{2max}$  followed by a 10-km performance run after a 3-day diet adaptation, which involved different GI and GL meals [CHO intake (%), GI, and GL per day were 73%, 80, and 553 for the high GI and high GL (HH); 73%, 36, and 249 for the low GI

and low GL (LL); and 31%, 79, and 227 for the high GI and low GL (HL), respectively]. There were no differences in the time to complete the 10-km run between the two high-CHO trials; however, the performance in the LL trial was improved as compared to that in the HL trial (mean  $\pm$  SEM: HH vs. LL vs. HL: 51.3  $\pm$  5.3 vs. 48.6  $\pm$  1.3 vs. 55.3  $\pm$  6.9 min). It appears that the amount, rather than the nature, of the CHO consumed during the 3-day isoenergetic CHO loading may be the most overriding factor on subsequent metabolism and endurance run performance.

## Introduction

The onset of fatigue during prolonged exercise is associated with the depletion of the body's stored muscle glycogen [11]. For this reason, there has been great interest over the years in the nutritional means of increasing the supply of exogenous carbohydrate (CHO) both before and during exercise. Carbohydrate loading is known to produce an increase in stored muscle glycogen, and this practice has been found to correlate positively with performance during submaximal exercise events lasting over 90 min [10], even though the factors affecting glycogen kinetics and the underlying mechanism are not completely understood. During the last decade, the most commonly used method for CHO loading was from either the 3-day classical or the modified regimen [7,23].

Carbohydrate can be functionally classified according to the extent to which it increases blood glucose levels. This leads to the concept of glycemic index (GI), which is a ranking of foods based on their actual postprandial blood glucose response as compared to a reference food, either glucose or white bread [16]. This index counters the problem of considerable interindividual vari-

ability in the absolute glycemic response to foods and also reflects the rate of digestion and absorption of a CHO-rich food. In addition, the glycemic load (GL) was first proposed in 1997 by Salmeron and co-workers as the measure which incorporates both the quantity and quality of the dietary CHO consumed [21].

Some studies have indicated that a low GI (LGI) meal may have potential benefits over a high GI (HGI) meal when considering a high CHO intake prior to exercise because of the promotion of sustained CHO availability during exercise [25,30]. In comparison to a number of studies that have examined the application of a pre-exercise CHO GI meal [25,27,30], the concept of GL is less studied directly in sports nutrition and is primarily applied in epidemiological research [16,21,26]. Furthermore, GL is derived by multiplying the amount of available CHO consumed in the diet by its GI value. Therefore, GL can be reduced by lessening either the CHO intake or the dietary GI. Although both of these approaches reduce acute plasma glucose and insulin responses [15], their effect on metabolic and physiological responses during exercise is still unclear. A latest study in our laboratory [8] observed that the ingestion of mixed isoenergetic meals with an

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## Bibliography

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