# CARBOHYDRATE FEEDING PRIOR TO PROLONGED STRENUOUS EXERCISE : IS THE GLYCAEMIC INDEX RELEVANT ?

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Background : Carbohydrates that elicit rapid hyperglycaemic responses such as glucose, have been shown to be detrimental to physical performance when eaten 60-45 minutes before an event (Costill et al. 1977). The accompanying surge in plasma insulin produces hypoglycaemia and inhibits the mobilisation of free fatty acids. Both factors cause muscle glycogen to be depleted at a faster rate. Low levels of muscle glycogen are accompanied by muscular fatigue.

Aim : The aim of this project was to examine the effect of low and high glycaemic index (G.I.) foods on plasma glucose and insulin responses before, during and after prolonged, strenuous exercise.

Methods : Ten male volunteers exercised for 90 minutes on a bicycle ergometer at an intensity of 65% of the maximal oxygen consumption. At this intensity, muscle glycogen is a critical substrate fuel. The subjects ingested equal carbohydrate portions (1 g/kg body weight) of glucose, potato (high G.I. food) and lentils (low G.I. food) on separate occasions one hour before the start of exercise. Water (400 ml) was ingested in the control trial. Blood samples were collected at 15 minute intervals in the period before, during and up to 30 minutes after exercise and were analysed for plasma glucose and insulin.

Results : Lentils produced significantly ($P < 0.05$) less hyperglycaemia before exercise and significantly less hypoglycaemia during exercise compared to potato. Potato produced glycaemic responses that were very similar to the glucose load. Insulin levels were also significantly lower ($P < 0.05$) after the lentil meal compared to either potato or the oral glucose load for the first 60 minutes of exercise. However, the plasma glucose levels were not significantly different for all trials after the first 30 minutes of exercise.

Conclusion : Since these trials were not continued to exhaustion, the effect of low or high G.I. foods on endurance performance was not determined. Nevertheless, the literature provides evidence that the insulin response to quickly absorbed carbohydrates such as glucose inhibits free fatty acid release thus increasing the dependence on muscle glycogen and decreasing the time to fatigue. The results of the present study therefore suggest that lentils and other slowly digested and absorbed carbohydrates may be advantageous when consumed one hour prior to prolonged strenuous exercise.

COSTILL D.L., COYLE E., DALSKY G., EVANS W., FINK W. and HOOPES D. (1977) J. Appl. Physiol. 43 : 695.

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