DIETARY FATS AND PHYSICAL PERFORMANCE

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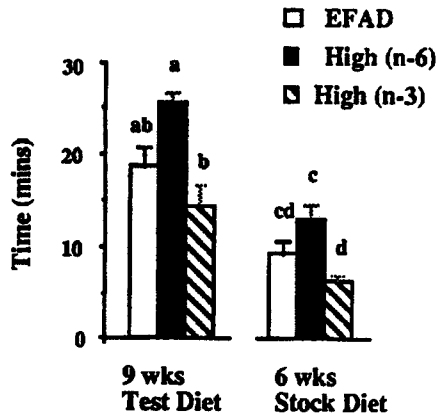
Until recently, there has been little interest in dietary fats as a source of energy for exercise. Classical studies examining diet and exercise have revealed that physical performance is affected by the levels of dietary carbohydrate (Bergstrom et al. 1967) and led to the concept of carbohydrate loading. Some recent studies have now shown that dietary fats may enhance performance (Miller et al. 1984; Simi et al. 1991). These studies have compared high fat and high carbohydrate diets, but have not investigated the effects of different types of dietary fat.

Earlier work has shown that changes in dietary fatty acid profile can alter skeletal muscle membrane composition as well as the function of isolated skeletal muscles (Ayre 1994). The aim of the present study was to determine whether the same changes in dietary fatty acids could alter physical performance in whole rats. I manipulated the levels of dietary polyunsaturated fatty acids (PUFAs) and examined the effects on physical performance of whole animals. Groups of nine male rats were fed one of three isoenergetic diets (containing 10% fat w/w). These were an essential fatty acid deficient diet, EFAD; a diet high in (n-6) PUFAs, High (n-6); or a diet enriched with (n-3) PUFAs, High (n-3). After nine weeks on the diets, rats were fed a stock diet of laboratory chow for a further six weeks.

There was no effect of diet on forelimb grip strength, but submaximal treadmill running endurance in rats fed the High (n-3) diet was dramatically (44%) less than in rats fed the High (n-6) diet ($P < 0.05$) (see Figure). Rats were then fed a commercial stock diet for six weeks and performances were re-evaluated. Responses were typically lower than at nine weeks, and although grip strength was similar for all groups, endurance was again significantly 51% lower in the High (n-3) group ($P < 0.01$).



Submaximal endurance for groups of nine male rats fed one of three diets; EFAD; High (n-6), or High (n-3). Diet had a significant effect after both nine weeks and again after six weeks recovery on a stock diet. Significantly different treatments are denoted by different superscripts.

Dietary fatty acids clearly exert significant effects on endurance and there is no sign of recovery. The results show a striking difference in effect for two diets that differ only in their ratio of (n-6) and (n-3) fatty acids and point to the need for further research in this area.

AYRE, K.J. (1994). Ph.D. Thesis, University of Wollongong.
BERGSTROM, J., HERMANSEN, L., HULTMAN, E. and SALTIN, B. (1967). Acta Physiol. Scand. 71: 140.
MILLER, W.C., BRYCE, G.R. and CONLEE, R.K. (1984). J. Appl. Physiol. 56: 78.
SIMI, B., SEMPORE, B., MAYET, M-H. and FAVIER, R.J. (1991). J. Appl. Physiol. 71: 197.

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