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### Effects of a Low Carbohydrate Diet Versus a High Carbohydrate Diet on 5-km Running Performance

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A common belief is that high intensity exercise ( $>60\% \text{VO}_{2\text{max}}$ ) is best sustained by high rates of carbohydrate oxidation. The belief is based, in part, on an idea developed by Krogh and Lindhard in 1920. In the 100 years since, few studies have tested its validity. **PURPOSE:** We tested the hypothesis that performance in competitive recreational athletes exercising at  $>80\% \text{VO}_{2\text{max}}$ , during simulated 5-km running time trials (5KTT) would be impaired during a 6-week period of adaptation to a low-carbohydrate, high-fat (LCHF) diet, compared to their performances when they ate a diet higher in carbohydrate and lower in fat (HCLF). **METHODS:** Seven male athletes (age  $35.6 \pm 8.4$  years, height  $178.7 \pm 4.1$  cm, weight  $68.6 \pm 1.6$  kg) completed two maximal exercise ( $\text{VO}_{2\text{max}}$ ) tests (Day 1 and 39) and four 5KTT (Day 4, 14, 28, and 42) in a fasted state during two 6-week periods when they ate either a HCLF or a LCHF diet, in a randomized counterbalanced, crossover design. **RESULTS:** Exercise performance during the  $\text{VO}_{2\text{max}}$  tests was unchanged on either diet ( $p = 0.251$ ). Performance in the initial 5KTT was significantly slower on the LCHF diet ( $M_{\text{diff}} = 49$  sec; 95% CI, 15 to 82;  $p = 0.011$ ,  $\eta^2 p = .683$ ; Day 4). There were no diet-related performance differences in the remaining three 5KTT ( $M_{\text{diff}} = 32$  sec; 95% CI, 26 to 91;  $p = 0.224$ ,  $\eta^2 p = .235$ , Day 14;  $M_{\text{diff}} = -5$  sec; 95% CI, 51 to 41;  $p = 0.806$ ,  $\eta^2 p = .011$ , Day 28;  $M_{\text{diff}} = -12$  sec; 95% CI, 108 to 85;  $p = 0.777$ ,  $\eta^2 p = .014$ , Day 42). Subjects exercised at  $\sim 82\% \text{VO}_{2\text{max}}$ . Carbohydrate oxidation provided 94% of energy on the HCLF diet, but only 65% on the LCHF diet. **CONCLUSION:** 5KTT performance at  $\sim 82\% \text{VO}_{2\text{max}}$  was independent of the runners' habitual diet. The HCLF diet offered no advantage over a diet with a high-fat content. Since these athletes run faster than 88% of recreational distance runners in the United States (U.S.), this finding may have wide general application.

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