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Effect of low-carbohydrate-ketogenic diet on metabolic and hormonal responses to graded exercise in men.

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Author information

Abstract

Maximal oxygen uptake (VO₂ max) and lactate threshold (LT) were measured during graded, incremental exercise in 8 healthy, untrained volunteers (aged 22 +/- 0.9 yrs) following 3 days on a control, mixed diet, or a ketogenic (50% fat, 45% protein and 5% carbohydrates) diet of equal energy content. Before and after exercise tests acid base balance, plasma beta-hydroxybutyrate (beta-HB), free fatty acid (FFA), and some hormone concentrations were determined. In comparison with the normal diet, the ketogenic diet resulted in: an increased VO₂ max, decreased respiratory exchange ratio and a shift of LT towards higher exercise loads. Blood LA concentrations were lower before, during and after exercise. Post exercise blood pH, as well as pre-and post exercise base excess and bicarbonates were reduced. Resting beta-HB concentration was elevated to approx. 2.0 mM, and FFA to approx. 1.0 mM. During a 1 h recovery period beta-HB decreased to 0.85 mM (p < 0.01) after the ketogenic diet, while plasma FFA did not change after exercise under either conditions. Both the pre-and post-exercise levels of adrenaline, noradrenaline, and cortisol were enhanced, whilst plasma insulin concentration was decreased on the ketogenic diet. It is concluded that the short-term ketogenic diet does not impair aerobic exercise capacity, as indicated by elevated VO₂ max and LT. This may be due to increased utilization of beta-HB and FFA when carbohydrate stores are diminished. Stimulation of the sympatho-adrenal system, and cortisol secretion with reduced plasma insulin concentration seem to be of importance for preservation of working capacity.

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Publication type, MeSH terms, Substances

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