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The effect of captopril on growth, body composition and insulin sensitivity of mice fed diets containing different types of starch

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Background – The renin-angiotensin system (RAS) is in adipose tissue and contributes to lipogenesis and differentiation of adipocytes. Captopril, an angiotensin converting enzyme inhibitor, prevents the formation of angiotensin II, the biologically active component of the RAS, has been shown to decrease body fat.

Objective – The present experiment assessed the effect of captopril on growth, body composition and insulin sensitivity of obesity-prone mice fed diets that were high in fat (21%) and that contained one of two different starches - amylose or amylopectin.

Design – 8-week old male C57BL/6J mice were housed individually and maintained on a high fat (21%) diet with 40% starch - either amylose (AM), a starch thought to be relatively resistant to digestion, or amylopectin (AP), an easily digested starch. Half of the animals in each of the dietary groups received water containing captopril (0.2 mg / ml), whereas the remainder had plain water to drink. Thus, 4 groups (n=12 per group) were studied (i.e., AM ± captopril, AP ± captopril). Body weight was recorded weekly. Water and food intake were recorded daily. Glucose tolerance testing (I.P. glucose, 2 g/kg) was performed at week 12. Body composition was determined at week 14. Mice were killed at week 16 and blood samples collected for analyses of plasma metabolites and hormones.

Outcomes – Compared with initial measurements, mice not receiving captopril had a 30% increase in body weight by week 16 (not influenced by the type of starch), while body weight of captopril-treated mice had decreased by 57%. Most of the weight loss in the captopril-treated animals occurred within the first four weeks, during which time the food intake was not affected. The weight loss associated with captopril was greater in the animals maintained on the AM diet. Body fat was lower in captopril-treated mice, with the greatest loss seen in those maintained on the AM diet. Over the course of the experiment, captopril increased energy expenditure as estimated by food intake and changes in body composition. Captopril increased plasma adiponectin and improved glucose tolerance. Type of starch did not alter glucose tolerance or blood glucose level.

Conclusions – The results suggest that captopril decreases body weight through increased energy expenditure. The effect of captopril on body fat and glucose tolerance may be mediated by increased levels of adiponectin.

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Metabolic effects of weight loss on a very low carbohydrate diet compared to an isocaloric high carbohydrate, low fat diet in obese subjects

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Background – Despite the popularity of very low carbohydrate diets (LC), no long term studies have compared their effects of weight loss and metabolic change to a conventional high carbohydrate, low fat diet (HC) under isocaloric conditions.

Objective – This study compared the effects of an energy reduced, isocaloric LC and a HC on weight loss and cardiovascular disease (CVD) risk outcomes after 6 months.

Design – 88 obese adults were randomly assigned to either an energy restricted (~6-7 MJ,30% deficit), planned isocaloric LC or HC for 24 weeks in an outpatient clinical trial. Body weight, blood pressure, glucose, lipids, insulin, apoB and C-reactive protein were measured at Week 0 and 24.

Outcomes – Weight loss was similar in both groups (mean ± SD: LC -11.9 ± 6.3kg, HC -10.1 ± 5.7kg; P=0.17). Blood pressure, C-reactive protein, fasting glucose and insulin reduced similarly with weight loss in both diets. LC produced greater decreases in triacylglycerol (LC -0.64 ± 0.62mmol/L, HC -0.35 ± 0.49mmol/L; P=0.01) and increases in HDL-C (LC 0.25 ± 0.28mmol/L, HC 0.08 ± 0.17mmol/L; P=0.002). LDL-C decreased in HC but remained unchanged in LC (LC 0.03 ± 0.79mmol/L, HC -0.46 ± 0.71mmol/L; P<0.001). However a high degree of individual variability for the LDL response in LC was observed, with 24% of individuals reporting an increase of at least 10%. ApoB levels were not significantly different from baseline in either diet group.

Conclusion – We conclude that under isocaloric conditions a LC and HC result in similar weight loss. Overall, although both diets had similar improvements with weight loss for a number of metabolic risk markers, HC had more favourable effects on the blood lipid profile. This suggests the potential long-term effects of LC for CVD risk remains a concern and that blood lipid levels should be monitored.

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