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Comparative Effects of 3 Popular Diets on Lipids, Endothelial Function and Biomarkers of Atherothrombosis in the Absence of Weight Loss

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Abstract:

Background: While the effect of popular diets on weight loss has been extensively studied, less is known in the absence of weight loss. We hypothesized that a diet high in total and saturated fat would be associated with adverse effects on LDL-C, endothelial function and biomarkers of atherothrombosis compared to lower fat diets.

Methods: We tested 3 popular diets, including Atkins (50% fat), South Beach (30% fat) and Ornish (10% fat) in a randomized and counterbalanced, crossover study. Subjects completed each of the three 4-week dietary intervention phases followed by a 4-week washout period. They were weighed weekly and caloric adjustments made if weight change exceeded 1 kg. At the completion of each dietary phase, 3-day food records were analyzed, fasting blood was sampled and brachial artery reactivity testing (BART) performed.

Results: Eighteen of 26 adults (mean age: 30.6 ± 9.6 yrs, 50% female) completed all 3 dietary phases. There were no changes in weight at the conclusion of each phase. However, non-significant increases in LDL-C occurred during the Atkins phase (pre: 96.5, post: 112.9 mg/dL; $P=0.12$), whereas LDL-C was reduced during the Ornish (pre: 110.1, post: 84.6 mg/dL; $P=0.006$) and South Beach phases (pre: 101.7, post: 91.5 mg/dL; $P=0.01$). BART testing revealed a significant inverse correlation between flow-mediated vasodilation and intake of total fat ($r^2=-0.29$; $P=0.03$), saturated fat ($r^2=-0.31$; $P=0.02$) and monounsaturated fat ($r^2=-0.35$; $P=0.01$). Microarray analysis demonstrated increased expression of several leukocyte biomarkers including, ICAM2 (37%; $P=0.002$), SELL (26%; $P=0.007$) and SOD1 (42%; $P=0.04$) at the completion of the Atkins diet compared to baseline. In contrast, expression of atherothrombotic biomarkers was not increased after the South Beach or Ornish phase.

Conclusions: In the absence of weight loss, the high fat Atkins diet is associated with increased LDL-C, reduced endothelial vasoreactivity and increased expression of biomarkers of atherothrombosis. As such, these data suggest that isocaloric conversion to the Atkins diet may negatively impact cardiovascular health as compared to the South Beach or Ornish Diet.