

What effect do Isocaloric Low-Fat, Low-Carbohydrate and Moderate-Fat Diets have on Obesity and Inflammatory Coronary Artery Disease?

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Background: Two-thirds of all Americans are either overweight or obese, accounting for almost 10% of all US medical expenditures. States with a greater incidence of overweight/obesity also have greater rates of cardiovascular disease. Cardiovascular disease remains a major cause of morbidity and mortality and has been shown to be due to inflammation by Fleming, et al. Numerous risk factors, including obesity, have been implicated as irritants for this inflammatory cardiovascular disease process. This study was designed to determine the effect of three different isocaloric diets designed to promote weight loss on (1) inflammatory cardiovascular disease risk factors, (2) coronary blood flow and (3) weight loss/BMI.

Method: One hundred and twenty men (63) and women (57) between 30-59 years of age with BMIs greater than 30 were enrolled into one of three dietary and exercise programs. Participants were randomly assigned to a 1500-1600 kcal/day low-fat, low-carbohydrate or moderate fat diet for 12 months. Dietary adherence was assessed using dietary recall, urine ketone testing and measurement of respiratory quotient. Weight, BMI, and 14 cardiovascular lipid and coronary blood flow health risk indices were monitored at baseline, 6 weeks, 3, 6 and 12 months. These indices were measured again 4 months post-study to determine residual effect. Fasting blood work included total cholesterol, LDLc, HDLc, triglycerides (TG), TC/HDL, VLDLc, TG/HDL, CRP, IL-6, Lp(a), fibrinogen and homocysteine. Objective measurement of coronary blood flow using nuclear imaging was made at baseline and 1 year to determine the effect of these dietary changes on heart disease.

Results: Dietary adherence resulted in statistically significant ($p < 0.001$) reductions in body weight and BMI for each of the three dietary regimens. Coronary blood flow improved on both the moderate-fat and low-fat diets. Effect sizes (R , R^2) for differences between diets and their fat content were significant ($p < 0.000001$) for all indices of inflammation. Interleukin-6 increased on lowered-carbohydrate diets and decreased with low-to-moderate fat diets. These changes in IL-6 corresponded to changes seen in coronary blood flow.

Conclusions: Appropriate diet and exercise with time intensive counseling can lead to effective weight reduction and maintenance for most people. Long-term adherence to lowered-carbohydrate diet significantly increased cardiovascular risk as measured by inflammatory CVD risk markers and coronary blood flow. Long-term adherence to low-to-moderate fat diet significantly reduces CVD risk and improves coronary blood flow. Obesity, like cholesterol, is clearly one of several risk factors promoting an inflammatory

effect on coronary arteries and the subsequent development of heart disease. The benefit of weight loss can be compromised if the dietary changes made promote an increase in inflammatory coronary artery disease.