

## A Low-Carbohydrate Diet in Overweight Patients Undergoing Stable Statin Therapy Raises High-Density Lipoprotein and Lowers Triglycerides Substantially

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### Summary

**Background:** A low-carbohydrate diet remains controversial, especially in patients with arteriosclerotic heart disease.

**Hypothesis:** This study was undertaken to evaluate the effect of a low-carbohydrate diet on the lipid levels in obese patients with known arteriosclerotic heart disease on chronic statin therapy.

**Methods:** Thirty-eight overweight patients with angiographically documented arteriosclerotic heart disease were followed in a private cardiology practice setting. All patients were undergoing stable statin therapy. Patients received a 15-min consultation and a 4-page pamphlet explaining a low-carbohydrate diet; no other diet instruction was given. Patients were followed weekly for 2 weeks, then monthly for 3 months, then every third month. A fasting finger stick lipid panel (cholesterol, high-density and low-density lipoprotein [HDL/LDL], triglycerides, and glucose) was obtained with each visit and patients were weighed in street clothes.

**Results:** The 38 patients were followed for a average of 11.8 months (range 6–22 months). Average body mass index declined from 33.5 kg/m<sup>2</sup> before to 27.9 kg/m<sup>2</sup> at the end of the study. Weight loss averaged 31 lbs (range 16–107 lbs). Triglyceride levels were lowered by 29.5%, HDL raised by 17.6%, and cholesterol decreased by 8.4%. The cholesterol/HDL ratio changed from 5.31 to 3.78 and LDL cholesterol decreased by 5%.

**Conclusion:** The addition of a low-carbohydrate diet for overweight patients with known coronary artery disease undergoing stable statin therapy causes significant weight loss and a favorable change in the lipid panel.

**Key words:** low-carbohydrate diet, statins, arteriosclerotic heart disease, lipids

### Introduction

The low-carbohydrate diet has recently received favorable evaluations<sup>1, 2</sup> and has been successful as a weight loss program.<sup>3</sup> The fear that a low-carbohydrate, high-fat diet would unfavorably change the lipid profile and therefore increase the risk of developing arteriosclerotic heart disease has prevented the acceptance of this diet in the medical community. In this study, a highly selected group of overweight individuals with documented coronary artery disease and already undergoing statin therapy were started on a low-carbohydrate diet with the hope that weight loss would produce an additional lowering of triglycerides and a raise in high-density lipoprotein (HDL).

### Materials and Methods

#### Study Patients

Between February 1999 and February 2003, 59 obese/overweight patients with documented coronary artery disease were advised to start a low-carbohydrate diet. The instructions to the patients were simple and involved a 15-min consultation; a four-page pamphlet explained the rationale of the diet. Patients were encouraged to obtain further advice from the published literature in bookstores. No dietician was involved.

The 59 patients had documented coronary artery disease by angiography and either had undergone coronary intervention with angioplasty or bypass surgery.

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Of the 59 patients, 38 (30 men, 8 women, average age 64.6, range 43–87) were able to lose at least 16 lbs and to maintain the weight loss for an average of 11.8 months (range 6–22 months).

Twenty-eight patients were hypertensive and 12 diabetic. This report details the results of the 38 patients.

All patients received a variety of statins. The statin dose was not changed during the study, and no additional lipid-lowering medications were added.

## Results

The diet was well accepted. All patients tried to stay on the induction diet of <20 g carbohydrates for a minimum of 2 weeks, and gradually added further carbohydrates. The patients managed the diet with little supervision and frequently encouraged other family members to join them. Weight loss was greatest in the first 3 months, with an average weight loss of 31 lbs (range 16–107 lbs). Follow-up ranged from 6 to 22 months (average 11.8 months).

Cholesterol levels averaged 189 mg/% at the beginning of the study and declined to 173 mg/%, constituting a decline of 8.4%. High-density lipoprotein increased from 39.2 to 46.1 mg/%, an increase of 17.6%; triglycerides lowered from 209.4 to 141.9, a decrease of 29.5%; low-density lipoprotein (LDL) lowered from 107.2 to 100.9 mg/%, a decrease of 5.8%; and the cholesterol/HDL ratio declined from 5.31 to 3.89.

Of the 28 patients with hypertension, 23 were able to reduce their antihypertensive medications. Two patients on insulin therapy were able to stop insulin administration. All diabetics were able to reduce their hypoglycemic medications.

## Discussion

A low-carbohydrate diet in overweight patients with coronary artery disease and already on statin therapy reduced triglycerides and raised HDL substantially while total cholesterol and LDL changed to a lesser degree. Additional benefits were reduction of blood pressure in 23 of 28 patients and better control of blood sugar in most diabetic patients. These results were obtained in patients who previously had received intense dietary instructions on a low-fat diet during hospital stays; they had been unable to lose weight on this diet. No significant side effects were observed during the mean observation period of 11.8 months. Long-term studies as to the risk and benefits of a low-carbohydrate diet are not available. The concept of the low-carbohydrate diet is simple and does not require intense dietary counseling; motivated patients get sufficient information from the available literature in bookstores.

As is the case with all diets, not everybody is able to adhere to the diet, and at present there is still a large fear factor by the public and physicians regarding the diet's side effect. This study adds further evidence that the low-carbohydrate diet has multiple and significant beneficial effects on patients with coronary artery disease. Further long-term and larger studies with clinical outcomes will be required before reaching any final conclusion as to the ultimate long-term safety of this diet.

The treatment of obesity remains difficult and controversial. As early as 1986, Reaven<sup>3</sup> predicted an increase in obesity and diabetes as a result of the widespread recommendation of the low-fat diet. The review article by Taubes in *Science*<sup>4</sup> questioned the scientific basis of the low-fat diet. The lack of effectiveness of the low-fat diet in lowering lipids was reviewed in the *European Heart Journal*.<sup>5</sup> Recent studies documented beneficial effects of a low-carbohydrate diet on lipid levels.<sup>6,7</sup>

## Conclusion

This study documents that weight loss can be achieved and maintained with a low-carbohydrate diet, adding significant beneficial effects on lipid levels in patients already undergoing statin therapy.

It is feasible in a busy private cardiology practice to motivate obese patients to lose weight requiring limited patient/physician interaction. A low-carbohydrate diet achieved significant weight loss in motivated patients without demonstrable side effects at least for the observed period of 1 year. It produced beneficial effects on lipids, blood pressure, and blood sugar in patients already undergoing statin therapy.

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