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High Carb, Low Glycemic Index Diet Best to Reduce CV Risk **CME**

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July 25, 2006 — Diets high in carbohydrates (CHOs) with low glycemic index (GI) are best for cardiovascular risk reduction, according to the results of a randomized controlled study reported in the July 24 issue of the *Archives of Internal Medicine*. The editorialist suggests that it is time to incorporate the concepts of glycemic index and glycemic load into clinical practice to reduce cardiovascular risk.

"Despite the popularity of low-glycemic index (GI) and high-protein diets, to our knowledge no randomized, controlled trials have systematically compared their relative effects on weight loss and cardiovascular risk," write Joanna McMillan-Price, MNutrDiet, from the University of Sydney in Australia, and colleagues. "A unifying hypothesis is that a high dietary glycemic load (GL; the contribution to postprandial glycemia of all foods in a diet) increases the difficulty of weight control because rapidly digestible CHOs can cause marked fluctuations in blood glucose and insulin levels, in turn stimulating hunger and inhibiting fat oxidation. Both low-GI and high-protein diets have caught the public's attention, but clinicians and health professionals remain skeptical, calling for greater scientific evidence on which to base advice to patients."

In this study, 129 overweight or obese young adults (body mass index [BMI], ≥ 25 kg/m²) were randomized to 1 of 4 reduced-fat, high-fiber diets for 12 weeks, and changes in weight, body composition, and blood chemistry profile were studied. Diets 1 and 2 were high carbohydrate (55% of total energy intake), with high and low GIs, respectively, whereas diets 3 and 4 were high protein (25% of total energy intake), with high and low GIs, respectively. The glycemic load was highest in diet 1 and lowest in diet 4.

Mean weight loss was similar in all groups (diet 1, $-4.2\% \pm 0.6\%$; diet 2, $-5.5\% \pm 0.5\%$; diet 3, $-6.2\% \pm 0.4\%$; and diet 4, $-4.8\% \pm 0.7\%$; $P = .09$). However, the proportion of subjects in each group who lost 5% or more of body weight varied significantly by diet (diet 1, 31%; diet 2, 56%; diet 3, 66%; and diet 4, 33%; $P = .01$). Women on diets 2 and 3 lost approximately 80% more fat mass (-4.5 ± 0.5 [mean \pm SE] and -4.6 ± 0.5 kg) than did those on diet 1 (-2.5 ± 0.5 kg; $P = .007$).

Mean low-density lipoprotein cholesterol levels decreased in the diet 2 group (-6.6 ± 3.9 mg/dL [-0.17 ± 0.10 mmol/L]) but increased in the diet 3 group ($+10.0 \pm 3.9$ mg/dL [$+0.26 \pm 0.10$ mmol/L]; $P = .02$). Goals for energy distribution were not achieved exactly, in that both CHO groups ate less fat, and the diet 2 group ate more fiber.

"Both high-protein and low-GI regimens increase body fat loss, but cardiovascular risk reduction is optimized by a high-carbohydrate, low-GI diet," the authors write. "At least in the short term, our findings suggest that dietary GL, and not just overall energy intake,

influences weight loss and postprandial glycemia. Moderate reductions in GL appear to increase the rate of body fat loss, particularly in women."

Study limitations include inexact achievement of dietary goals for energy distribution and study duration limited to 12 weeks.

"Diets based on low-GI whole grain products (in lieu of whole grains with a high GI) maximize cardiovascular risk reduction, particularly if protein intake is high. Reassuringly, this advice can optimize clinical outcomes within current nutrition guidelines, without the concerns that apply to low-CHO diets. Multicenter studies to evaluate weight reduction, weight maintenance, and long-term outcomes, particularly in individuals with established risk factors, are clearly warranted."

The National Heart Foundation of Australia and Meat and Livestock Australia supported this study. Two of the authors have disclosed writing books about low GI diets.

In an accompanying editorial, Simin Liu, MD, ScD, from the University of California, Los Angeles, notes that until recently, knowledge of responses to GL has not been comprehensive and applied to the development of food-composition tables in guiding dietary practice.

"Accumulating data now indicate that postprandial glycemia is an important risk factor in the development of CVD [cardiovascular disease], which can be controlled through both pharmacologic and dietary means that delay gastrointestinal absorption of carbohydrates," Dr. Liu writes. "Given the fact that a large segment of the population is following many popular diets that emphasize low-GI and/or low-carbohydrate intake for weight loss, future feeding trials and mechanistic studies such as the one reported by McMillan-Price and colleagues will continue to provide welcome insights in a field that is often shrouded with confusion."

Dr Liu has disclosed no relevant financial relationships.

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Learning Objectives for This Educational Activity

Upon completion of this activity, participants will be able to:

- Describe the effect of GI on weight loss in overweight men and women.
- Describe the effect of GI and GL on metabolic measures (lipid profile and insulin sensitivity) in overweight men and women.

Clinical Context

A high CHO intake can exaggerate postprandial hyperglycemia and predispose to obesity, type 2 diabetes, and the metabolic syndrome, and restriction or modification of CHO intake can have beneficial effects on energy expenditure, triglyceride concentrations, high-density lipoprotein cholesterol, and glucose homeostasis. While a low fat, high CHO diet remains a "best practice" recommendation, studies suggest that a higher protein, low CHO or low GL diet may provide benefits for weight loss and cardiovascular risk reduction.

The current study is a 12-week parallel, randomized controlled trial of 4 weight loss diets of defined GL, varying in CHO and protein content and in GI, conducted in overweight men and women to determine if lower GL would affect rate of weight and fat loss and improve cardiovascular function.

Study Highlights

- Inclusion criteria were adults aged 18 to 40 years with body mass index of 25 kg/m² or higher, body weight less than 150 kg, willing to eat red meat, and weight fluctuations of less than 5 kg in the past 2 months.
- Exclusion criteria were chronic illness, regular medications, eating disorder, special diets, pregnancy, and food allergies.
- 129 participants (98 women and 31 men) were randomly assigned to 4 diet groups stratified by body mass index and sex.
- All 4 diets were reduced energy, reduced fat (30%), and moderate fiber (30 g/day) with differences in quantity and quality of CHOs.
- Diet 1 was a high CHO (55%), average protein (15%) diet based on high GI whole grains.
- Diet 2 had the same macronutrients but used low GI foods.
- Diet 3 was a higher protein (25%) and reduced CHO (45%) diet based on lean red meat and high GI whole grains.
- Diet 4 had similar macronutrients as diet 3 but used low GI CHO choices.
- Subjects had eating plans designed for weight loss: 1400 kcal/day for women and 1900 kcal/day for men. Dairy intake was held constant.
- Primary outcomes were weight and body composition measured by dual energy x-ray absorptiometry and waist circumference at baseline and week 12.
- Other outcomes were glucose, lipid profile, free fatty acids, leptin, and insulin sensitivity measured as homeostasis model assessment.

- Hyperinsulinemia was defined as fasting insulin levels higher than 110 pmol/L and hypertriglyceridemia as fasting levels higher than 1.5 mmol/L.
- At baseline and during weeks 4 and 8, subjects kept a 3-day food diary that included 2 weekdays and 1 weekend day.
- Mean weight reduction during 12 weeks was 4.2% to 6.2% of baseline weight and similar in the 4 groups.
- Reductions in fat mass and waist circumference were significant in each group ($P < .01$ for all).
- There were significant differences in the proportion of individuals who lost 5% or more of baseline body weight: 31% for diet 1, 56% for diet 2, 66% for diet 3, and 33% for diet 4.
- There was a significant effect of sex on fat mass with women having a higher reduction in fat mass than men.
- The GI had a significantly different effect in the high CHO diets compared with the high protein diets, and this effect was more pronounced in women.
- The high CHO, low GI diet (diet 2) was associated with significant decline in low-density lipoprotein cholesterol level, whereas the low CHO, high GI diet (diet 3) was associated with an increase in low-density lipoprotein cholesterol.
- Declines in lean body mass reached significance in 2 high GI groups, but overall was not different for the 4 diets.
- All 4 groups achieved their intended CHO and protein intake. Mean dietary fiber intake was 25 g/day.
- Dropout rate was higher in the 2 diets with high GI foods (15%).

Pearls for Practice

- Overweight men and women who follow a diet high in CHO and low in GI or high in protein and high in GI are twice as likely to achieve a weight loss of more than 5% for 12 weeks vs the converse diets.
- Women on high CHO diets are more likely to lose fat mass compared with men. A high CHO, low GI diet is most likely to be associated with low-density lipoprotein cholesterol reduction.

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Goal

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