

# What is the dietary treatment for low HDL cholesterol?

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## CLINICAL COMMENTARY

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*Even modest increases in HDL can be clinically important; exercise, weight loss, and tobacco cessation can help. When it comes to HDL, most of our patients are not as fortunate as natives of Limone sul Garda, Italy (famously low but efficient HDL) or Honshu, Japan (high HDL). Medications based on these protective genetic anomalies are being developed. Also, the flushing resulting from niacin may soon be more effectively mitigated than with aspirin. Until these new therapies are available, urge multifaceted lifestyle modification—if only for its more robust cardiovascular benefits.*

*A low HDL can elicit a clinical fatalism from even the best of us. But each increase in baseline HDL of 1 mg/dL is associated with a 5% decrease in the risk of death from coronary disease, (1) so even modest increases in HDL can be clinically important. In addition to the dietary measures described above, evidence exists that exercise, alcohol in moderation, weight loss, and tobacco cessation also increase HDL. Unfortunately, the magnitude of even these small improvements appear to be directly proportional to baseline HDL levels (2).*

*So ... when are those new medications coming? □*

## EVIDENCE-BASED ANSWER

Low-carbohydrate diets raise high-density lipoprotein (HDL) cholesterol levels by approximately 10%; soy protein with isoflavones raises HDL by 3% (strength of recommendation [SOR]: C, based on meta-analysis of physiologic parameters). The Dietary Approaches to Stop Hypertension (DASH) diet and multivitamin supplementation raise HDL 21% to 33% (SOR: C, based on single randomized trial each measuring physiologic parameters). No other dietary interventions studied raise HDL (SOR: C, based on meta-analysis of physiologic parameters). □

## EVIDENCE SUMMARY

Low HDL is recognized as a risk factor for atherosclerosis. Clinicians find raising HDL a challenge, and patients often inquire about dietary advice that may help raise HDL.

No quality evidence exists that specifically looks at the effect of a dietary intervention on HDL or whether it affects survival. However, several dietary intervention studies in specific populations include HDL as a secondary endpoint in the study. This leaves clinicians to act on physiologic data that may or may not increase the overall health and survival of patients. Dietary interventions that raised HDL include low-carbohydrate diets, the DASH diet, supplementation with soy protein including isoflavones, and multivitamin supplementation.

Table. Summary of studies evaluating the effect of various diets on HDL cholesterol

| STUDY   | INTERVENTION                                 | METHODS  | HDL EFFECT |
|---|--|--|------------|
| Nordmann, et al 2006 (3); Wood et al 2006 (4)       | Low-carbohydrate diets                       | Systematic review with meta-analysis of 5 RCTs of low-carbohydrate vs low-fat diets. 10% increase in HDL. Absolute increase 4.6 mg/dL (95% CI, 1.5–8.1). Subsequent uncontrolled prospective trial consistent with systematic review (12% increase in HDL) | ++         |
| Zhan and Ho 2005 (7)                                | Soy protein with isoflavones                 | Systematic review with meta-analysis of 23 RCTs evaluating effect of various amounts of soy protein with isoflavones on lipid profile. 3% increase in HDL. Absolute difference 1.5 mg/dL (95% CI, 0.0–2.8)   | +          |
| Morcos 1999 (6)                                     | Multivitamin                                 | RCT of 46 subjects in placebo controlled crossover study. 31% increase in HDL  | ++++       |
| Azadbacht et al 2005 (5)                            | DASH diet in metabolic syndrome              | RCT of 116 patients randomized to control diet, weight control or DASH diet. Absolute increase of 7 mg/dL for men (21%). Absolute increase of 10 mg/dL for women (33%). No confidence intervals given  | +++        |
| Kelly et al 2004 (8)                                | Low glycemic diet                            | Systematic review of 15 RCTs with low glycemic diets for patients with coronary heart disease. Heterogeneity prevented meta-analysis. No effect on HDL.  | 0          |
| Brunner et al 2005 (9)                              | Dietary advice                               | Systematic review of 23 RCTs comparing dietary advice and no advice to reduce cardiovascular risk. 956 participants. No effect on HDL.   | 0          |
| Chen et al 2006 (10)                                | Soluble fiber                                | RCT of 110 adults randomized to 8 g of soluble fiber vs control. No effect on HDL.   | 0          |
| Lewis et al 2004 (11)                               | Omega-3 fatty acids in hyper-triglyceridemia | Systematic review of 10 RCTs comparing omega-3 fatty acids. Considered poor to moderate quality. Variable results from RCTs  | ???        |
| Farmer et al 2001 (12)                              | Omega-3 fatty acids in type 2 diabetes       | Systematic review with meta-analysis of 18 trials with 823 patients. No effect on HDL  | 0          |
| Hooper et al 2004 (13)                              | Omega-3 fatty acids for prevention of CVD    | Systematic review with meta-analysis of 48 trials of 36,913 participants taking omega-3 fatty acids for prevention of cardiovascular disease. No effect on HDL   | 0          |
| Tapsell et al 2004; (14)<br>Spiller et al 1998 (15) | Walnuts and almonds                          | One RCT and one prospective cohort trial of nuts added to the diet. No significant effect  | 0          |

Several overall diet interventions appear to raise HDL, but whether this affects cardiovascular events or mortality is unknown. A systematic review with meta-analysis of 5 randomized controlled trials (RCTs) of low-carbohydrate versus low-fat diets showed a 10% increase in HDL attributed to the low-carbohydrate diet, which translated to an absolute increase of 4.6 mg/dL (95% confidence interval [CI], 1.5-8.1). (1) A subsequent uncontrolled prospective trial was consistent with this systematic review and showed a 12% increase in HDL. (2) The DASH diet was studied as an intervention in a RCT of 116 patients with the metabolic syndrome. Men responded with an increase of 21% and women with an increase of 33% (3).

Supplementation with several food additives and nutritional supplements has been tested. A systematic review with meta-analysis of 23 RCTs evaluating effect of various amounts of soy protein with isoflavones on lipid profile found a 3%

increase in HDL with an absolute difference 1.5 mg/dL (95% CI, 0.0-2.8) (4). Supplementation with standard multivitamins in a single small, crossover RCT showed a 31% increase in HDL. (5)

Many other strategies, supplements, and plans have been tested in different populations. Other than the above interventions, no other interventions raise HDL when subjected to meta-analysis or quality randomized trials (TABLE). □

## RECOMMENDATIONS FROM OTHERS

No specific guidelines on dietary therapy of HDL exist; however, the American Heart Association (AHA) published diet and lifestyle recommendations in 2006 (14). These guidelines recommend a diet low in fat, saturated fat, trans fat, and cholesterol in addition to minimizing sodium, added sugars, and alcohol. The AHA also recommends for consumption of oily fish and the DASH diet. □

**FAST TRACK**

*Low-carbohydrate diets, soy protein, and the DASH diet all raise HDL levels*

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