

## Pooled Analysis of Studies on the Effect of Walnut Consumption on Serum Lipids

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Epidemiologic and clinical studies have shown that walnut consumption favorably affects serum lipids. We conducted a random-effects pooled analysis of data from clinical studies to derive robust estimates of the effects on serum lipids of walnut-enriched diets compared with various reference diets. Data included 510 observations from 217 subjects enrolled in 9 (7 randomized crossover and 2 non-randomized pre-post) studies. Endpoints included serum total cholesterol (TC), LDL, HDL, LDL:HDL, and triglyceride (TG). We found that the effects of walnut-enriched diets depended on whether the reference diet was an average American (AA), low fat (LF), or Mediterranean (Med) diet. Compared with AA, LF, and Med, respectively, walnut-enriched diets lowered TC by  $19 \pm 3$ ,  $11 \pm 2$ , and  $9 \pm 2$  mg/dL (mean  $\pm$  SE,  $P < 0.0001$ ); LDL by  $16 \pm 2$ ,  $9 \pm 2$ , and  $10 \pm 2$  mg/dl ( $P < 0.0001$ ); and LDL:HDL by  $0.34 \pm 0.07$  ( $P < 0.0001$ ),  $0.11 \pm 0.05$  ( $P = 0.04$ ), and  $0.22 \pm 0.06$  ( $P = 0.0003$ ). Walnut-enriched diets had no significant effect on HDL or TG. Exclusion of the 2 non-randomized studies did not materially affect these results. We conclude that walnut-enriched diets improve the serum lipid profile compared with average American, low fat, and Mediterranean diets, with the greatest improvements observed when compared with the average American diet. This study is funded by the International Tree Nut Council, Nutrition Research & Education Foundation.