

Green kiwifruit: effects on plasma lipids and *APOE* interactions



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Background:

Diet and other lifestyle modifications are crucial elements in the reduction of cardiovascular disease (CVD) risk¹. Furthermore, response to dietary change may be influenced by genotype². Inclusion of various dietary components, including soluble fibre and selected vitamins and phytochemicals, has been shown to improve dyslipidaemia and lower CVD incidence³. Kiwifruit are a good source of several of these dietary components⁴.

Objectives:

- To investigate the effect of consuming two green kiwifruit daily in conjunction with a healthy diet on plasma lipids.
- To examine response according to apolipoprotein E (*APOE*) genotype.

Method/Design:

Eighty-seven men (age: 48±9.47 years, range 27 to 73 years) were recruited from around Auckland, NZ, for an 8-week randomised controlled cross-over study (Figure 1).

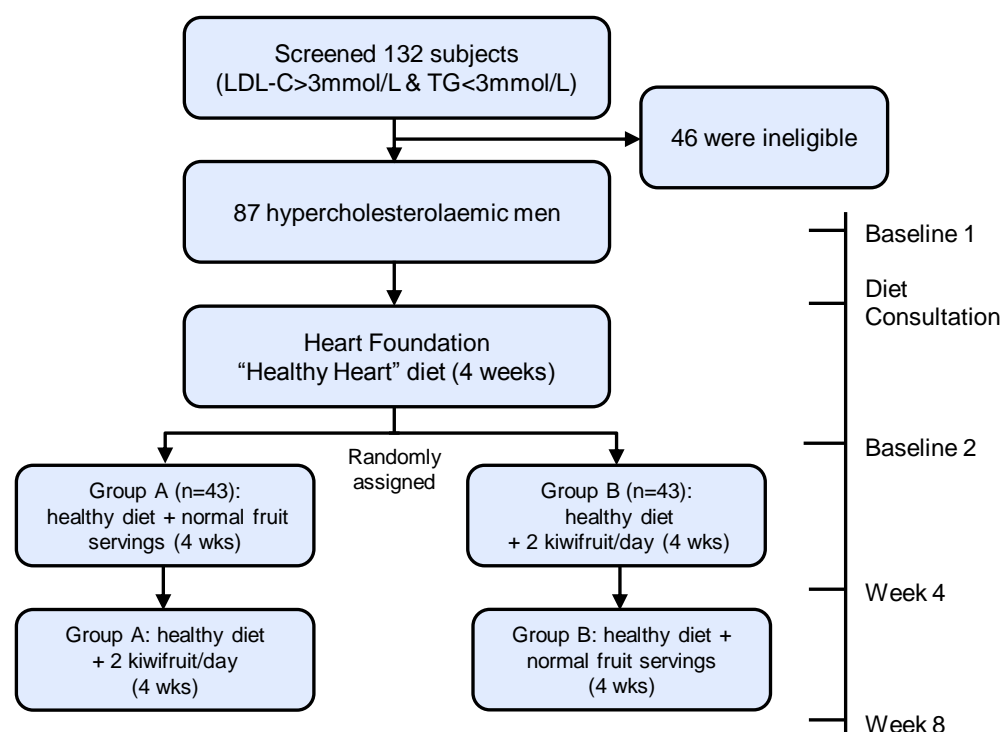


Figure 1: Study flow



A fasting blood sample for plasma lipid profile and *APOE* genotype analysis, anthropometric measures and dietary data were collected at baselines 1 and 2, and weeks 4 and 8.

References:

1. Lichtenstein, A.H., et al., *Diet and lifestyle recommendations revision 2006: a scientific statement from the AHA Nutrition Committee. Circulation*, 2006. **114(1)**: p. 82-96.
2. Minihane, A.M., et al., *ApoE genotype, cardiovascular risk and responsiveness to dietary fat manipulation. Proceedings of the Nutrition Society*, 2007. **66(2)**: p. 183-97.
3. Badimon, L., G. Vilahur, and T. Padro, *Nutraceuticals and atherosclerosis: human trials. Cardiovasc Ther*, 2010. **28(4)**: p. 202-15.
4. Ferguson, A.R. and L.R. Ferguson, *Are kiwifruit really good for you? Acta Horticulturae*, 2003. **610**: p. 131-35.

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Results:

Two subjects were excluded (poor compliance). The 4-week healthy diet run-in period resulted in significant improvements of lipid profiles and decreases in body weight. Regardless of treatment no further changes in body weight were seen.

Kiwifruit intervention

Compared to control treatment, kiwifruit treatment (Table 1) resulted in significantly higher plasma HDL-C, and lower TC/HDL-C ratio.

Table 1: Plasma lipid and apolipoprotein concentrations (n=85)

| | Baseline 2 | End-kiwifruit | End-control | P value |
|----------------|-------------------|--------------------------------|--------------------------------|---------|
| TC (mmol/L) | 6.04 (5.85, 6.23) | 6.10 (5.93, 6.29) | 6.11 (5.92, 6.30) | 0.96 |
| LDL-C (mmol/L) | 3.91 (3.76, 4.06) | 3.92 (3.77, 4.08) | 3.95 (3.80, 4.12) | 0.50 |
| HDL-C (mmol/L) | 1.38 (1.31, 1.44) | 1.39 (1.33, 1.46) | 1.35 (1.29, 1.41) | 0.004* |
| TG (mmol/L) | 1.52 (1.39, 1.65) | 1.55 (1.42, 1.70) | 1.58 (1.45, 1.72) | 0.71 |
| TC/HDL-C ratio | 4.46 (4.29, 4.63) | 4.46 (4.28, 4.63) | 4.60 (4.41, 4.79) [†] | 0.002* |
| ApoA1 (g/L) | 1.36 (1.31, 1.41) | 1.39 (1.34, 1.44) [†] | 1.37 (1.32, 1.42) | 0.19 |
| ApoB (g/L) | 1.11 (1.07, 1.16) | 1.12 (1.07, 1.16) | 1.12 (1.08, 1.17) | 0.60 |
| ApoB/A1 ratio | 0.83 (0.78, 0.87) | 0.82 (0.77, 0.86) | 0.83 (0.79, 0.88) | 0.05 |

No interaction effects were seen between order of treatment and treatment (2-way ANOVA)

*Significant differences between kiwifruit versus control ($P < 0.05$) (Dependent Student *t*-test)

[†]Significant change from baseline 2 to end ($P < 0.05$) (Dependent Student *t*-test)

Apolipoprotein E interactions

APOE4 carriers had a significant decrease in TG concentration with the kiwifruit intervention compared to control (Figure 2).

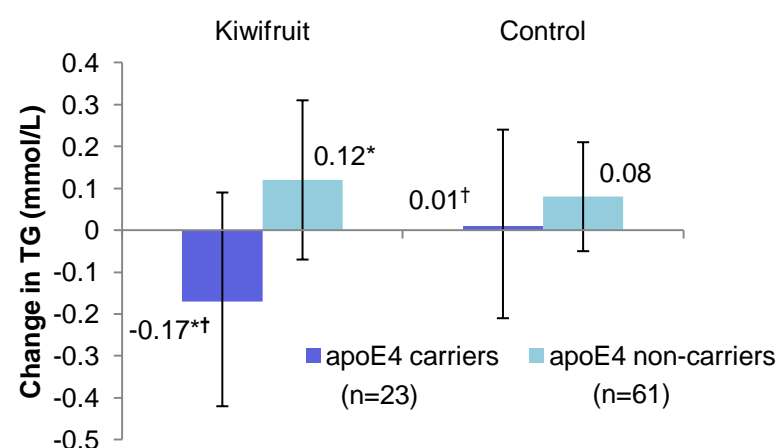


Figure 2: Mean (95% CI) changes in TG concentration from baseline

*Significant differences between *APOE4* carriers and non-E4 carriers for the kiwifruit intervention ($P = 0.01$) (Independent Student *t*-test)

[†]Significant differences between kiwifruit and control treatments for *APOE4* carriers ($P = 0.03$) (Dependent Student *t*-test)

Conclusions:

The small but significant increase in HDL-C and decrease in TC/HDL ratio and TG (in *APOE4* carriers) suggests that the regular inclusion of green kiwifruit as part of a healthy diet may be beneficial in improving the lipid profiles of men with high cholesterol.

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