DIETARY α-LINOLENIC AND LINOLEIC ACIDS, PLATELET AGGREGATION AND THROMBOXANE A_2 PRODUCTION

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Increased intakes of α-linolenic acid (ALA) may protect against coronary heart disease (de Logeril et al. 1994). People consuming more ALA have more eicosapentaenoic acid in their tissue phospholipids (Allman et al. 1995) which leads to decreased thromboxane A_2 (TXA_2) production, a potent promoter of platelet aggregation (Dyerberg et al. 1978). The aim of the current study was to compare two low saturated fat diets; the only variable being the ratio of ALA to linoleic acid (ALA:LA).

After consuming a diet with 37% energy (en) from fat (16% en, saturated fat) for two weeks, healthy men aged 18 to 35 years (n=18) consumed a diet with 10% en saturated fat, 13% en monounsaturated fat and 7% en polyunsaturated fat. Half ate a diet with ALA:LA of 1.4:1 (ALA-rich) and the remainder ALA:LA of 1:34 (ALA-poor). Blood was sampled at the beginning, middle and end of six weeks on the test diets to measure platelet aggregation induced by collagen (0.5 μg/mL platelet-rich plasma) and the resultant TXA_2 concentration. Bleeding times were measured after standardised incision at the beginning and end of the test diets. Erythrocyte membrane fatty acids were analysed to monitor dietary compliance by increases in the ω3 fatty acids, eicosapentaenoic (EPA) and docosapentaenoic acid (DPA).

The aggregation in platelet-rich plasma (PRP) at six minutes after the injection of collagen and the TXA_2 concentrations of the PRP are shown in the table. When the changes on each diet were compared with each other, no significant differences were detected. However, ANOVA of the endpoints on each individual diet showed that on the ALA-poor diet collagen-induced aggregation decreased ($P<0.05$) while TXA_2 production ($P<0.05$) decreased on the ALA-rich diet. Bleeding times were unchanged.

		Baseline[1] 0 weeks	Mid-point[1] 3 weeks	End-point[1] 6 weeks
Collagen 0.5 μg/mL	ALA-rich	57 ± 9	39 ± 8	46 ± 10
(% aggregation)	ALA-poor	60 ± 9	45 ± 12	32 ± 11
Thromboxane A_2	ALA-rich	151 ± 19	91 ± 8	93 ± 20
(ng/mL)	ALA-poor	133 ± 27	85 ± 15	101 ± 24
Bleeding time	ALA-rich	6.1 ± 0.6		8.1 ± 1.1
(minutes)	ALA-poor	5.6 ± 0.6		7.0 ± 0.7

[1]means ± sem

There is a trend to decreased collagen-induced aggregation and bleeding times on both diets. The mechanism for decreases on the ALA-rich diet may be explained by decreased TXA_2 but the effects of both diets may be related to consumption of a diet lower in saturated fat. In conclusion, these results only represent the first half of the study. When all subjects have completed, the statistical power will be sufficient to confirm the trends observed.

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