

Effects of Rapeseed Oil and Sunflower Oil on Platelet Aggregation and Thromboxane Production

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Experiment 1. In this highly controlled trial, 26 normolipidemic men (average age 28 years, range 18 to 60) were fed a baseline diet high in milk fat (MF) (fat 36 % of energy, saturates 19 %, monounsaturates 11 %, polyunsaturates 4 %), followed by a diet high in sunflower oil (SO) (fat 38 % of energy, saturates 13 %, monounsaturates 10 %, polyunsaturates 13 %) and another diet high in low-erucic-acid rapeseed oil (RO) (fat 38 % of energy, saturates 12 %, monounsaturates 16 %, polyunsaturates 8 %). All diets were mixed natural diets with the same cholesterol contents. The baseline milk fat diet was given for 14 days and the oil diets for 24 days in a blind cross-over design. The platelet in vitro aggregation (slope %/min) induced by 1, 2 and 3 μM ADP and collagen (25 $\mu\text{g}/\text{ml}$ PRP) was highly significantly ($p < 0.001$) increased after both oil diets when compared with the results from the milk fat diet. The aggregation pattern determined by threshold collagen concentration confirmed increased collagen sensitivity of the platelets after the rapeseed oil diet ($p < 0.001$). The enhancement of platelet aggregation was associated with increased in vitro platelet thromboxane production after the oil diets vs. the milk fat diet ($p < 0.05$ after the sunflower oil diet and $p < 0.001$ after the rapeseed oil diet).

Experiment 2. Effects of α -linolenic acid in a low-erucic acid rapeseed oil diet and linoleic acid in a high-oleic acid sunflower oil diet on platelet aggregation in vitro were compared. In the cross-over study 20 healthy male subjects, average age 29 yr (range 20-46 yr), followed experimental rapeseed oil (RO) and Trisun-sunflower oil (TSO) diets after a habitual diet for six weeks. In the experimental-diet protocol subjects were provided most of the fat containing foods (margarine, oil, salad dressing, bread, buns, cakes, pies and cookies prepared with experimental fats) but allowed to eat other foods almost freely. Compositions of the diets were calculated from dietary records kept by the subjects. Experimental diets contained saturated/monounsaturated/polyunsaturated fatty acids as follows: RO diet 12.4/18.6/8.9 % of total energy (en%) (6.3 en% linoleic acid and 2.3 en% α -linolenic acid) and TSO diet 11.8/17.8/8.3 en% (8.2 en% linoleic acid and 0.3 en% α -linolenic acid), respectively. Platelet aggregations induced by either all three ADP (1, 2 and 3 μM) or thrombin concentrations (0.12, 0.15 and 0.18 NIH/ml) gave significantly stronger responses after the TSO diet compared with the RO diet ($p = 0.000$). The collagen- (1.5, 2.5 and 5.0 $\mu\text{g}/\text{ml}$) induced aggregation in 10 subjects was also stronger after the TSO diet ($p = 0.057$). After the TSO diet platelet aggregation was enhanced from the level of the habitual diets by one thrombin (0.18 NIH/ml), one collagen (1.5 $\mu\text{g}/\text{ml}$) and all three ADP concentrations. Results show that linoleic acid has a specific effect on platelet function, not found with α -linolenic acid.