

The effect of palmitic and stearic acid rich diets on thrombotic risk factors in healthy males

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Evidence has accumulated which suggests that specific haemostatic and thrombotic factors exist which may increase the risk for acute thrombosis. These factors include increased platelet aggregation, increased reactivity of the coagulation cascade, abnormalities of blood rheology and depressed fibrinolytic mechanisms (1). While only a few studies have been conducted to assess the effects of fatty acids on thrombosis, there is some evidence from animal and human studies that diets rich in stearic acid may promote thrombosis (2), without being hypercholesterolaemic.

The aim of this study was to investigate the relative thrombosis potential of diets rich in stearic acid (SA) against those rich in palmitic acid (PA), by measuring the influence on platelet function and plasma levels of selected coagulation factors. Fourteen healthy male subjects aged 20-56 years were recruited in the CBD area of Melbourne. The study design was a blind crossover design with subjects consuming either a SA or PA rich diet for 4 weeks followed by a 7 week washout period and the alternate diet. Seven subjects were randomly assigned to each group. Test fats were given providing SA or PA at a level of ~6% of total energy, in the form of spreading and baking margarines. Weighed food records were maintained throughout the study. Venous blood was collected into citrate vacutainers for the analysis of plasma coagulation factors and whole blood platelet aggregation. The blood coagulation parameters: prothrombin time (PT), activated partial thromboplastin time (APTT), antithrombin III, fibrinogen and factor VII and the fibrinolytic factor plasminogen will be measured using an ACL 200 Haemostasis Analyzer at the conclusion of the study. Whole blood platelet aggregation is measured using a Chrono-Log whole blood aggregometer, with collagen, arachidonic acid (AA) and ADP as agonists. All 14 subjects have completed the first phase. The platelet aggregation data shown in the table for 7 subjects on each test diet indicate no significant differences using collagen or ADP agonists but an increased aggregation to AA in the subjects on the PA diet.

Agonist	Palmitic acid		Stearic acid	
	Baseline ¹	Day 28 ¹	Baseline ¹	Day 28 ¹
Arachidonic acid (1mM)	12.2 ± 4.1	15.8 ± 2.3 ^a	15.9 ± 1.2	16.0 ± 1.5
ADP (8µM)	8.9 ± 2.2	10.6 ± 2.9	7.9 ± 2.9	7.7 ± 3.1
ADP (17µM)	9.5 ± 3.5	11.9 ± 2.4	9.5 ± 3.5	9.8 ± 4.1
Collagen (2µg/ml)	12.5 ± 5.0	16.0 ± 1.5	12.2 ± 3.4	14.2 ± 1.5

¹ Height (Ω at 5 mins) mean ± SD; ^a different to baseline P<0.05

At this stage, with the limited number of subjects (n=7) in each group, there is no evidence to suggest that SA is prothrombotic. However, its mode of action if prothrombotic is more likely to be via altered haemostatic factors, which will be determined at the conclusion of the study.

1. Meade TW. Fibrinogen and other clotting factors in cardiovascular disease. In: Francis RB, ed Atherosclerotic Cardiovascular Disease, Haemostasis and Endothelial Function. Marcel Decker, Inc. New York. 1992:1-34.
2. Renaud S. Dietary fatty acids and platelet function. Proc Nutr Soc Aust 1985; 10:1-13.