Influence of dietary stearic acid enrichment on individual platelet phospholipid fatty acid composition

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It is widely accepted that stearic acid, as opposed to saturated fats in general, is not hypercholesterolemic. In addition, stearic acid enriched diets have previously been shown to reduce platelet aggregation (1) and platelet size as measured by mean platelet volume (MPV) (1,2). This decrease in MPV, indicative of platelets in a quiescent, non-activated state, may represent a reduced thrombotic tendency.

Many cell functions are influenced by their membrane fatty acid composition and thus, it is important to determine if there is preferential distribution of stearic acid amongst specific platelet phospholipid fractions and if stearic acid incorporation affects the level and distribution of other specific fatty acids.

Five healthy male subjects aged 44 ± 14 years consumed a stearic acid (C18:0) enriched diet at a level of 6.4% total energy (~ 20 g per day compared with an habitual intake of ~ 8 g per day) for four weeks. Habitual and intervention dietary intakes were measured using seven day weighed food records. Venous blood was collected for Full Blood Examination including measurement for MPV and platelet fatty acid determination at days 0 and 28. The platelet phospholipid (PL) classes, phosphatidylethanolamine (PE), phosphatidylcholine (PC), phosphatidylserine (PS) and phosphatidylinositol (PI), were separated by TLC using the solvent system: methyl acetate: propan-1-ol: choloroform: methanol:0.25% aqueous KCI (25:25:25:10:9, by vol). Fatty acid methyl esters were prepared by a standard method and identified using Gas Chromatography.

Stearic acid levels increased significantly ($P < 0.05$) in the PE and PC platelet PL fractions by 17% and 15%, respectively, compared with baseline levels. In the PI fraction, there was a non-significant trend to decrease stearic acid levels combined with a significant increase in the level of linoleic acid and a significant decease in the level of arachidonic acid (AA) by 248% and 13%, respectively, compared with baseline levels. No differences were observed in MPV.

	PE[1]	PC[1]	PS[1]	PI[1]
C18:0% at baseline	15.63 ± 0.46	13.79 ± 1.31	41.51 ± 2.29	38.16 ± 0.76
C18:0% at day 28	18.22 ± 1.37[a]	15.92 ± 2.25[a]	41.82 ± 1.38	35.81 ± 2.33

[1]mean ± SD, [a]significantly different to baseline ($P < 0.05$).

The significant decrease in AA in the PI fraction may be linked to the previously encountered lower platelet aggregation in stearic acid enriched diets (1).

1. Kelly FD, Sinclair AJ, Mann NJ, Turner AH, Abedin L, Li D. A stearic acid-rich diet improves thrombogenic and atherogenic risk factor profiles in healthy males. Eur J Clin Nut 2001; 55: 88–96.
2. Schoene NW, Allmann AM, Dougherty RM, Denvir E, Iacono JM. Diverse effects of dietary stearic acid and palmitic acids on platelet morphology. In: Sinclair A and Gibson R (eds). Essential fatty acids and eicosanoids. AOCS, Champaign, Illinois. 1992; 290–292.