Proceedings of the Nutrition Society (2013), **72 (OCE4)**, E256 doi:10.1017/S0029665113002814

Summer Meeting, 15–18 July 2013, Nutrition and healthy ageing

Substitution of dietary saturated fatty acids with monounsaturated fatty acids improves circulating levels of E-Selectin: results from the DIVAS study

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Endothelial dysfunction, combined with inflammation, plays a significant role in the development of atherosclerosis and risk of cardiovascular disease (CVD)[(1)]. Reduction in dietary saturated fatty acid (SFA) intake is a key dietary recommendation for CVD risk reduction[(2)]. However, it remains unclear whether monounsaturated fatty acids (MUFA) or *n*-6 polyunsaturated fatty acids (*n*-6 PUFA) are the optimal fatty acids to replace dietary SFA. The aim of this study was to determine the effects of substitution of SFA with either MUFA or *n*-6 PUFA on circulating markers of endothelial function and inflammation in men and women at increased risk of developing CVD.

A total of 195 men and women at increased CVD risk (mean age 44 (*sd* 10) years and BMI 26.9 (*SD* 4.0) kg/m^2) participated in a 16-week, parallel, randomised, controlled, single-blinded intervention study (DIVAS – (**D**ietary **I**ntervention and **VA**scular function **S**tudy; ClinicalTrials.gov NCT01478958). Participants were randomly assigned (minimised for gender, age, BMI and CVD risk score) to one of the following isoenergetic diets: SFA-rich (target composition: 36% of total energy (%E) as total fat, 17%E SFA, 11%E MUFA, 4%E *n*-6 PUFA), MUFA-rich (36% E total fat, 9%E SFA, 19%E MUFA, 4%E *n*-6 PUFA), or *n*-6 PUFA-rich (36% E total fat, 9%E SFA, 13%E MUFA, 10%E *n*-6 PUFA). A flexible dietary model was developed to deliver the dietary interventions in which exchangeable fats in the habitual diet were replaced by study foods (spreads, oils, snacks) with a specific fatty acid composition. Vascular cell adhesion molecule-1 (VCAM-1), intracellular cell adhesion molecule-1 (ICAM-1), interleukin-6 (IL-6), tumor necrosis factor alpha (TNF-α), E-Selectin, P-Selectin, von Willebrand factor (vWf) and C-Reactive protein (CRP) were determined by immunoassays in the fasting blood samples collected at baseline and following 16 weeks of intervention.

Blood E-Selectin levels ($P = 0.025$) were significantly influenced by dietary fat composition. It was observed that there was a differential response after the MUFA-rich compared with the SFA-rich diet in which E-Selectin levels decreased after MUFA (Week16–Week0: −2.33 (SEM 0.91) ng/ml) compared to the increase following the SFA-rich diet (Week16–Week0: 1.27 (*SEM* 1.01) ng/ml), ($P = 0.008$). There were no significant effects of treatment on blood VCAM-1, ICAM-1, IL-6, TNF-α, P-Selectin, vWf and CRP.

In conclusion, this study suggests that replacement of dietary SFA with MUFA may have beneficial effects on circulating levels of E-Selectin.

The DIVAS study was supported by the Department of Health and the UK Food Standards Agency (N02044).

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