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A dietary exchange model to achieve target nutrient intakes in diets high and lower in saturated fatty acids

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An underlying principle of the current recommendation to replace dietary saturated fatty acids (SFA) with unsaturated fatty acids, is to reduce cardiovascular disease risk factors such as raised fasting serum cholesterol, an effect that is highly variable in populations[(1)]. The Reading, Imperial, Surrey Saturated fat Cholesterol Intervention (RISSCI) study was designed to investigate the metabolic origins of variation in serum low density lipoprotein-cholesterol (LDL-C) response to changes in the intake of dietary SFA. A dietary exchange model was developed to deliver isoenergetic diets with a high (18% total energy), and lower SFA content (≤10% total energy, current recommendation), to reproduce the variation in LDL-C observed in previous human intervention studies. The lower SFA diet involved the replacement of SFA with mono- and polyunsaturated fatty acids (MUFA/PUFA). This abstract presents data as evidence for the efficacy of this model in delivering this exchange of nutrients in free-living volunteers.

One hundred healthy men (30–65 y; 19–30 kg/m2), recruited at the Universities of Surrey and Reading, were included in the analysis. An isoenergetic dietary exchange model using exchangeable sources of dietary fat (butter/spreads, oils, dairy foods and snacks) - equating to 40 g/d of fat - was devised for the two 4-week dietary interventions: a high (18%) followed sequentially by a lower (≤10%) SFA diet, with SFA exchanged with MUFA and PUFA. The exchange of fatty acids was based on data from the NDNS years 1–4 rolling programme and a previous dietary intervention trial, the Dietary Intervention and VAScular function (DIVAS) study[(2)]. Four-day dietary intakes were recorded in the final week of the two diets and compared using paired t-tests. Data are presented as mean ± SD.

Nutrient targets were broadly achieved, with significantly higher SFA intakes during the high SFA diet (20 ± 7%) compared to the lower SFA diet (9 ± 4%) ($p < 0.001$). As expected, MUFA and PUFA intakes were significantly higher on the low SFA diet (14 ± 6% and 12 ± 6%, respectively) compared to the high SFA diet (12 ± 4% and 4 ± 2%) ($p < 0.001$). There were no other significant differences between the two diets in total energy, protein, total carbohydrate, free sugars and fibre.

A flexible and effective dietary exchange model was developed to replace SFA with unsaturated fatty acids in free-living individuals, to deliver diets of high and lower SFA content. Investigations are ongoing to identify the metabolic and genetic origins of variability in fasting LDL-C response to dietary SFA intake.

1. SACN (2019) Saturated fats and health.
2. Weech M, Vafeiadou K, Hasaj M *et al.* (2014) **144**, 846–855.