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A dietary exchange model to study inter-individual variation in serum low-density lipoprotein cholesterol response to dietary saturated fat intake

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A current dietary recommendation to reduce of cardiovascular diseases (CVD) is to decrease intake of dietary saturated fatty acids (SFA) to 10 % total energy. One of the key mechanistic links between SFA and CVD is the impact of SFA in raising serum low-density lipoprotein cholesterol (LDL-C). However, this response displays a high degree of inter-individual variation[(1)]. The Reading, Imperial, Surrey Saturated fat Cholesterol Intervention (RISSCI) study has been designed to investigate the metabolic mechanisms underlying this variation in LDL-C response. A dietary exchange model has been developed for the RISSCI study to deliver diets with a high (18 % total energy) and lower (≤ 10 % total energy) content of SFA by its replacement with polyunsaturated (PUFA) and monounsaturated fatty acids (MUFA), to reproduce the variation in LDL-C observed in human intervention studies. This abstract presents interim data as evidence for the efficacy of this dietary exchange model.

Data from twenty healthy male participants (51 ± 10 y; 24 ± 3 kg/m^2) recruited at the Universities of Surrey and Reading were included in this interim analysis. A 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 low (≤10 %) SFA diet. Dietary intakes were assessed at baseline and in the final week of the two dietary intervention periods using 4-day food diaries. Data were analysed using one-way repeated measures ANOVA with the Holm procedure used to correct for multiple pairwise comparisons. Data are presented as mean ± SD.

Dietary compositional targets were broadly met (**Table**), with significantly higher SFA intakes and trends in favour of lower PUFA and MUFA intakes, during the high SFA diet compared to the low SFA diet. There were no other significant differences between the two intervention diets in total energy or other macronutrient intakes.

Table. Dietary intake data during high and low SFA diets. [a,b] Different letters denotes significant differences

	Baseline Mean±SD	High SFA Diet Mean±SD	Low SFA Diet Mean±SD	P value
Energy (kJ)	9395 ± 3214	9373 ± 1832	9872 ± 2543	0.577
Fat (%E)	34 ± 6	38 ± 5	37 ± 5	0.013
SFA (%E)	12 ± 2 [a]	19 ± 3 [b]	9 ± 2 [a]	<0.001
PUFA (%E)	5 ± 2	3 ± 2	9 ± 4	<0.001
MUFA (%E)	10 ± 5	8 ± 4	11 ± 5	<0.001
Carb (%E)	48 ± 7	47 ± 6	45 ± 6	0.044
Protein (%E)	15 ± 3	15 ± 2	16 ± 6	0.629

Our initial findings indicate the flexible dietary exchange model was successful in substituting SFA with unsaturated fatty acids in free-living men. This exchange model will be used subsequently in the RISSCI study, to investigate the mechanisms underlying the inter-individual variation in LDL-C response to SFA.

1. Antoni R & Griffin BA (2018) *Nutr Bull*, **43**: 206–211.

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