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Dietary fat manipulation and not apolipoprotein E (epsilon) genotype has a significant impact on cytokine production – insights from the SATgenε study

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It is recognised that polymorphisms in the apolipoprotein (*APO)E (epsilon*) gene play an important role in cardiovascular disease (CVD) risk[(1)]. In addition to modestly higher plasma cholesterol, a pro-inflammatory phenotype has been reported in carriers of the *APOE4* allele[(2)]. Our aim was to explore the impact of chronic dietary fat manipulation on cytokines production according to *APOE* genotype.

Fifty two healthy participants (mean age 50 (SD 9) y and BMI 26.4 (SD 4.3) kg/m^2) were prospectively recruited according to *APOE* genotype ($n = 26$ E3/E3 and $n = 26$ E3/E4), and assigned to three iso-energetic diets; low fat (LF, 24% energy (E) from fat, 8%E saturated fat (SFA)), high fat-high saturated fat (HSF, 38%E fat, 18%E SFA), and HSF with 3 g/d docosahexaenoic (HSF-DHA) diets, each for an 8-wk period in a sequential design. Fasting blood samples were collected at baseline and at the end of each of the intervention diets. Concentrations of interleukin (IL)-1 β, IL-6, IL-8, IL-10 and tumour necrosis factor (TNF)-α were measured in cell free supernatants derived from whole blood culture assays stimulated for 24 h with either 0.05 or 1 μg/ml of bacterial lipopolysaccharide (LPS), using a cytokine multiplex antibody bead kit (Invitrogen)[(3)]. Cytokine production was corrected for the number of monocytes in the whole blood cultures.

	Baseline (pg per 10^3 monocytes)		LF diet (pg per 10^3 monocytes)		HSF diet (pg per 10^3 monocytes)		HSF-DHA diet (pg per 10^3 monocytes)		
Cytokine	Mean	SEM	Mean	SEM	Mean	SEM	Mean	SEM	*P*
IL-1 β	9.46^a	0.75	11.5^a	0.98	11.1^a	0.86	10.1^a	1.09	NS
IL-6	48.9^a	3.96	62.5^a	7.40	55.7^a	4.47	52.5^a	5.53	NS
IL-8	380^a	46.5	454^a	38.6	419^a	44	348^a	34.7	NS
IL-10	1.14^b	0.13	1.41^a	0.14	1.21^{ab}	0.10	1.09^b	0.09	0.036
TNF-α	2.94^b	0.38	3.90^{ab}	0.47	4.60^a	0.51	4.99^a	0.69	0.012

Effect of dietary fat manipulation on cytokine production (pg per 10^3 monocytes) by 0.05 μg/ml LPS-stimulated whole blood cultures of fifty two healthy subjects. NS, not significant. ^{a,b}Mean values within a row with unlike superscript letters were significantly different ($P \leq 0.05$).

No diet*genotype interactions were found, although a significant diet interaction was observed for TNF-α and IL-10 production after stimulation with 0.05 μg/ml LPS ($P = 0.012$ and $P = 0.036$ respectively) and 1 μg/ml LPS ($P = 0.006$, $P = 0.049$). TNF-α concentrations were higher ($P \leq 0.05$) after the HSF diet compared with the baseline, whereas IL-10 was higher ($P \leq 0.05$) after the LF diet compared with the baseline and HSF-DHA diet. Our study data suggests a greater sensitivity of monocyte cytokine production to the quality and quantity of dietary fat, than APOE genotype in healthy participants.

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