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Associations between fatty acid consumption and vascular health: evidence from the Caerphilly cohort

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Although research has indicated that the replacement of dietary saturated fatty acids (SFA) with mono- or poly-unsaturated fatty acids (MUFA or PUFA) may reduce the risk of cardiovascular disease (CVD) via effects on lipids, blood pressure and endothelial function^(1–2), evidence from long-term prospective studies on the effect of fatty acid consumption on vascular health is insufficient and inconsistent⁽³⁾.

The present analysis aimed to investigate the relationship between total fat, SFA, PUFA and an estimated MUFA intake (eMUFA) with systolic and diastolic blood pressure (SBP and DBP), pulse wave velocity (PWV), plasma insulin, glucose, triacylglycerol (TAG) and fibrinogen concentrations using data from the Caerphilly cohort. Included in this cohort were 2,512 men, aged 45–59 years at phase (P) 2, who were followed up at 5 year intervals (P 2–3 for total fat, P 2–3 for SFA, eMUFA and PUFA and P 1–2 for insulin, P 1–3 and 5 for SBP, DBP, TAG, glucose and fibrinogen and P 5 for PWV). Multiple linear regression analysis was used to investigate cross-sectional and longitudinal relationships, with adjustments for dietary and lifestyle variables.

	Cross sectional ¹						Longitudinal ²	
	SBP		DBP		Glucose		PWV	
	Coef	SE	Coef	SE	Coef	SE	Coef	SE
Total fat	-0.008	0.035	0.038*	0.019	0.001***	0.001	-0.025	0.007
SFA	0.121*	0.060	0.103**	0.032	0.002***	0.001	0.022*	0.011
eMUFA	-0.080	0.119	-0.021	0.064	0.004***	0.001	0.015	0.022
PUFA	-2.513*	1.093	-0.755	0.593	-0.008	0.009	-0.520**	0.198
SFA: total fat	23.62**	8.828	14.03**	4.788	0.088	0.070	4.339**	1.587
PUFA: SFA	-2.058*	0.858	-1.124*	0.465	-0.015*	0.007	-0.425**	0.154
%E from SFA	26.60	14.03	24.88***	7.605	0.359***	0.112	4.643	2.589

PWV, pulse wave velocity; SBP, systolic blood pressure; DBP, diastolic blood pressure; 1, association between dietary intake at P 2 with blood pressure at P 2; 2, association between dietary intake at P 2 with PWV at P 5; coefficients were significantly different at * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

At P 2, increasing SFA consumption was associated with higher P 2 SBP ($P = 0.043$), DBP ($P = 0.002$) and glucose concentrations ($P = 0.001$) and higher PWV in P 5 ($P = 0.049$). Also at P 2, increasing PUFA consumption was associated with a lower P 2 SBP ($P = 0.022$) and P 5 PWV ($P = 0.009$). This led to a lower P 2 SBP ($P = 0.017$), DBP ($P = 0.016$), glucose ($P = 0.025$) and P 5 PWV ($P = 0.006$) with an increasing dietary P:S (PUFA:SFA) ratio. The present results suggest that consumption of SFA is associated with CVD risk, while PUFA may be related to cardio-protective markers. Importantly, as indicated by PWV, consumption of SFA and PUFA may predict future risk of CVD.

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