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Vitamin E status has an impact on plasma n-3 fatty acid proportion in a healthy adult Irish population

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Many of the health benefits of vitamin E intake are believed to derive from its antioxidant properties[1], among them the prevention of oxidation of PUFA[2]. Previous animal studies have demonstrated the importance of dietary vitamin E in protecting circulating PUFA[3, 4]; however, to our knowledge this has not been investigated in humans.

This study aimed to determine the relationship between habitual vitamin E intake and plasma α-tocopherol concentrations on plasma fatty acid proportion, in a nationally representative sample. Dietary intake data from the National Adult Nutrition Survey (NANS)[5] were used; valid reporters who did not consume supplements containing PUFA were included in the study (n = 601). Plasma α-tocopherol concentrations were measured by HPLC and plasma fatty acids were extracted and quantified using GC-MS. Participants were divided into vitamin E intake quartiles and plasma α-tocopherol quartiles and differences in plasma fatty acid proportion were explored by general linear regression using SPSS.

Across both vitamin E intake and plasma α-tocopherol quartiles, PUFA intake significantly increased. Following adjustment for

	Vitamin E intake quartiles								
	1 (n = 150)		2 (n = 150)		3 (n = 151)		4 (n = 150)		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	GLM*
Vitamin E mean daily intake (mg/d)	6·0	1·1	9·0	0·7	11·9	1·0	20·5	8·5	
PUFA (%)	42·1	4·5	41·8	4·4	42·7	4·0	43·0	4·4	0·412
n-3 PUFA (%)	5·0^{c}	1·2	5·2^{bc}	1·4	5·6^{ab}	2·0	5·8^{a}	2·0	P < 0·001
α-Linolenic acid (C18:3n3) (%)	0·80	0·31	0·82	0·26	0·86	0·22	0·88	0·28	0·282
Eicosatetraenoic acid (C20:4n3) (%)	0·20	0·20	0·19	0·08	0·28	1·13	0·18	0·09	0·828
Eicosapentaenoic acid (C20:5n3) (%)	1·08^{b}	0·46	1·20^{ab}	0·63	1·29^{ab}	0·69	1·43^{a}	0·94	0·011
Docosapentaenoic acid (C22:5n3) (%)	0·79	0·19	0·79	0·19	0·83	0·20	0·83	0·20	0·110
Docosahexaenoic acid (C22:6n3) (%)	2·10^{c}	0·68	2·21^{bc}	0·78	2·37^{ab}	0·92	2·47^{a}	1·03	0·002
n-6 PUFA (%)	36·9	4·4	36·5	4·4	36·9	3·9	37·2	4·3	0·799
Linoleic acid (C18:2n6c) (%)	26·0	4·1	25·7	3·9	26·5	3·5	26·6	4·0	0·767
γ-Linolenic (C18:3n6) (%)	0·57	0·19	0·56	0·18	0·54	0·19	0·56	0·20	0·534
Eicosadienoic acid (C20:2n6) (%)	0·38	0·22	0·39	0·18	0·39	0·19	0·39	0·15	0·537
Eicosatrienoic acid (C20:3n6) (%)	2·09^{a}	0·44	2·12^{a}	0·53	2·04^{ab}	0·45	1·99^{b}	0·47	0·023
Arachidonoic acid (C20:4n6) (%)	7·74	1·87	7·53	2·05	7·52	1·67	7·44	1·62	0·873
Docosatetraenoic acid (C22:4n6) (%)	0·27^{a}	0·10	0·24^{b}	0·08	0·24^{ab}	0·10	0·23^{ab}	0·08	0·043
n-3/n-6	0·14^{b}	0·04	0·14^{ab}	0·04	0·16^{a}	0·07	0·16^{a}	0·06	0·001

* general linear model univariate analysis, adjusted for gender, vitamin E containing supplement use, total energy and corresponding PUFA intake as percentage of total energy (%TE) intake, was carried out to determine significance with log transformed value; different superscript letters denote significant differences across vitamin E intake quartiles (P < 0·05)

PUFA intake, vitamin E intake showed positive correlations with plasma n-3 PUFA (P < 0·001), EPA (P = 0·011) and DHA (P = 0·002) proportion and plasma n-3/n-6 ratio (P = 0·001) and a negative correlation with plasma eicosatrienoic acid (P = 0·023) proportion. When plasma α-tocopherol was examined, only plasma α-linolenic acid (ALA) proportion significantly increased with increasing plasma α-tocopherol (data not shown). These results suggest that circulating plasma n-3 PUFA (EPA and DHA) may be protected by vitamin E intake.

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1. Cardenas E & Ghosh R (2013) *Biochem Pharmacol* **86**, 845–852.
2. Weber P, Bendich A & Machlin LJ (1997) *Nutrition* **13**, 450–460.
3. Lebold KM & Traber MG (2013) *Free Radic Biol Med* **66**, 13–19.
4. Guo Q, Richert BT, Burgess JR, *et al*. (2006) *J Anim Sci* **84**, 3089–3099.
5. Irish Universities Nutrition Alliance (IUNA). National Adult Nutrition Survey Summary Report. Food Safety Promotion Board, Abbey Court, lower Abbet Street, Dublin 1: Irish Universities Nutrition Alliance, 2011.