Proceedings of the Nutrition Society (2016), **75 (OCE3)**, E113 doi:10.1017/S0029665116001282

Summer Meeting, 11–14 July 2016, New technology in nutrition research and practice

Estimation of vitamin D_2 intakes in diverse European populations based on serum 25-hydroxyvitamin D_2 data

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Unlike vitamin D_3, which is made by the action of UVB sunlight on the skin and also obtained in the diet, vitamin D_2 only comes from dietary sources[1]. The few items in the human food chain that contain significant amounts of vitamin D_2 are supplements, fortified foods, ultraviolet B (UVB) light exposed mushrooms, and food made with UVB exposed bakers' yeast. Despite the widely held assumption that dietary exposure to vitamin D_2 is limited, we have recently reported that 78 % ($n = 884$) of participants in the National Adult Nutrition Survey (NANS) in Ireland had serum 25-hydroxyvitamin D_2 (25(OH)D_2) concentrations above the limit of quantification[1]. Data on serum 25(OH)D_2 in other European populations is lacking. The objective of this study was to generate serum 25(OH)D_2 data and estimates of vitamin D_2 intakes using subsets of serum samples from 14 European population studies.

Bio-banked sera (each $n = 100–170$) from Ireland [adults, children], Germany [adults, children and adolescents], Norway [adolescents, adults], Netherlands [adults, older adults], Finland [ethnic minority adults], Iceland [older adults], Denmark [children] and multi-country [adolescents] were analysed as part of the European Commission-funded *ODIN* project (www.odin-vitd.eu/) using our liquid chromatography tandem mass spectrometry method which measures 25-hydroxyvitamin D_3 and 25(OH)D_2 simultaneously[1]. Data from 9 randomized controlled trials which tested the efficacy of UVB-exposed mushroom products or vitamin D_2-enhanced beverages in improving vitamin D status[2,3,4], showed a mean response in serum 25(OH)D_2 (nmol/L) to ingested vitamin D_2 (µg) of 0·95 nmol/L per µg/day. This response factor was used to estimate median intakes in each of the 14 populations.

	Serum 25(OH)D_2 (nmol/L)[1]		Estimated vitamin D_2 intake (µg/d)[1]	
Country (no. of studies)	Median	SD	Median	SD
Ireland (2)	2·5	0·7	2·6	0·05
Germany (2)	1·5	0·1	1·6	0·1
Norway (2)	1·5	0·5	1·5	0·5
Multi-country (1)	1·4*	-	1·5	-
Greece (2)	1·3*	0·2	1·3	0·2
Netherlands (2)	1·2*	0·3	1·3	0·3
Denmark (1)	1·1*	-	1·2	-
Finland (1)	1·0*	-	1·1	-
Iceland (1)	0·8*	-	0·9	-

[1]Estimates are presented as the average (SD) of medians from the individual population studies within a country where there were two studies.
*Value above the limit of detection (0·44 nmol/L) but below limit of quantitation (1·43 nmol/L).

Median concentrations of serum 25(OH)D_2 ranged from 0·8–2·5 nmol/L in these European populations, while median vitamin D_2 intakes were estimated to be in the range 0·9–2·6 µg/day (see table), with Ireland having the highest estimated median intake of 2·6 µg/day. In conclusion, based on serum 25(OH)D_2 concentration data, European populations have exposure to vitamin D_2 in their diet. The exact dietary sources of vitamin D_2 in the European food chain needs to be investigated.

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Supported by funding from the European Commission: ODIN (Food-based solutions for optimal vitamin D nutrition and health through the life cycle; Contract code 613977).