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Vitamin D_2 *v.* vitamin D_3 supplementation in raising 25OHD status: preliminary findings of a meta-analysis

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There is growing evidence for the positive effects of vitamin D in reducing risk from disease and all cause mortality. This has increased our awareness of the need for evidence-based strategies to redress the high prevalence of low vitamin D status in the UK. We have just completed a 48-month FSA-funded study (known as the D-FINES study) in which we show that South Asian women were vitamin D deficient for the entire year and Caucasian women were below 50 nmol/l during the winter months (1). In a parallel study in Aberdeen, post-menopausal Caucasian Scottish women had a 10 nmol/l lower 25OHD status in comparison with post-menopausal Caucasian women living in Southern England (2). While food fortification is a sustainable solution for the prevention of vitamin D deficiency, the Food Industry needs to determine the most effective means of carriage, optimal concentration and chemical form of vitamin D if it is to maximise the effectiveness of fortification. The aim of this study was to undertake a meta-analysis of vitamin D_2 *v.* vitamin D_3 RCTs in raising 25-hydroxyvitamin D status.

The literature search for the meta-analysis used the ISI Web of Knowledge using terms: 'vitamin D_2 and D_3' or 'ergocalciferol and cholecalciferol'; 'supplementation' and '25 hydroxyvitamin D'. The Inclusion criteria was: (1) healthy adults, male or female; (2) study compared D_2 and D_3 in various vehicles; (3) outcome measure serum 25(OH)D; (4) intervention trials (one exception) nine studies included: eight intervention trials and one observational total subjects: *n* 919; age: 18–97 years; supplement dose: 1000–4000 IU/d for 14 d 3 months; or 50 000–300 000 IU bolus; oral and im. As shown below, six out of the eight RCT found the change in 25HOD status was greater in the vitamin D_3 form in comparison with the vitamin D_2 form.

The published studies were: Armas (2004) *J Clin End Metab* **89**, 5387–5391: **D2<D3;** Biancuzzo (2010) *Am J Clin Nutr* **91**, 1621**–162**6: **No diff;** Glendenning (2009) *Bone* **45**, 870–875: **D2<D3;** Holick (2008) *J Clin End Metab* **93**, 677–681: **No diff;** Leventis (2009) *Scand J Rheumatol* **38**, 149–153: **D2<D3;** Romagnoli (2008) *J Clin End Metab* **93**, 3015–3020: **D2<D3;** Tjellessen (1986) *Bone Miner* **1**, 407–413: **D2<D3;** Trang (1998) *Am J Clin Nutr* **68**, 854–8: **D2<D3.** All studies (except two) found 25OHD change higher with vitamin D_3.

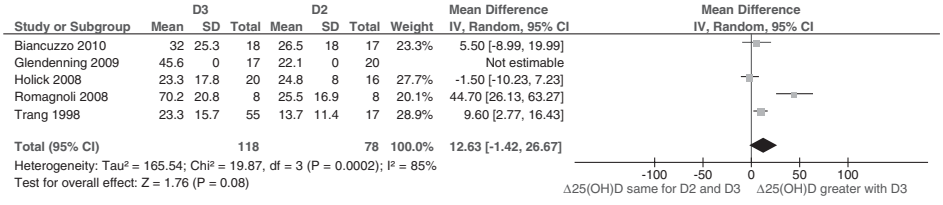

Fig. 1. Forest plot: change in 25(OH)D status between D2 *v.* D3.

These results are further confirmed in the Forest Plots as shown in Fig. 1. Further analysis of the meta-analysis data is currently underway but these data suggest that vitamin D_3 is a superior form of vitamin D for raising 25HOD status.

1. Macdonald HM, Mavroeidi A, Fraser WD *et al*. (2011) Effect of sunlight and diet on seasonal differences in the vitamin D status of cohorts of healthy post-menopausal women living in the North and South of the UK: a major cause for concern. *Osteoporosis Int* (In the Press).
2. Darling AL, Hart K, Macdonald HM *et al.* (2011) Interaction between diet and sunlight exposure on vitamin D status in pre-menopausal Asian and Caucasian women living in Southern England: multilevel modelling analysis of the D-FINES study. *Proc Nutr Soc* 2010 **69**, OCE1, E125. *To be submitted to J Clin Endocrin Metab.*