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Estimating dietary requirements for vitamin D: a systematic review of intake–status relationship to inform European recommendations

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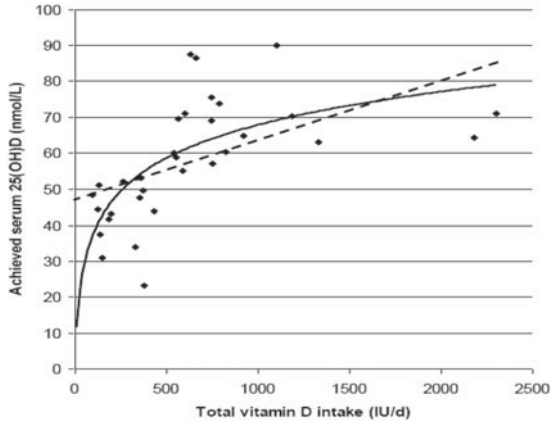
The Institute of Medicine Dietary Reference Intake (DRI) committee in North America recently established an Estimated Average Requirement and RDA value for vitamin D based on target serum 25-hydroxyvitamin D (s25(OH)D) concentrations of 40 and 50 nmol/l, respectively, which support bone health outcomes(1). The committee used data from nine randomised controlled trials (RCT) with vitamin D_3 performed in Europe (>49.5°N) and Antarctica (78°S), during their respective winter seasons (with minimal UV blue sun exposure), to establish regression equations of the simulated response of s25(OH)D concentration to total vitamin D intake, and used these to establish the DRI values for the target s25(OH)D concentrations(1). However, the DRI committee also highlighted that the regression analysis had several assumptions/uncertainties that may have had implications for its DRI estimates(1). The present work used a systematic review approach to identify relevant RCT with vitamin D_3, followed by meta-regression to explore the vitamin D intake–status relationship, and in particular, the appropriateness of the regression analysis approach used by the DRI committee for making European vitamin D recommendations.

Methods included a structured search on Ovid MEDLINE; rigorous inclusion/exclusion criteria, data extraction and meta-regression (using different model constructs). In particular, priority was given to data from winter-based RCT>49.5°N and 78°S for the meta-regression (*n* 12 out of total 44 RCT identified in our search).

A weighted linear-model meta-regression analyses of natural log (ln) total vitamin D intake (i.e. diet and supplemental vitamin D) *v.* s25(OH)D achieved in winter (the model used by the DRI committee(1)) produced a curvilinear relationship and predicted an achieved mean [95% lower CI] s25(OH)D (nmol/l) = 9.2 [8.5] ln*(total vitamin D intake). Use of non-transformed total vitamin D intake data provided a more linear relationship with a predictive equation of achieved mean [95% lower CI] s25(OH)D (nmol/l) = 0.021 [0.011]*(total vitamin D intake) + 43.569 [36.137].



In conclusion, while the relation of s25(OH)D to vitamin D intake is critical to the establishment of dietary requirements, the model used to describe this relationship needs to be considered carefully especially if s25(OH)D less than 50 nmol/l are chosen as the threshold.

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1. Institute of Medicine Food and Nutrition Board (2010). *Dietary Reference Intakes for Calcium and Vitamin D*. Washington, DC: National Academies Press.