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A PBPK model of Low-concentration Vitamin D Supplementation in the Absence of Sunlight

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Abstract: A variety of studies discuss the benefits of vitamin D on human physiology, but few mathematical models explore the response of the human body on low-concentration supplementation of vitamin D under sunlight-restrictive conditions. Using a physiologically-based pharmacokinetic (PBPK) techniques and published human data, this study developed a model to predict the metabolic cascade of orally derived, low concentration (placebo, 200 IU and 400 IU) supplementation of vitamin D over the course of 28 days in the absence of sunlight. Adaptations to the standard PBPK model format included a dynamic adipose tissue binding coefficient to compensate for additional lipid and protein binding of vitamin D and its metabolites.