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Estimated equivalency of vitamin D production from natural sun exposure versus oral vitamin D supplementation across seasons at two US latitudes.

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Abstract

BACKGROUND:
The relationship between oral vitamin D supplementation and cutaneous photosynthesis is not well understood.

OBJECTIVE:
We sought to provide estimates of the equivalency of vitamin D production from natural sun exposure versus oral supplementation.

METHODS:
Using the FastRT simulation tool, we determined sun exposure times needed to achieve serum vitamin D(3) concentrations equivalent to 400 or 1000 IU vitamin D for individuals of various Fitzpatrick skin types living in Miami, FL, and Boston, MA, during the months of January, April, July, and October.

RESULTS:
Peak ultraviolet B irradiation for vitamin D synthesis occurs around 12 pm Eastern Standard Time (EST). In Boston, MA, from April to October at 12 pm EST an individual with type III skin, with 25.5% of the body surface area exposed, would need to spend 3 to 8 minutes in the sun to synthesize 400 IU of vitamin D. It is difficult to synthesize vitamin D during the winter in Boston, MA. For all study months in Miami, FL, an individual with type III skin would need to spend 3 to 6 minutes at 12 pm EST to synthesize 400 IU. Vitamin D synthesis occurs faster in individuals with lighter Fitzpatrick skin types. The duration to attain 1000 IU of vitamin D is longer in all scenarios.

LIMITATIONS:
Results of the computer model are only approximations. In addition, calculations were made based on the assumption that (1/4) of 1 minimal erythema dose directed at (1/4) body surface area is equal to 1000 IU of oral vitamin D.

CONCLUSIONS:
Although it may be tempting to recommend intentional sun exposure based on our findings, it is difficult, if not impossible to titrate one's exposure. There are well-known detrimental side effects of ultraviolet irradiation. Therefore, oral supplementation remains the safest way for increasing vitamin D status.

Comment in

1 J Am Acad Dermatol. 2010 Jun;62(6):935-6.

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