Vitamin D Production – Only Short Sun Exposures are Required!

It is essential for the dermatologist to know how much skin area should be irradiated by how much UVB to ensure the correct production of vitamin D hormone. The authors of this paper fill this gap in knowledge. They have performed a randomized trial where they investigated the interdependence between body surface area and UVB dose in vitamin D production using a fixed physical UVB dose.

Below is a summary of a recently published paper by Bogh et al. The reference for the whole article is the following: *Bogh MK, Schmedes AV, Philipsen PA, Thieden E, Wulf HC. Interdependence between body surface area and UVB dose in vitamin D production: A randomized controlled trial. Br J Dermatol 2010 Oct 7. doi: 10.1111/j.1365-2133.2010.10082.x. [Epub ahead of print].*

The fat-soluble vitamin D3 is a steroid hormone that acts through a cognate nuclear receptor. Vitamin D3 is a true dermatological hormone; not only it is produced in the skin but it also exerts some of its effect in the integument. The congenital absence of vitamin D3 receptor has a skin phenotype (total alopecia), and vitamin D has been implicated in the regulation of epidermal growth and differentiation, dermal connective tissue metabolism and in the immune response. Vitamin D deficiency has been linked with cancer and autoimmune diseases such as diabetes and multiple sclerosis.

The prohormone, 25(OH)vitamin D3 is produced by a photochemical reaction in the skin from vitamin D3. Actually, one of the reasons that humans have lost hair during evolution was the necessity of efficient vitamin D production. Even though the major biochemical steps of the photochemical synthesis have long been delineated, surprisingly little is known on the doses, wavelengths and skin area exposure which are required to maintain the physiological vitamin D concentrations. It seems that solar ultraviolet-B (UVB, 280–315 nm) radiation is responsible for more than 90% of the vitamin D required. An increasing focus on the vitamin D deficiency has shaped the public opinion and cause a shift of the accent from UVB as a carcinogen to solar radiation as a healthy element providing us with the "sunshine vitamin".

Ninety-two participants were exposed to 7.5–30 mJ/cm^2 UVB on 6%, 12% or 24% of their skin. Each participant had four UVB exposures at intervals of 2–3 days. When correlation analysis was performed, it turned out the vitamin D production depends on the dosis and area only in the low range of the spectrum (6–12% body area and for 7.5 mJ/cm^2). Thus, for small UVB doses the area of irradiated body surface is important. These findings support earlier calculations that significant vitamin D can be produced by only a few minutes sun exposure on ~24% body surface area. This study indicates that for the sake of vitamin D production only short sun exposures in a week during the summer are required.

The first author of the study, Morten K. Bentzen Bogh, a PhD-student (MD) at Department of Dermatology, Bispebjerg University Hospital, Denmark, presented the results at the recent International Melanoma Congress in Sydney in November and the study is now published in the British Journal of Dermatology. Morten will start his clinical training at Department of Dermatology, Malmö University Hospital, Sweden, in January 2011 and the study is part of his PhD-thesis, which he will defend in Copenhagen during spring 2011.

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