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**Optimal cutaneous vitamin D synthesis: Balance between beneficial and harmful health effects of solar UV-B**

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**Statement of the Problem:** Early humans, before migration out of East Africa (~100,000 years ago), lived in surroundings abundant in solar radiation, and to this day, traditionally living Hadza people in Tanzania have vitamin D levels of ~115 nmol/L. Migration to other continents induced loss of skin pigmentation to keep the same vitamin D<sub>3</sub> production as it was previously in East Africa. Thus, the level of 115 nmol/L could serve as the measure of optimal vitamin D status that was formed during millennia of human evolution. It represents a target for contemporary humans usually having a vitamin D deficit.

**Methodology & Theoretical Orientation:** Krzyscin *et al.* (2016) modeled vitamin D doses received by the Hadza adults during typical life activities and found that the daily vitamin D<sub>3</sub> synthesis due to solar exposures was equivalent to ~2000 IU of vitamin D<sub>3</sub> taken orally. To assess safety of sunbathing to get such high doses by people with different skin phototypes, we propose to calculate a health risk factor (HRF), i.e. a number of the optimal vitamin D doses attained during maximal allowed duration of sunbathing yielding exposure of 1 Minimal Erythemal Dose.

**Findings:** It appears that HRF is independent on skin phototypes. The

optimal vitamin D dose is obtained safely, i.e. without erythema, for  $HRF > 1$ . Such conditions usually happen around sunny noon in spring/summer for people exposing ~30% of the whole body.

**Conclusion & Significance:** Analyses of HRF time series for several mid-latitude sites show that young adults (~20 yr.) could obtain optimal vitamin D<sub>3</sub> doses equivalent to 2000 IU vitamin D<sub>3</sub> taken orally for only 2-3 months per year. Such vitamin D<sub>3</sub> supplementation seems to be necessary over the whole year for persons >59 yr. but it may be reduced to ~1000 IU in spring/summer for outdoor active persons.

**Speaker Biography**

Janusz W Krzyscin has been involved in modelling surface UV radiation for almost 30 years. He has developed a model for serum 25(OH) vitamin D changes due to solar exposure and elaborated theory for antipsoriatic heliotherapy to be carried out in any country. He proposed a method of improving vitamin D<sub>3</sub> status by using UV transparent garment made of fine linen that is especially important for persons exposing limited skin area due to cultural/religious reasons. He is a leader of team producing free smartphone apps for planning and monitoring healthy sunbathing.

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