

# A Study on Quantifying Personal UV Exposure, Vitamin D Status and Their Relationship within a Group of High School Students in an Alpine Environment

Grobner, Matthias

Vitamin D's essential role in human health is increasingly being recognized. However, the quantitative relationship between the cutaneous synthesis of vitamin D and personal UV exposure is unclear and hard to define. The purpose of this study was to characterize this relationship in a group of high school students in an alpine environment (Davos, Switzerland). The personal UV exposure of each participant was monitored over a half year (March to August) using state-of-the-art electronic dosimeters, while blood samples were taken on a monthly basis to determine the serum concentration of 25-hydroxyvitamin D3 (25(OH)D3). Daily logbook provided information to correct the UV exposure for sunscreen, body area and dietary intake. During school days students were only exposed to 1.7% of the ambient UV irradiance, whereas 85% of the cumulative UV dose was obtained on weekends and holidays. All students were vitamin D de- or insufficient at the beginning of March; the status increased to sufficient levels by summertime. The increase in vitamin D correlated well ( $r = 0.89$ ) with the measured personal UV exposure, yielding a mean increase in serum 25(OH)D3 concentration of  $0.38 \pm 0.22$  ng/ml per  $100 \text{ J/m}^2$  of vitamin D-weighted UV exposure. Even in an alpine climate, in wintertime vitamin D insufficiency seems inevitable due to both geographical circumstances and minimal skin exposure to UV radiation. As a result, during winter the intake of vitamin D supplements should be considered, whereas during summer adequate vitamin D concentrations can be easily achieved just by small but regular sun exposure.