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# The antioxidant status of the human skin: A comparison between South Korea and Germany

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**Background:** Carotenoids can serve as marker substances for the antioxidant status of the skin providing protection against the destructive action of reactive oxygen species. Since most antioxidants cannot be produced by the human organism, they have to be ingested with a nutrition rich in fruit and vegetables. The traditional Korean cuisine is largely based on uncooked vegetables which can provide an increase in antioxidants, especially carotenoids, but little is known about differences in the antioxidant status of Western and Asian populations.

**Objective:** In this German-Korean study, we investigated whether dietary differences between German subjects, South Korean subjects and Korean immigrants to Germany are reflected in the cutaneous antioxidant status considering the different dietary and socio-cultural factors in South Korea and Germany.

**Methods:** The carotenoid concentrations of 279 Korean volunteers resident in South Korea, 332 German volunteers resident in Germany and 103 Korean-German immigrant volunteers resident in Germany were measured and individual data regarding lifestyle and dietary habits were analyzed. Measurements were performed non-invasively on the skin of the hand palm using a mobile measuring system, based on reflectance spectroscopy.

**Results:** The mean carotenoid concentration of the Korean subjects in South Korea was shown to be significantly higher ( $5.81 \pm 0.11$ ;  $p < 0.001$ ) than the mean concentration of both the German subjects ( $4.62 \pm 0.10$ ) and of the immigrant Korean subjects in Germany ( $4.77 \pm 0.18$ ). Furthermore, the Korean-born first generation of immigrants had come during the 1960's and 1970's to Germany and mostly preserved Korean dietary habits, showing significantly higher



mean concentrations ( $p < 0.001$ ) than the German born second and third Korean generations in Germany.

**Conclusion:** The results of the study demonstrate that the higher uptake of antioxidants in Korean subjects is reflected in a higher antioxidant status. It also indicates that not only a healthy nutrition but also a simultaneously low stress exposure are essential to obtain a high antioxidant status.

