



Ursula Arens
Writer; Nutrition
& Dietetics

Ursula has spent most of her career in industry as a company nutritionist for a food retailer and a pharmaceutical company. She was also a nutrition scientist at the British Nutrition Foundation for seven years.

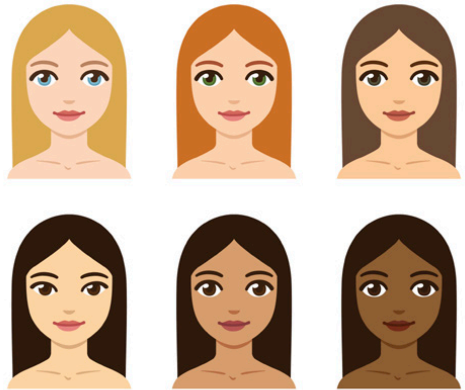
50 SHADES OF SKIN

Skin is our biggest organ and all of it visible. But can your skin affect your nutrition? And can your nutrition affect your skin?

There is much earnest discussion about skin and possible beneficial nutrients by companies selling expensive moisturising lotions and anti-aging creams. However, there is a dearth of data showing that putting any specific nutrient onto the surface of our bodies affects any measure of skin quality.

Skin (colour) is known to be the major factor linked to the production of vitamin D from exposure to sunlight. Vitamin D production is perfectly proportionate to pigmentation: the lighter the skin, the higher the level of vitamin D production per unit of UV light exposure. There has been an explosion in research interest in vitamin D, especially in novel areas beyond bone health and calcium metabolism, and the recent Scientific Advisory Committee on Nutrition (SACN) report on vitamin D launched in July 2016,⁵ provides important updates, including that everyone in the UK should be taking a daily 10ug supplement of vitamin D, especially in the periods of winter and spring. Turn to page 27 for more on vitamin D guidelines.

Chalé and Chalé investigated the topic of vitamin D and skin in the August issue of *Journal of the Academy of Nutrition and Dietetics*.³ They considered especially the delicate suggestions that racial sensitivities may muddle communication of vitamin D status and risk in different population groups. Chalé and Chalé report that American health surveys often group people into cultural and social categories. Identities of being Hispanic or Latino may say a lot about language and food culture,



but also include a wide splay of skin pigmentation being clumped together, and are not helpful in identifying those at greatest risk of poor vitamin D status. Rather than aggregating heterogeneous traits into homogenous groupings, researchers investigating and reporting on vitamin D status in populations should use measures from skin reflectance spectrophotometry. This scores skin colour/ tone on a scale of 0 to 100 and accurately predicts vitamin D status in individuals of different ancestry. In this way, people of different ethnic backgrounds, but similar skin tones, can be better assessed in relation to vitamin D risk. However, more sophisticated measurement does not change conclusions that the highest risk groups for poor vitamin D status are people with darkest skins living in most northerly latitudes.

SKIN YELLOWING

The appearance of (pale) skin can be influenced by diet resulting in various shades of yellowness. Eating lots of carrots does result in carotenemia, and is especially visible in the thin and delicate skins of infants and young children. Skin yellowing could be an amazing assessment tool for dietary intakes of fruits and vegetables, and general antioxidant status (so say makers of skin scanner technology

equipment Biozoom®). So what do we know about diet-induced skin yellowing?

There are many excellent studies demonstrating this association. Aguilar and colleagues (2014)¹ looked at whether measurements of serum carotenoids in children and teens correlated with skin spectroscopy measures, and whether these could also be valid biomarkers for intakes of fruits and vegetables (F&V). They concluded, “yes and yes”. Skin and serum carotenoids were highly correlated and total carotenoids, alpha carotene and beta carotene assessed from 24-hour diet recalls correlated to skin colour measures in children and teens.

Aguilar and different colleagues later examined intervention effects of dietary carotenes in a randomised clinical trial (2015).² Children were asked to maintain normal diets but to additionally consume a small or a larger amount (30ml or 120ml) of a carotenoid rich juice daily for eight weeks. These doses matched beta carotene intakes of just over 20g or just over 90g of cooked carrots per day. Skin scores measured by spectroscopy increased in both groups compared to baseline, and showed significant change by week two (although differences between the lower and higher dose groups were not significant). Conclusions are that including higher amounts of carotenoids in the diets of children results in rapid changes to skin yellow tones and that smaller intake amounts also appear to result in measurable effects.

What about measures in the thicker and older skins of adults? Kristine Pezdirk and colleagues investigated Australian young women in a single-blind randomised crossover trial (2016).⁴ Thirty women of Caucasian or Chinese background, were randomised to consume at least seven daily servings of F&V. For four weeks they were supplied with F&V

boxes that provided items high in carotenoids, such as carrots, sweet potatoes, pumpkin and canned tomatoes. The high-carotene weeks were calculated to provide about 176mg beta-carotene. Then, after a two-week washout period, the young women with given weekly F&V boxes that provided items low in carotenoids, such as aubergines, mushrooms, cauliflower and pears, calculated to provide only about 2.0mg beta carotene per week. Serum and skin tones were assessed in both sun-exposed and protected skin areas and, of course, all women were required to avoid sun bathing and the application of tanning agents during the trial period.

Women in both four-week periods successfully recorded heroic intakes of F&V of about seven servings per day, but serum and skin measures demonstrated that not all F&V are the same. In the periods of high carotene F&V intakes, there were significantly higher plasma levels of alpha and beta-carotene and lutein, and there were also significant increases in measures of skin yellowness in different body areas, but no changes to measures of skin lightness or redness.

While many intervention trials investigating possible cancer protective effects of high dose (>20mg/d) beta carotene supplements demonstrated disappointing results in the 1990s, and possible adverse outcomes in smokers specifically, the data supporting possible health beneficial effects of diets high in food-sourced carotenes and other antioxidants remains really impressive. The fast and reliable skin measures of carotenoid intakes may become a useful research measure, and may also become a useful motivational measure in those that like to have daily and numeric scores of all their healthy life habits.

Counting steps is so yesterday: tomorrows health discussions will be all about your skin tone score.

Information sources

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- 3 Chalé A, Chalé C (2016) Color by Numbers: When Population Skin Pigmentation is not Political but a Polytypical Evaluation Exercise to Measure Vitamin D, Diseases, and Skin Pigmentation. *Journal of the Academy of Nutrition and Dietetics*, 116, 8, 1251-1256
- 4 Pezdirk K, Hutchesson MJ, Williams RL, Rollo ME, Burrows TL, Wood LG, Oldmeadow C, Collins CE (2016) Consuming High-Carotenoid Fruit and Vegetables Influences Skin Yellowness and Plasma Carotenoids in Young Women: A Single-Blind Randomized Crossover Trial. *Journal of the Academy of Nutrition and Dietetics*, 116, 8, 1257-1265
- 5 SACN (2016) Vitamin D and Health. Public Health England, London