Flawless Skin in Summer and Beyond

Chris D. Meletis, ND (with permission from cpmedical.net, access pin: 587556)

Summertime can pose a number of challenges to achieving healthy skin. Although getting outdoors and enjoying the sunshine does increase vitamin D production, at the same time that we're being exposed to this health-promoting vitamin, we're also exposed to ultraviolet (UV) light, which can cause damage to the skin.

The sun's rays promote the production of large amounts of highly-reactive free radicals in the upper skin layers, primarily in the epidermis. Free radicals are the main cause for premature skin aging and may impact immune function in the skin, resulting in less than optimal skin health. The body protects the skin against free radical damage by quenching these free radicals with antioxidants.1 These free radicals react immediately with antioxidants contained in the skin, thus depleting the antioxidants, which must be replaced. Free radicals also react with other structural and functional molecules in the skin, resulting in their damage, disorganization and destruction.

Other factors that cause stress to the skin include exposure to air pollution, illness, alcohol intake and smoking. Cortisol, the primary hormone secreted during the stress response, has also been shown to alter the physiology of the skin, resulting in thinning of the skin and suboptimal skin resilience.2

Healthy, Radiant Skin

Skin color is based on several factors, including blood oxygenation, blood flow to the skin, melanin production and carotenoids in the skin. Melanin is the pigment in the skin produced upon UV light exposure to protect the underlying tissue from UV damage. Carotenoids are yellow, orange and red pigments synthesized by plants and ingested in the diet. The most common carotenoids include alpha-carotene, beta-carotene, beta-cryptoxanthin, lutein, zeaxanthin and lycopene. These molecules have significant antioxidant and free-radical scavenging activity.

Interestingly, research indicates that perceived health and facial attractiveness in a Caucasian face is related to skin coloration. In a Caucasian face, red and yellow skin tones were associated with health. In fact, in one study done in the UK, participants were allowed to adjust skin color of photographs to enhance what they perceived to be a healthy appearance. The participants seeking to make the photographs appear more healthy, increased redness, yellowness and lightness of the skin color in the photos. The authors suggest that the participants preferred skin color caused by high carotenoid levels over skin color caused by suntan.3 Researchers suggest that the skin color preferences are not likely a sensory bias, but may be an accurate indication of health.4 Blood oxygenation and skin perfusion increase skin redness and are associated with increased cardiovascular fitness and levels of carotenoids. From a biological and anthropological perspective, red skin color in a Caucasian face signals health and vitality.

UV Exposure and Skin Health

As potent free radical scavengers, carotenoids have the ability to protect skin from damage. Various carotenoids have been shown to support skin health and appearance. Animal models have shown that, following UV light exposure, dietary supplementation of carotenoids such as lutein decreases reactive oxygen species, a type of free radical believed to cause UV-induced aging in the skin.5

UV exposure from sunlight is well-established as a cause of premature skin aging. In one study, researchers administered orally and topically the carotenoids lutein and zeaxanthin to subjects, followed by UV light irradiation. The subjects were evaluated for skin surface lipids, skin hydration, photoprotective activity, elasticity, and malondialdehyde levels, which is a measurement of lipid peroxidation or oxidative stress. The study showed that both oral and topical administration of the carotenoids provided significant antioxidant activity in the skin. The researchers reported that oral administration of lutein may provide better protection when evaluating lipid peroxidation and photoprotective activity in the skin following UV light exposure.6 Similarly, studies indicate that individuals with high levels of antioxidants in the skin have less premature skin aging, resulting in furrows and wrinkles that are less deep and dense compared to the skin of individuals with low antioxidant levels.7

In another study, researchers supplemented beta-carotene at a dose of either 30 mg/day or 90 mg/day for 90 days to women 50 years of age or older. The women were evaluated at the beginning of the study and again after the 3 months for facial wrinkles and elasticity, UV-related damage, and pro-collagen gene expression, which is the structural protein found in skin and other connective tissue. The results showed that in the low-dose group, elasticity and wrinkling was reduced, pro-collagen gene expression was increased, and markers of UV-related damage were lower. The study authors stated that 30 mg/day of beta-carotene supplementation was the most beneficial in improving skin health and function that were impaired by photoaging.8 Also, researchers have shown that supplementation with a combination of antioxidants, including beta-carotene, lycopene, lutein, alpha-tocopherol (vitamin E) and selenium, improves skin health compared to subjects given a placebo.9

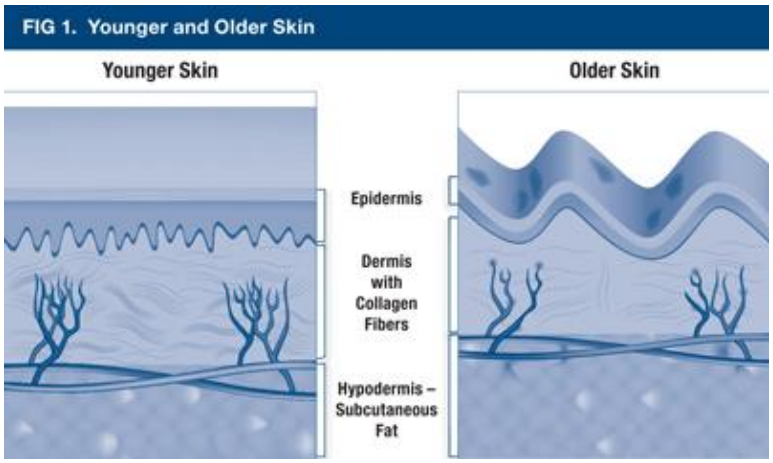
Animal models indicate that oral supplementation with lutein and zeaxanthin prior to UVB exposure results in a decrease in the UV-induced inflammatory response in the skin.10 Similarly, in a human study, subjects were supplemented with beta-carotene alone, a mixture of beta-carotene, lutein and lycopene, or a placebo for 12 weeks. The subjects were evaluated for skin redness 24 hours after UV exposure at the beginning of the study and again after 6 and 12 weeks of supplementation. The study showed that both groups receiving carotenoids had increased levels of carotenoids in the skin after 12 weeks of supplementation and had decreased redness 24 hours after UV exposure compared to the placebo group and the UV-induced skin redness at the beginning of the study.11 A meta-analysis of studies regarding beta-carotene and UV exposure concluded that beta-carotene supplementation can support healthy skin color after UV exposure. The analysis also reported that approximately 10 weeks of supplementation of beta-carotene is necessary to provide this effect, and protection increases with each additional month of supplementation.12

Animal models have also shown that dietary supplementation with lutein and zeaxanthin can protect against the effects of extended UV exposure on the skin. Supplementation with these

carotenoids was shown to decrease skin fold thickness and mast cell infiltration, seen with extended UV exposure. Additionally, there was improvement in skin health and improved survival following extended UV exposure in the carotenoid-supplemented mice compared to mice fed the standard diet.13 Additional mechanisms in which carotenoids enhance skin health after exposure to UV light include the modulation of more than 140 genes that are affected by UVA light, reduced stress-signaling, decreased breakdown of the extracellular matrix which provides structural support to the tissues, and promoting skin cell differentiation.14

Flawless Skin: Two Other Approaches

Another important nutrient for optimal skin health is zinc. Zinc is an essential mineral required for growth and development, immune function, and protein synthesis. Researchers have demonstrated that zinc levels in the skin may be reduced despite adequate serum zinc concentrations. This may result in various skin reactions, including inflammation, dryness, itching, or bumps.15



Numerous studies indicate that zinc supports clear skin. One study showed that oral supplementation with 30 mg elemental zinc for 3 months resulted in clearer skin in over 31 percent of the subjects.16 Zinc has been shown to balance the normal flora on the skin, which can help regulate inflammation and blemishes.17 Furthermore, studies have shown that the inflammatory balancing effect of zinc in the skin may be related to its ability to decrease nitric oxide production. Nitric oxide is a free radical produced under the influence of pro-inflammatory mediators when the skin is inflamed and can result in local tissue damage.18

Hyaluronic acid, another substance important for skin health, is naturally occurring within the body and is a major component of skin. It belongs to a class of compounds known as glycosaminoglycans (GAGs) involved in tissue repair. UV light exposure can decrease the production and increase the breakdown of hyaluronic acid in the deeper layer of skin known as the dermis.19 Hyaluronic acid attracts water into the dermis layer of the skin, promoting water retention, and can hold up to 1,000 times its own weight in water. This ability allows for skin elasticity, which prevents the formation of wrinkles in the skin. Hyaluronic acid levels decline with aging, resulting in reduced ability of the skin to retain water.20 This induces skin changes, including dryness, thinning, and looser skin with decreased ability to repair itself. Hyaluronic acid can be applied topically or ingested orally to boost hyaluronic acid concentration in the skin. This promotes water retention resulting in smooth, tighter and well-hydrated skin.

Conclusion

Summertime and frequent UV light exposure can be damaging to skin. Radiant skin can be achieved without exposure to sunlight. Carotenoids, such as beta-carotene, lutein and zeaxanthin, have been associated with facial attractiveness and healthy skin tones. Carotenoids also fight free radical

damage in the skin and reduce redness associated with UV light exposure. Additionally, zinc and hyaluronic acid promote clear, well-hydrated and smooth skin.

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