



Studies show
phytonutrients
support skin health
and anti-aging



Skin health plays a vital role in general wellbeing

The largest organ in the human body, skin must be nourished and protected to maintain its structure and help regulate its many biological functions.



Often referred to as the body's first line of defense, skin is not only an essential physical barrier between the highly regulated systems in the body and the immediate environment, it also contributes to immune defense, sensation, thermoregulation and vitamin production.^{1,2}

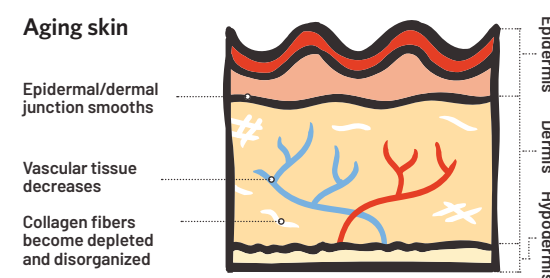
The condition and appearance of skin is influenced by diet, age and lifestyle. However, the rate at which it ages is primarily due to two independent factors:

- Intrinsic – genetic and hormonal such as the breakdown of collagen and elastin leading to a loss of firmness and elasticity²
- Extrinsic – environmental such as ultraviolet (UV) radiation, oxidative and physical stress, poor nutrition and smoking²

The link between nutrition and skin health
It is widely accepted that a diet rich in fruit and vegetables can help to preserve the healthy and

youthful appearance of skin. This is supported by advances in nutrition science over the past few decades, which have uncovered new insights into the relationship between dietary habits and health.³

With the link between nutrition, skin health and anti-aging now more widely understood and documented, dietary supplements are becoming an increasingly accepted and recognized approach for supporting skin health.



The role of plant-based active compounds in skin health and anti-aging

There is a substantial body of scientific literature to support the link between specific food ingredients and skin health. Intervention studies indicate that it is possible to manipulate and delay skin aging and improve skin conditions with selected nutrients.⁴ These range from vitamins A, C, D and E, and the minerals zinc, copper, and selenium, to fatty acids and a variety of plant extracts.^{5,6}



Carotenoids – powerful antioxidants and UV protection

There are over 600 naturally occurring types of carotenoids. Considered the most efficient botanical antioxidants, carotenoids such as β -carotene, lutein, and lycopene are the most important phytonutrients for the prevention of skin aging and cancer.^{7,8,9,10}

Carotenoids are easily absorbed by the body and are vital components of the skin's natural protective antioxidative system. After ingestion, there are two main pathways for the accumulation of carotenoids in the skin:⁸

- Diffusion from adipose tissue, blood and lymph flow
- Secretion via sweat glands and/or sebaceous glands onto the skin surface

Carotenoids (and vitamins) form the basis of the body's non-enzymatic defense mechanism against reactive oxygen species (ROS), which can age the skin. Studies show that antioxidants form protective chains in human tissue, acting synergistically to provide protection against the destructive action of ROS.⁸ As the body's endogenous defense system against ROS is often insufficient, carotenoid-rich supplements can help to increase antioxidant levels to protect skin against oxidative stress.

Carotenoids are also a rich source of provitamin A, which contributes to the maintenance of normal skin. When ingested, α -carotene and β -carotene are converted to vitamin A in the body.^{5,11} Vitamin A is used in the treatment of several skin diseases such as acne, and disorders of keratinization, including psoriasis.

Mixed carotenoids – photoprotection against skin cancer and photoaging

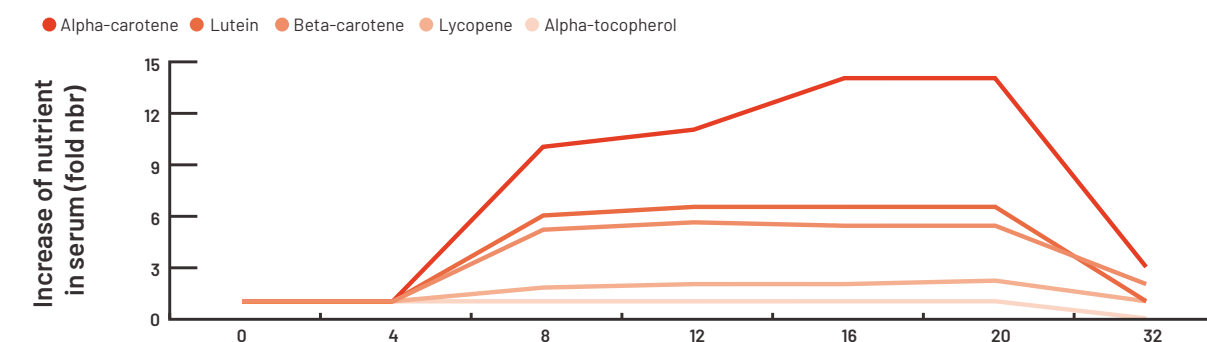
Several studies indicate that consuming a mixture of carotenoids, such as β -carotene, lutein and lycopene has a synergistic effect and increases the body's antioxidant defense.^{12,13}

The richest single source of natural mixed carotenoids is palm fruit (*Elaeis guineensis*). It has the highest α -carotene content (approximately 35%), compared

to other carotenoid-rich plants, and contains high levels of β -carotene and lycopene.¹⁴

Results of a placebo-controlled intervention study of 400 male and females from 5 European regions showed that supplementing the diet with carotene-rich palm oil resulted in 5-fold and 14-fold increases respectively in serum levels.¹⁵

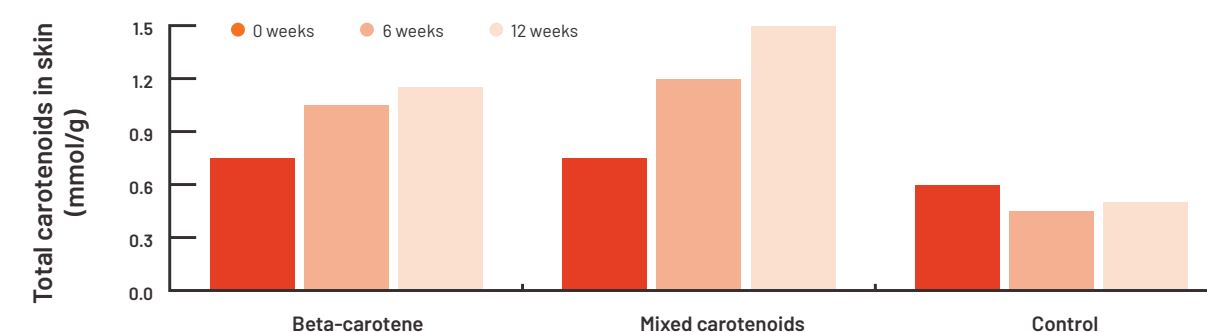
Alpha-carotene showed the greatest relative response in serum, followed by beta-carotene, lutein and lycopene¹⁵



A number of recent studies in humans showed that oral uptake of mixed carotenoids also has photoprotective effects. In a comparative 12-week study, supplementation with mixed carotenoids containing

β -carotene, lutein and lycopene showed greater protection against UV-induced erythema compared to β -carotene alone.^{16,17}

Mixed carotenoids may be more effective than beta-carotene for UV protection



The global skin supplement market is expected to reach USD 6.8 billion by end 2024¹⁸



Scientific evidence is behind the rapid growth of the skin health supplement market

The studies referred to validate that dietary supplements containing carotene and mixed carotenoids may play a beneficial role in skin health and anti-aging.

Carotenes and mixed carotenoids are well absorbed in the human body and play a valuable role in protecting the skin and other tissues from oxidative stress and they may help reduce the harmful effects of UV exposure. These active compounds can also help mitigate other forces, both intrinsic and extrinsic, that age and damage the skin.

It is important to note that endogenous photoprotection is complementary to topical photoprotection, and that these two forms of prevention are not mutually exclusive.

With further research, the health claims and beneficial effects of carotene and mixed carotenoids will firmly establish their role in a skin health supplement and anti-aging regime. It will also serve to raise the legitimacy of food supplements and the important role phytonutrients play in health and nutrition.

Rich in carotenes and mixed carotenoids, our NutriPhy® carotenoid range supports skin health and anti-aging.

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