



Made for
each other:

Collagen and carotenoids

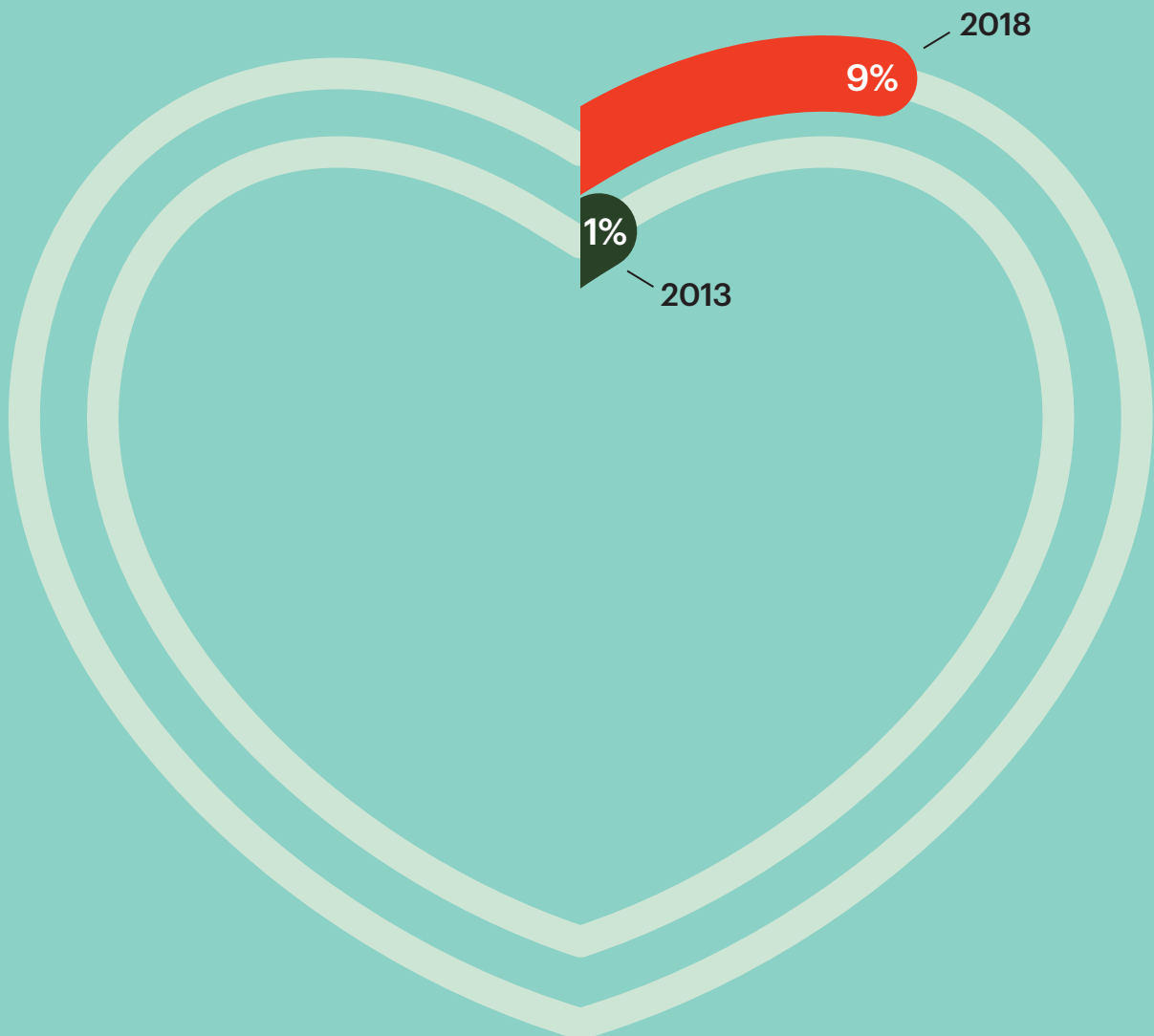


Collagen and Carotenoids™: Perfect partners

This is a love story. It's about two of the star ingredients in the ingestible skincare market and how they turned out to be perfect for each other.

The first is collagen. Rising consumer awareness of its benefits for elasticity, wrinkle reduction and moisture has been a recent success story in the beauty and skin wellness space. In 2013, collagen was estimated to account for 1% of the U.S. beauty-from-within supplements market. By 2018, that figure had risen to 9%.¹

The second are carotenoids, which can improve the skin's ability to balance response to oxidative stress and DNA damage, as well as bring out its natural color. The great news is that carotenoid products – such as Lycoderm™, Lycored's blend of tomato phytonutrients and rosemary leaf – are a perfect partner for collagen.



Carotenoids : The foundation for skin health

Carotenoids can be a “foundation”, one that creates the best possible cellular environment for skin health and appearance.

Lycoderm™, for example, contains optimal concentrations of lycopene, phytoene and phytofluene for skin wellness, as well as natural Vitamin A and Vitamin E. These ingredients are combined with carnosic acid to help support skin health and appearance.

Lycoderm™ is formulated to help balance the skin’s response to environmental challenges such as UV exposure, and to reveal its healthy glow.

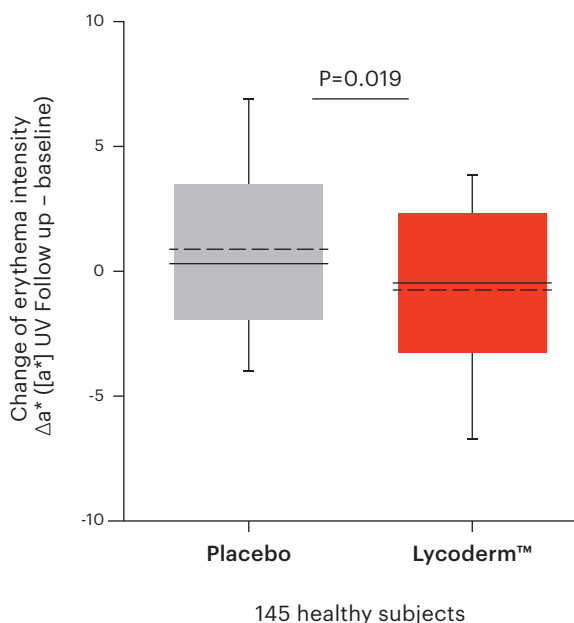
Proven benefits

Lycoderm™ is supported by a large body of robust scientific evidence. Most recently, its efficacy was tested in a well controlled, full-scale, double-blind clinical study on 145 subjects.² The research explored the role of Lycoderm™ in enhancing skin resilience and balancing skin response to UV challenge.

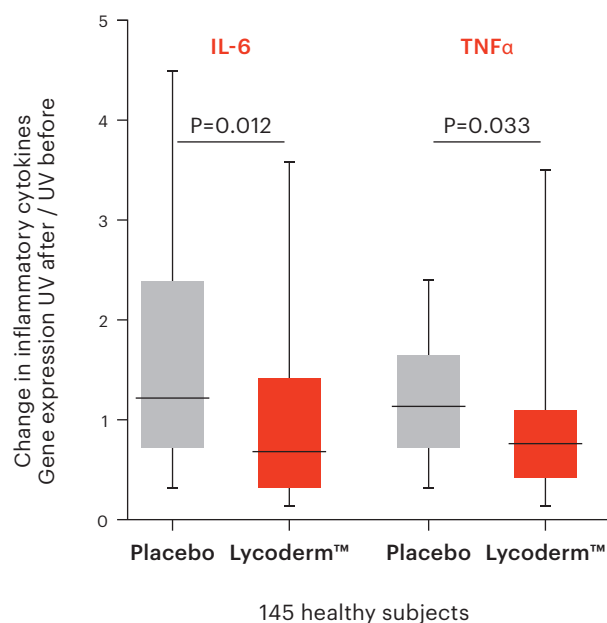
The subjects supplemented for 12 weeks with either Lycoderm™ or a placebo. They were exposed to controlled local UV radiation at baseline, and again at the end of supplementation. A statistically significant decrease in erythema formation was observed in the group taking the supplement compared to the placebo group (Fig 1). At the molecular level there was a reduction in pro-inflammatory cytokines. This more balanced inflammatory status was also reflected in reduced erythema.

The results provided definitive proof of the effect of Lycoderm™ on physiological parameters such as reduction of the intensity of erythema caused by UV exposure.

Fig 1) Lycoderm™ significantly decreased erythema formation after UV exposure



Lycoderm™ significantly decreased UV response in IL-6 and TNFα biomarkers



Six ways carotenoids and collagen work well together

There are several different ways in which carotenoids and collagen work synergistically. Here are six of the most important:

1) Creating the optimal micro-environment for collagen to thrive

Collagen is sensitive to degradation caused by inflammation and oxidative stress, resulting in increased perceived skin aging. Balancing these processes is therefore critical to maintaining a healthy collagen network over time.

Carotenoids can boost our inner collagen network by creating a healthy microcellular environment in which it can thrive. This is the result of several cellular mechanisms, including the reduction of enzyme activity involved in collagen degradation, as well as anti-oxidative and anti-inflammatory pathways.

2) Balancing MMPs

MMPs (Matrix metalloproteinases) are a family of proteins with a role in the degradation of proteins in the extracellular matrix. MMP-1 in particular is a photo-aging marker and a key player in collagen degradation. Modulating levels of MMP-1, along with other markers such as ICAM-1 and HO-1, is important to boosting natural collagen.

Award-winning research commissioned by Lycored in 2017 found that oral intake of Tomato Nutrient Complex, in contrast to placebo capsules, was associated with a significant reduction of UVR-induced expression of MMP-1.³

3) Directly balancing collagen levels

Another factor in the degradation of collagen is the recruitment to the skin of neutrophils following stress challenge. These immune cells secrete proteolytic enzymes, which are involved in collagen degradation. Carotenoid supplementation can limit the collagen loss initiated by neutrophils.

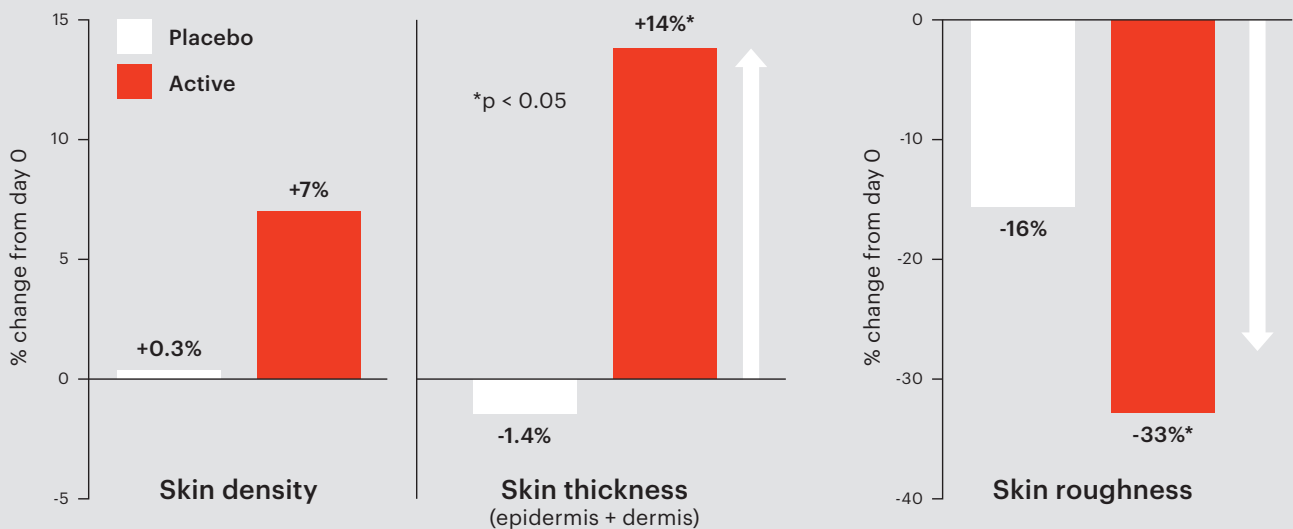
4) Influencing overall skin appearance

Like collagen, carotenoids influence overall youthful appearance. In a 12-week study measuring the density, thickness and smoothness of skin, statistically significant improvements were found in subjects who received an antioxidant supplement containing Lycoder™⁴ (Fig 2)

Furthermore, collagen and carotenoids can work synergistically on two key elements of skin appearance. Whereas collagen's primary role is structural, carotenoids have been shown to improve the color and therefore attractiveness of the skin.⁵



Fig 2) When our skin is well nourished, it also appears smooth



5) Balancing UV

Unhealthy UV exposure is the most common preventable cause of skin aging, and a major factor in perceived skin aging.⁶ (Fig 3)

It is associated with inflammation and oxidative stress, which increase the collagen degradation process and influence core parameters related to skin texture and appearance.

Balancing these processes is critical to modulating the collagen network and to addressing perceived skin aging. The ability of Lycoderm™ to balance the skin's response to UV challenge is another reason to pair it with collagen.

6) Healthy blood flow

Healthy blood flow associated with normal nutrient delivery is one of the most important factors in skin appearance. A "healthy glow" has been shown to correlate with the presence of carotenoids in the skin, and skin color from dietary carotenoids can be interpreted as a sign of vitality and therefore attractiveness.⁷ One of the underlying mechanisms for this may be improved blood flow. Meanwhile, collagen, which represents as much as 40% of the total protein of the vessel wall also has a key role in blood flow.⁸

Fig 3) Identical twins (61 years) with significant difference in sun exposure (an average of 10 hours difference a week).



Perceived age difference was 11.25 years.

Collagen and carotenoids: A relationship through the ages

The relationship between collagen and carotenoids changes with time, with the two ingredients fulfilling different roles at different life stages.

Carotenoids – Reaching younger demographics

Between the ages of 18 and 35, our bodies have healthy collagen levels and our skin does not need additional “structural support”. However, at this stage of life, our skin still needs to be nourished, balanced and sustained. Increasing levels of carotenoids can help meet these needs, building the foundations of skin health and revealing a healthy glow.

In other words, when we are young, we generally do not need the support that collagen provides. The inclusion of carotenoids can therefore open up skincare supplements to a whole new age demographic.

It is also worth noting that there is a growing market for vegetarian and vegan collagen offerings, largely driven by demand from younger consumers. Lycoderm™ is available in a vegan version, making it perfect for these products.

Support in later life

As we grow older, lines, wrinkles and firmness become greater concerns, and collagen comes into its own. In these later stages of life, carotenoids can also help the skin cope with environmental challenges such as UV, helping us age beautifully.

	18-35	36-45	46-60
	Increased carotenoid levels 100% to build skin health foundation and reveal the skin’s healthy glow	Overall improvement in coping and maintaining skin’s appearance and reveal it’s healthy glow	Helps skin cope with environmental challenges such as UV to recover and age beautifully
Balance inflammation	✓	✓	✓
Environmental challenges	✓	✓	✓
Antioxidant + Nutrient reservoir	✓	✓	✓
Collagen levels	NA	✓	✓
“Structure support” (lines, wrinkles firmness)	NA	✓	✓

Key hint: At 18 through 35 our bodies have healthy collagen levels and our skin does not need additional “structural support”. The unmet skincare need for this age demographic includes nourishing, balancing, and sustaining the skin

Conclusion

Carotenoids can support overall wellness and healthy circulation, help the skin cope with environmental challenges, and modulate expression of skin photo-aging markers. For all these reasons they provide the ideal foundation for skin health. And collagen, with all the structure it provides, can build on this foundation.

So if you're looking for a way to help your next ingestible skincare product stand out from the crowd, a carotenoid product such as Lycoderm™ may be the perfect match.



About Lycored™

Committed to 'Cultivating Wellness', Lycored, part of Adama Group, is an international company at the forefront of unearthing and combining nature's nutrition potential with cutting edge science to develop natural ingredients and products. Established in 1995 in Israel, Lycored is the global leader in natural carotenoids for food, beverage and dietary supplement products. For more information visit www.lycored.com.

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