

## **The Truth About Collagen**

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### **What is collagen and what is its role in the skin?**

Collagen is a protein, which means it is a molecule (collection) of amino acids, including a repeating sequence of glycine, proline and a third variable amino acid. The collagen molecule is shaped like a triple helix (triple spiral or rope) that combines with other collagen molecules in the skin to form a mesh-like network in the dermis, which is the layer of skin beneath the epidermis and above the subcutaneous fat.

### **What is collagen's role in the body and skin?**

There are many types of collagen in various parts of the body, including the skin, hair, nails, cartilage, bone and blood vessels. Collagen is a fiber that gives body tissues structure, toughness, rigidity and texture. In the skin, collagen is akin to a protective layer of leather that provides strength and protection. When it intermingles with elastic fibers, it gives skin stretch and resilience.

### **Why do we tend to lose collagen (age, UV, diet, other lifestyle factors)?**

As we mature, we have a reduced ability to produce a well-structured collagen triple helix (rope). Likewise, our ability to repair damaged collagen diminishes, so we are left with poor quality, fragile collagen that is reminiscent of a frayed rope. The result is poor skin turgor and strength, easy bruising, and increased susceptibility to skin tearing.

The sun's ultraviolet radiation, and other forms of light like fluorescent lighting, can damage collagen fibers, breaking them down to the point that they form poorly structured protein clusters. These clusters can give the skin a pebbly or beaded appearance. Broken-down collagen can also lead to atrophic (thin) skin, which occurs due to sun-damage and the aging process.

A major lifestyle contributor to poor collagen quality is smoking. Research suggests that smoking allows oxygen free radicals to attack collagen fibrils, rendering them weak and of poor quality. It is not surprising, therefore, that the skin of a smoker tends to look damaged and wrinkled, particularly around the mouth. The classic perioral "smoker's lines" become prominent as collagen and elastic fibers degrade.

Frequently, patients ask me why they have prominent lines around their mouth even if they never smoked. The answer is multifactorial—ultraviolet radiation, environmental pollutants and diet may play a role. But the squeezing action of the circular-shaped muscle that surrounds the mouth also plays a role, which is why it's best to avoid drinking with a straw.

There is controversy as to what role diet plays in collagen synthesis and quality. A mainly animal-based diet may be rich in proteins, but it also contains oxygen free radicals that damage and break down collagen. A plant-based diet is rich in antioxidants that destroy the oxygen free radicals before they have the opportunity to damage collagen. Therefore, a well-balanced and nutritional plant-based diet is ideal. The diet should contain sufficient amounts of amino acids, which are the building blocks of proteins like collagen. As a vegetarian myself, I suggest that you seek to uncover the vast array of vegetables that contain very high amounts of amino acids and protein.

### **How can you increase collagen production?**

Research on dietary supplementation suggests that oral supplementation with collagen hydrolysate leads to a statistically significant increase in synthesis (production) of proteins by chondrocytes, the precursor cells that become cartilage. Studies also suggest that collagen hydrolysate may decrease joint pain in athletes and might be useful in the treatment of osteoarthritis and osteoporosis. Other forms of oral collagen, whether extracted from various sources such as plants and animals, or synthesized in a lab, show promise in improving the appearance of skin. However, the data is sparse, and the topic is deserving of greater attention.

There appears to be no benefit from the application of creams that contain collagen. The collagen molecule is simply too large to penetrate the skin's surface.

There is significant data to show that a variety of procedures are able to increase collagen production and improve the appearance of skin. Studies prove that a variety of laser and other light-based procedures, monopolar radiofrequency, ultrasound, microneedling, subcision, volumizers and fillers increase collagen production. With most

of these interventions, collagen neogenesis (production of new collagen) continues for several months following the procedure, leading to significant improvement in the overall quality of the skin.

**Are there any side effects or risks to aesthetic procedures and interventions?**

Aesthetic procedures are very safe if performed by qualified and highly trained professionals. Always check the credentials and experience of your health care provider. After all, you are trusting this person with your face! An experienced professional will know how to appropriately screen patients in order to determine what treatment is right for each individual person's needs. Risks are dependent on individual circumstances and can be mitigated if a patient considering an aesthetic procedure consults with a board-certified dermatologist or plastic surgeon prior to undergoing the procedure.