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Collagen Evolved

Collagen is a protein naturally found in the connective tissue and skin, and is fundamental in giving skin its strength, structure and support. In fact, up to 70 to 80 percent of the inner layer of the skin, called the dermis, is made up of collagen.ⁱ

A crucial building block of the body, collagen shapes the structure of tendons, bones and connective tissues.ⁱⁱ It is essential for skin strength and ability to repair itself. As such, its presence helps maintain facial structure and a youthful appearance.

Collagen is the most widely found protein in nature. There are at least 16 different kinds of collagen, but most (80 to 90 percent) are comprised of molecules that are closely woven to form long, thin fibers. These molecules work together to help withstand stretching and maintain the structure of the skin.ⁱⁱⁱ

Collagen naturally depletes as a person ages, the pace of which may be affected by intrinsic and extrinsic factors including genetics or hormonal changes, as well as the degree of sun damage, smoking and skin damage due to pollution. This ongoing collagen loss leads to the appearance of lines, folds, wrinkles and changes in facial contour. Replenishing collagen can maintain the structure of the face and contribute to a younger, healthier appearance.

The “Free Radical Theory of Aging” (Harman 1956, Nagy 1978), which is the most universally accepted theory on aging, is centered around collagen. It states that aging happens on the deepest cellular level where free radicals attack healthy collagen and create collagen-eradicating enzymes. As such, external signs of aging are attributed specifically to a reduction in collagen. A significant, thriving segment of the beauty industry has developed around collagen, from products that counter free radicals that attack collagen, to ones that stimulate new collagen production.

FACIAL AESTHETICS

The use of fillers in facial aesthetics dates back to the 1800s, a time when injectable fillers were comprised of materials ranging from paraffin to vegetable oil, mineral oil, lanolin, beeswax or silicone.^{iv} In more recent times, the field of ingredients has expanded to include hyaluronic acid, hydroxylapatite, polymethyl methacrylate (PMMA), poly-L-lactic-acid and collagen.

Despite the proliferation of other types of dermal fillers, collagen has remained a gold standard with an unparalleled record of safety and efficacy.^v

COLLAGEN IN AESTHETICS

In 1981, the Food and Drug Administration (FDA) approved the first injectable bovine collagen for use in facial aesthetic rejuvenation. To create the collagen used in these injectables, bovine collagen is sterilized, purified and processed to remove portions of the molecule that have the potential to cause allergic reactions. The collagen is then cross-linked with a chemical called glutaraldehyde to strengthen the fibers.^{vi}

These products provided patients with results lasting between three and 18 months, however required multiple treatments and one to two skin pre-tests to assess the potential for allergic reactions.^{vii}

In the 1990s, the FDA approved the first injectable porcine collagen, which is the most genetically similar to human collagen, for use in facial aesthetics. This collagen-based injectable consisted of gelatin foam, aminocaproic acid and human plasma, and functioned by forming a clot in the injection site, which stimulated collagen production in the body.^{viii}

In June 2008, the FDA approved EVOLENCE[®], an advanced collagen-based structural dermal filler that provides long-lasting treatment for the correction of moderate to deep facial wrinkles and folds, such as nasolabial folds. The original labeling was for a six-month duration and in June 2009, the FDA approved a labeling supplement which includes EVOLENCE[®] efficacy data through 12 months after initial treatment*. EVOLENCE[®] has been approved in Israel, Europe, Canada and parts of Asia since 2004/2005 and has been cleared for 12-month duration in those countries.

Rather than using chemicals to cross-link the collagen, this new filler uses a natural sugar called D-Ribose, which improves the durability of the product. This approach mimics the action of the body's own collagen by creating a true structural framework with natural, durable cross-links to ensure filler longevity.

To create the collagen used in this injectable dermal filler, porcine collagen is purified to remove portions of the molecule that have the potential to cause allergic reactions. A skin pre-test is not required prior to treatment.

THE MEDICAL USES OF COLLAGEN

The use of collagen as a medical device dates back to ancient Egypt, where collagen-based sutures were used during surgical procedures.^{ix}

From ancient civilizations through modern surgeries, collagen has played many roles in keeping people healthy and safe. Some of the diverse uses of collagen include:

- Heart valve or corneal replacement
- Wound dressing
- Vaginal contraceptive
- Hemostatic agent
- Bone/cartilage substitute
- Drug delivery
- Hemodialysis
- Artificial kidneys^x

* Initial treatment is defined as a single treatment with the option of touch-up within two to three weeks to achieve optimal correction.

ⁱ Waller JM, Maibach HI. Age and skin structure and function, a quantitative approach. *Skin Research and Technology* 12 (3), 145–154.

ⁱⁱ Medical Encyclopedia: Collagen vascular disease. Available online at <http://www.nlm.nih.gov/medlineplus/ency/article/001223.htm>, April 16, 2008.

ⁱⁱⁱ Molecular Cell Biology: Collagen the Fibrous Proteins of the Matrix. Available online at www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=mcb.section.6542. Accessed December 3, 2007.

^{iv} Dastoor SF, Misch CE, Wang HL. Dermal fillers for facial soft tissue augmentation. *Journal of Oral Implantology*. 2007;33(4):191-204.

^v Matarasso SL. The use of collagens for aesthetic rejuvenation. *Semin Cutan Med Surg*. 2006;25(3):151-7.

^{vi} Dastoor SF, Misch CE, Wang HL. Dermal fillers for facial soft tissue augmentation. *Journal of Oral Implantology*. 2007;33(4):191-204.

^{vii} Dastoor SF, Misch CE, Wang HL. Dermal fillers for facial soft tissue augmentation. *Journal of Oral Implantology*. 2007;33(4):191-204.

^{viii} Dastoor SF, Misch CE, Wang HL. Dermal fillers for facial soft tissue augmentation. *Journal of Oral Implantology*. 2007;33(4):191-204.

^{ix} Prior D. Localised drug delivery via collagen-based biodegradable matrices. *The Drug Delivery Companies Report*.

^x Chvapil M. Collagen Sponge: Theory and Practice of Medical Applications. *J Biomed Mater Res*. 1977;11:721-741.