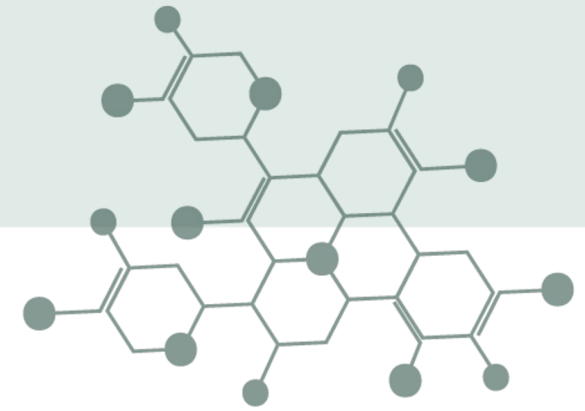


GHK-CU FOR SKINCARE

Skin and Aging



Skin consists of three layers: **epidermis, dermis and subcutaneous tissue**. It also contains hair follicles, sebaceous glands and sweat glands.

The **dermis** is the deeper layer, forming the main bulk of the skin. Its function is to provide a tough matrix to support the blood vessels, nerves and appendages that are embedded in it. The fibres present in the dermal connective tissue are predominantly **collagen and elastin**.

Some 80% of the dry weight of adult skin consists of collagen, produced by fibroblasts, are arranged parallel to the skin surface. This gives the skin a high **tensile strength** and prevents it from being torn by overstretching. In contrast, **elastin** constitutes about 5% of the dermis, and provides the skin with **elasticity and resilience**. Elastin fibres are also produced by fibroblasts. The dermal connective tissue additionally contains **sensory receptors** and the supportive **glycosamino- glycans (GAGs) such as hyaluronic acid**.

Box 1 Functions of the skin that decline with age⁷

- Epidermal turnover
- Immune function
- Wound healing
- Vascular reactivity
- Injury response
- Sweat production
- Barrier function
- Sebum production
- Sensory perception
- Vitamin D production

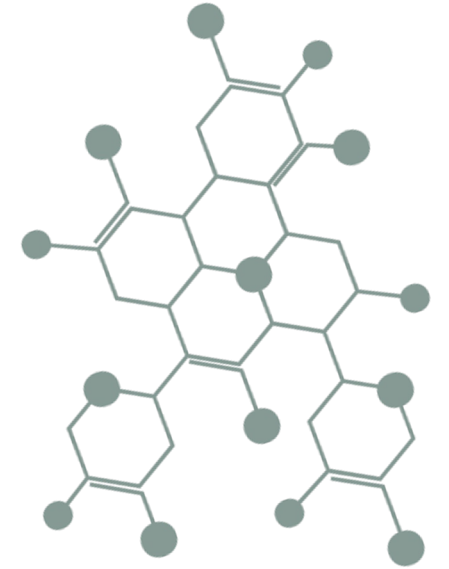
Skin and Aging: Collagen

The predominant form of **collagen** found in adult human skin is **type I**, followed by **type III**.

Collagen is synthesized by fibroblasts from procollagen molecules by the action of neutral endoproteases. The fibrils of collagen undergo a series of **post-translational modifications** in order to enhance their stability and tensile strength.

In **young** people, microscopic examination of collagen from the dermis of skin areas not exposed to the sun shows **thin, wavy, uniform fibrillar units**. The skin becomes thinner and changes structure and function with age. In the **elderly**, the skin contains **thickened, clumped** basophilic collagenous material, indicating partial degradation of collagen.

Collagen atrophy is a major factor in skin ageing. Studies show a significant decline in the quantity of dermal collagen with aging.



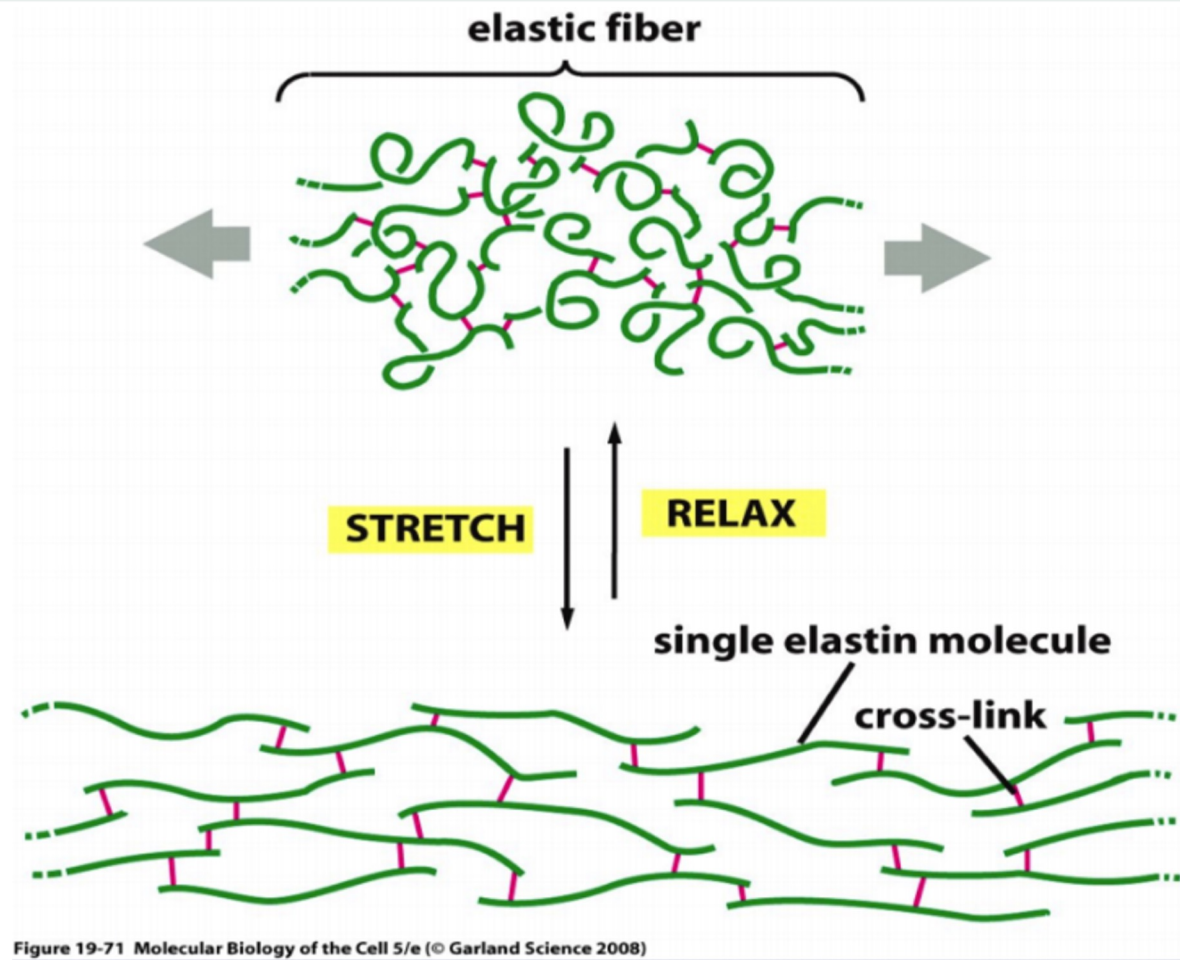
Skin and Aging: Elastin

Connective tissue protein with **rubber like** properties

Found in lungs, walls of large blood vessels, skin and ligaments

Also produced by fibroblast

Can be stretched to several times their normal length



GHK-CU

Naturally occurring

Protein fragment

Glycine-Histidine-Lysine

High affinity to bind copper

Decreases with age

GHK-CU

Dr Loren Pickart 1973

Applied the serum of young individuals to livers of old individuals and found the **liver tissue produced proteins more consistent with young individuals**

Discovered to be GHK-Cu, initially thought to be only **copper chelator**

GHK-CU; MORE THAN MEETS THE EYE

In 2010, the **Broad Institute of MIT** and Harvard created the Connectivity Map—a library of substances that modulate gene expression.

This tool allowed researchers to establish that **GHK-Cu is able to up- and down-regulate** a significant number of human **genes**. Today, we connect the biological effects of GHK-Cu to its effects on gene expression, to develop a more comprehensive view on GHK's mechanism of action.

The number of human genes stimulated or suppressed by GHK with a **change greater than or equal to 50% is 31.2%**.

GHK increases gene expression in 59% of the genes, while suppressing it in 41%.

GHK-CU IN SKIN

GHK is present in the $\alpha 2(I)$ chain of collagen I

Released during skin damage by activation of proteases

Regulates protein breakdown and accumulation in skin

Stimulates dermal basal cells

Cells become more cuboidal (stem-like)

GHK-CU IN SKIN

Protects against sun damage

Stimulates production of collagen

Stimulation of skin growth factors

GHK-CU IN SKIN

Tightens loose skin

Reverse thinning of age or steroids

**Improves firmness, elasticity, hydration,
hyperpigmentation, photodamage**

Improves skin hydration

Outperforms vitamin C and retinoic acid

GHK-CU

Leyden in 2002 at the 60th annual meeting of the Academy of Dermatology:

Facial cream containing GHK-Cu applied for **12 weeks** to the facial skin of 71 women with mild to advanced signs of **photoaging** increased **skin density and thickness, reduced laxity, improved clarity, reduced fine lines and the depth of wrinkles**

GHK-CU

GHK-Cu applied to thigh skin for **12 weeks improved collagen production in 70%** of the women treated, in contrast to 50% treated with the vitamin C cream, and 40% treated with retinoic acid.

In addition to **improving skin laxity, clarity, firmness and appearance, reducing fine lines, coarse wrinkles and mottled pigmentation, and increasing skin density and thickness**, GHK-Cu cream applied **twice daily** for 12 weeks also strongly **stimulated dermal keratinocyte proliferation**

GHK-CU IN HAIR

**Increases hair growth and thickness,
Enlarges follicle size**

GHK-CU IN WOUNDS

Improves wound contraction and granulation tissue

Increases activity of antioxidant (vitamin C and glutathione)

Stimulates blood vessel growth, then inhibits it

Better epithelialization

9x increased synthesis of collagen

Activation of fibroblasts and mast cells

Decreased MMP-9 and TNFa

Brown Algae: Discover the many benefits for your skin

Protects the skin's collagen

Brown algae's antioxidant effect protects against the skin's firming collagen degradation. It supports cellular energy production, increasing the skin's oxygen supply. This process positively affects cell renewal and the skin's overall appearance. An in vitro study on brown algae extract found that the application to cells can protect collagen cells by interacting with collagen inhibitors to preserve collagen.

Provides natural UV protection

Thriving in an environment with intense UV radiation and harsh climate conditions, these resilient marine plants have evolved an intricate defense mechanism to safeguard their DNA. Brown algae's amino acids boast potent antioxidant capabilities, neutralizing harmful free radicals and dispersing UV energy harmlessly as heat. According to board-certified dermatologist Keira Barz, M.D., "The amino acids in brown algae work as antioxidants scavenging toxic-free radicals but also dissipate UV energy into a form of harmless heat, essentially acting like nature's sunscreen."

Draws out impurities from the skin

Another excellent benefit of brown algae is that it has more minerals than almost any other land or sea plant. Its natural ability to draw out impurities enables deep skin detoxification, freeing your pores from buildup and leaving your complexion radiant and refreshed.

Boosts Hydration & Protects Skin Barrier

Experience supreme hydration benefits with brown algae. It is packed with polycarbohydrates that help with your skin's protective barrier, preventing moisture loss and shielding against environmental irritants. By ensuring optimal hydration, brown algae keep your skin supple, resilient, and invigorated.

Boosts the results of GHK-CU (Copper Peptides)

Combining the benefit of a natural healer like brown algae with the powerful Copper Peptide GHK-Cu can provide your skin with what it needs to stay healthy and beautiful. The Copper Peptides trigger stem cells to produce collagen and elastin, and the brown algae work to protect the skin and preserve collagen.

BROWN ALGAE

BPC-157 AND REPAIR

BPC 157 10 µg or 10 ng/kg or saline 5.0 ml/kg (controls), intraperitoneally, or BPC 157 in neutral cream (1.0 µg dissolved in distilled water/g commercial neutral cream) immediately after surgery or BPC 157 0.16 µg/ml in the drinking water (12 ml/day/rat)

healed tendons with return of function, collagen organization, and decrease in inflammatory cell recruitment and cytokine expression

Cerovecki, T. "Pentadecapeptide BPC 157 (PL 14736) Improves Ligament Healing in the Rat." *Journal of Orthopaedic Research* 28, no. 9 (2010): 1155–61.