

Hair and Skin

GHK-Cu

GHK-Cu is a naturally occurring copper complex that was first identified in human plasma, but has recently been found in multiple locations such as saliva and urine. Copper peptides are small, naturally occurring protein fragments that have high affinity for copper ions, which are critical to normal body function. GHK-Cu has a variety of roles in the human body including, promoting activation of wound healing, attracting immune cells, having anti-oxidant and anti-inflammatory effects, stimulating collagen and glycosaminoglycan synthesis in skin fibroblasts, and promoting blood vessel growth.

Evidence has shown that it acts as a feedback signal that is generated after tissue injury. It seems to act as a potent protector of tissue and it is an anti-inflammatory agent that controls the oxidative damage that occurs after tissue injury. Further, it then plays a big role in signaling tissue remodeling which removes damaged/scarred tissue and generates new, healthy tissue.

These positive effects decline with age because the concentration of GHK-Cu in the body decreases with age. Thus, there is an increase in inflammation, cancerous activity, and tissue destruction. In plasma, the level of GHK-Cu is about 200 ng/ml at age 20. By the age of 60, the level drops to 80 ng/ml.

Benefits of GHK-Cu:

- Tighten loose skin and reverse thinning of aged skin
- Repair protective skin barrier proteins
- Improve skin firmness, elasticity, and clarity
- Reduce fine lines, depth of wrinkles, and improve structure of aged skin
- Smooth rough skin
- Reduce photodamage, mottled hyperpigmentation, skin spots and lesions
- Improve overall skin appearance
- Stimulate wound healing
- Protect skin cells from UV radiation
- Reduce inflammation and free radical damage
- Increase hair growth and thickness, enlarge hair follicle size

GHK-Cu Research:

Since GHK-Cu plays an important role in skin biology, it is widely used in cosmetics as a reparative and anti-aging ingredient.

GHK stimulates both synthesis and breakdown of collagen and glycosaminoglycans and modulates the activity of both metalloproteinases and their inhibitors. It stimulates collagen, dermatan sulfate, chondroitin sulfate, and the small proteoglycan, decorin. It also restores replicative vitality to fibroblasts after radiation therapy. The molecule attracts immune and endothelial cells to the site of an injury. It accelerates wound-healing of the skin, hair follicles, gastrointestinal tract, and bony tissue. In cosmetic products, it has been found to tighten loose skin and improve elasticity, skin density, and firmness, reduce fine lines and wrinkles, reduce photodamage, and hyperpigmentation, and increase keratinocyte proliferation.

GHK-Cu FACIAL STUDIES:

Copper peptide GHK-Cu is widely used in anti-aging cosmetics (INCI name: Copper tripeptide-1). Several controlled facial studies confirmed the anti-aging, firming and anti-wrinkle activity of copper peptide GHK-Cu. Abdulghani et al. established that facial cream containing GHK-Cu increased collagen in photoaged skin of 20 female volunteers, performing better than vitamin C and retinoic acid. Leyden et al. conducted 12 weeks facial study of GHK-Cu containing face and eye cream, reporting significant improvement of skin laxity, clarity and appearance, reduced fine lines and the depths of wrinkles and increased skin density and thickness comparing to placebo. GHK-Cu eye cream performed better than vitamin K cream. Finkley et al. conducted 12-week facial study on 67 women and reported that GHK-Cu cream applied twice daily improved aged skin appearance, increased thickness, reduced wrinkles and strongly stimulated dermal keratinocyte proliferation as determined by histological analysis of biopsies. The same study found copper peptide GHK-Cu to be non-toxic and non-irritating.

HAIR GROWTH BENEFITS OF GHK-CU:

Copper peptide GHK-Cu and its analogs were found to strongly stimulate hair growth. The efficiency of synthetic analog of GHK-Cu was similar to that of 5% minoxidil.

Conclusion:

Copper peptides are clearly occurring small protein fragments that have high affinity to copper ions. In human plasma, the extent of GHK-Cu is ready 200 µg/ml at age 20. By the age of 60, the level drops to eighty µg/ml. In human beings, tripeptide GHK-Cu can promote activation of wound recovery, appeal of immune cells, antioxidant and anti-inflammatory consequences, stimulation of collagen and glycosaminoglycan synthesis in pores and skin fibroblasts and merchandising of blood vessels increase. GHK is a safe, extensively studied compound that has a wealth of positive and health-promoting effects in many tissues and systems. It has been widely used in anti-aging and cosmetic products in humans for decades without any adverse effects and can be easily incorporated in creams, liposomes, foams or subcutaneous injections.

Zinc Thymulin

Zinc Thymulin (ZT) is used to regenerate hair lost as a result of androgenic alopecia. Hair loss occurs in a large percentage of the adult human population and increases in prevalence with increasing age. Hair loss may occur in males and in females but is more prevalent in males. In the western population it is estimated that 50% of the male population have noticeable hair loss by 50 years of age. The most common form of hair loss in men is termed androgenetic alopecia (male pattern baldness). Most hair loss involves inactivation of hair follicles, that is, hair follicles cease to grow hair. Literature also suggests that the thinning of the fat scalp layer due to age can contribute to hair loss through inactivation of the stem cells which regulate hair growth. A deficiency of Zinc will also lead to hair loss.

Zinc and thymulin are two natural compounds involved in hair follicle growth and have been studied and found to promote hair growth. Combined into a spray solution, ZT can be applied to the scalp and treat hair loss, bald patches and as well as initiate the anagen hair growth phase (the active growth phase of hair follicles during which the root of the hair is dividing rapidly).

Testing has shown to be safe and effective, with proven clinical results published in the peer reviewed medical journal Hair Therapy and Transplantation.

We know what zinc is, what is thymulin?

Thymulin is a nonapeptide hormone derived from the thymus gland. Early reports of thymus extract stimulating hair growth was discovered in 1986 and 2000. The activity of the hormone is reliant on the mineral Zinc, which is why it is referred to as Zinc Thymulin. ZT also induces differentiation of T-cells.

Benefits of ZT:

- Can improve hair growth
- Can improve quantity of hair
- Can prevent hair loss
- Can improve endogenous hair pigmentation
- A variety of alopecia states can be treated
- Both women and men can be treated
- Treatment may be combined with known other hair restoration methods

Side Effects: In the study “An Analysis of the Safety and Efficacy of Topical Zinc-Thymulin to treat Androgenetic Alopecia“ Zinc Thymulin demonstrated no adverse systemic effects or local side effects of redness or scalp irritation or deterioration of hair color, quality or quantity.

Conclusion: Topical applications of ZT demonstrated safety and established efficacy for initiating and maintaining anagen to treat male pattern baldness when applied for 6 months.

Melanotan II

Melanotan II (MT2) is a stimulating peptide which induces skin tanning. Melanocyte Stimulating Hormones (MSH) are a class of peptide hormones produced in the intermediate lobe of the pituitary gland that stimulate pigment cells (melanocytes) in the skin and hair to produce and release melanin which leads to darker skin and hair. Melanotan II increases melanin production via stimulation of skin pigment cells called melanocytes.

What is Melanin?

Melanin is the skin pigment produced that protects our skin from sun's UV radiation and damage. It could be considered our body's own natural sunscreen. Low levels of melanin mean that the skin is highly susceptible to DNA damage with excess sun exposure. This lack of melanin and its protection against UV radiation means that those individuals with fair skin have a propensity to burn and risk more DNA damage. It also means that a lot of time is invested their ability to develop a tan safely without burning.

Receiving an adequate supply of vitamin D from the sun without being at risk of developing melanoma is somewhat of a balancing act. Studies have already discovered that staying out of the sun to prevent melanoma can cause vitamin D deficiency.

How to stimulate melanin production with tanning peptides

To get a safe tan, we need to stimulate the melanocyte stimulating hormone responsible for increasing melanin production. Scientists discovered the use of a "tanning peptide" when investigating possible ways to treat skin cancer. They hypothesized that by inducing the body's natural pigmentary system through the process of melanogenesis, a protective tan could be produced before UV exposure, thereby reducing the potential for skin damage. With just a little UV exposure, the release of α -Melanocyte Stimulating Hormone stimulates a natural increase in the production of melanin from the melanocytes in the skin. Use of the tanning peptide provides more α -MSH which results in more melanin being produced and greater tanning potential (skin pigmentation) regardless of your skin type.

Clinical trials have shown that use of Melanotan II may hold the potential to promote melanogenesis, with minimal side effects. The primary role of melanogenesis is to protect the hypodermis, which is the layer under the skin from the UV-B light that causes damage. It works by absorbing all of the UV-B light, which blocks its passage into the skin layer.

Benefits of a Melanocyte Stimulating Hormone:

- The ability to achieve a darker tan with less exposure to UV radiation
- Possible reduction in the risk of Melanoma (skin cancer)
- A possible reduction in the incidence of sun-damaged skin
- Fair skin individuals have the ability to develop a tan through the use of the MT2 peptide.
- It can lead to reduction in body fat
- No sunburn, No tan lines

- No sunless tanning streaks or fake tan removal
- It can increase libido
- (During clinic trials for its use as a tanning agent, melanotan II was found to be a potent stimulator of male erections. It has also been shown to increase female sexual desire in patients with sexual arousal disorder).

Side effects of melanotan II

Short term side effects after administration include:

- Facial flushing
- Reduced appetite, nausea and vomiting
- In males, spontaneous erections 1-5 hours after administration (priapism), associated with yawning and stretching complex

Long term, there is concern that melanotan II may increase the risk of:

- Melanoma – a potentially serious form of skin cancer
- Deepening of the color of moles, new moles and atypical melanocytic naevi
- Melanonychia – brown to black discoloration of one or more nails

Suggested usage: daily for 1 - 2 weeks then one to two times weekly for maintenance.

PTD-DBM

PTD-DBM which is short for Protein transduction domain (PTD)-Dvl-binding motif (DBM).

In simple terms, it is a follicle regeneration treatment. More specifically, it is a peptide-based topical scalp treatment which inhibits the follicle shrinking action of the body's hormones and enzymes effectively rescuing the follicle at a stem cell level. Treatment with PTD-DBM both prevents hair loss and promotes the growth of new hair follicles.

Many researchers believe that WNT signaling pathways inside of a cell are responsible for hair follicle development and hair regeneration in humans. These pathways are usually made of proteins and they communicate important cell activity and growth signals to various cells throughout our body.

The Discovery of PTD-DBM

Professor Choi Kang-yeol of Yonsei University in South Korea and a team of researchers discovered a protein responsible for hair loss in the condition known as androgenetic alopecia. This protein controls hair growth and the researcher developed a new substance that promotes hair regeneration by controlling the function of the protein.

The responsible protein is called CXXC-type zinc finger protein 5 (CXXC5), which acts as a negative regulator on the Wnt/ β -catenin pathway, which is linked to hair regeneration and wound healing. When CXXC5 binds with a protein called the Dishevelled protein, it prevents follicle development and hair regrowth. This is not good for those of us wanting to keep our hair. This led to the development of a new biochemical substance, called PTD-DBM, which interferes with this binding process.

The positive effect of PTD-DBM on hair regeneration is shown in human hair follicle dermal papilla cells. After seeing the success with PTD-DBM, additional research was gathered to make the ideal treatment for hair regrowth a **three-prong approach**.

1. Wound-induced hair neogenesis, aka microneedling. This treatment for androgenetic alopecia involves rolling very very fine needles over the skin to puncture it. The devices are called dermarollers. They are hand held and rolled over the treatment area to cause a "wound" and help create follicle generation. Microneedling is common in treating the skin and has also been known to increase the production of collagen and other healing factors by causing slight trauma to the skin.
2. CXXC5 targeting with PTD-DBM.
3. Valproic acid. Usually used to treat seizures, bipolar, schizophrenia and migraines. In this instance it was used topically to activate the Wnt/ β -catenin pathway.

So, there's a threefold action to the treatment. The "wounds" from microneedling induce the generation of follicles; the valproic acid stimulates the cell pathway linked to the development of follicles; and the PTD-DBM prevents CXXC5 from interfering with the follicular development process. When the scientists combined these three processes, the hair grew back even quicker.