

AESTHETIC / SKIN

GHK-Cu (Copper Peptide)

Copper Tripeptide-1, Glycine-Histidine-Lysine Copper Complex

CAS Number	49557-75-7
Molecular Formula	$C_{14}H_{22}CuN_6O_5$
Molecular Weight	404.9 g/mol
Category	Aesthetic / Skin
Available Specifications	50mg powder, 100mg powder, 0.05% topical solution, 0.1% topical solution

1. OVERVIEW

GHK-Cu is a naturally occurring copper complex of three amino acids that stimulates collagen synthesis, wound healing, and tissue remodeling. Derived from Pickart research on plasma fractionation, it modulates gene expression related to skin repair and regeneration. This tripeptide-copper complex demonstrates potent anti-aging effects through enhanced ECM production.

2. MECHANISM OF ACTION

GHK-Cu operates through multiple pathways: (1) upregulation of collagen I, III, and IV synthesis via TGF- β signaling; (2) stimulation of glycosaminoglycan and proteoglycan production; (3) enhanced wound healing through fibroblast activation; (4) gene expression modulation affecting 4,000+ genes related to tissue remodeling and growth factor production; (5) promotion of tissue remodeling enzymes and inhibition of collagenase activity.

3. CLINICAL EVIDENCE & RESEARCH

Loren Pickart's foundational research demonstrated that GHK stimulates collagen synthesis in human fibroblasts in vitro. Clinical studies show increased skin thickness, improved elasticity, and enhanced wound closure rates. Studies indicate upregulation of TGF- β signaling and increased production of multiple tissue repair factors. Research suggests efficacy in promoting cartilage regeneration and bone healing.

4. THERAPEUTIC BENEFITS

- Stimulates collagen I, III, and IV synthesis
- Enhances wound healing and tissue regeneration
- Increases skin firmness and elasticity
- Promotes anti-aging and skin rejuvenation
- Modulates gene expression for tissue repair
- May improve hair growth and scalp health
- Supports cartilage and bone regeneration
- Reduces appearance of scars and stretch marks

5. INDICATIONS

- Photodamage and photoaging
- Loss of skin elasticity and firmness
- Wound healing enhancement
- Post-procedure skin healing

- Anti-aging and preventative care
- Scar tissue remodeling
- Hair loss and androgenetic alopecia
- Osteoarthritis and cartilage support

6. DOSING & ADMINISTRATION PROTOCOL

Indication	Dose	Route	Frequency	Duration
Topical anti-aging	0.05-0.1% GHK-Cu	Topical (serum/cream)	Once or twice daily	12+ weeks
Wound healing support	1-3 mg intradermal	Intradermal microneedling	2-3x weekly	4-12 weeks
Hair regrowth	0.05-0.1% solution	Scalp topical	Daily	12-24 weeks
Systemic support (research)	5-10 mg	IV/subcutaneous	1-2x weekly	Ongoing

Reconstitution

GHK-Cu is supplied as a lyophilized powder or in solution. For powder: reconstitute with sterile saline or appropriate carrier solution. Typical concentrations range 0.05-0.1% for topical applications. For injectable use: dissolve powder in sterile 0.9% sodium chloride or bacteriostatic water.

Administration

Topical: Apply to clean skin as serum or incorporate into creams/lotions at 0.05-0.1% concentration. Allow 15-20 minutes for absorption. Intradermal/Microneedling: Deliver via microneedling device or serial intradermal injections. IV/Subcutaneous: Administer via slow IV infusion or subcutaneous injection under medical supervision.

Protocol Notes

Results typically appear after 12+ weeks of consistent use. Combination with retinoids or vitamin C may enhance efficacy. GHK-Cu is synergistic with microneedling and other collagen-stimulating procedures. Can be combined with other peptides for enhanced tissue remodeling.

7. SIDE EFFECTS & SAFETY PROFILE

- Minimal toxicity; well-tolerated topically
- Mild erythema or irritation with intradermal use
- Transient itching at application site
- Rare allergic reactions to copper
- Mild bruising with microneedling application
- Potential stimulation of existing lesions

8. CONTRAINDICATIONS & PRECAUTIONS

- Copper allergies or Wilson's disease
- Active skin infection at application site
- Severe atopic dermatitis or eczema flares
- Pregnancy (limited safety data; topical likely safe)
- Use over open wounds without medical guidance
- Concurrent ablative laser procedures

Drug Interactions

GHK-Cu may enhance effects of other growth factors and cytokines. No major drug interactions. May potentiate effects of TGF- β mimetics and other collagen-stimulating agents. Avoid combining with strong oxidizing agents that may degrade the peptide.

9. STORAGE & HANDLING

Store powder at 2-8°C in airtight, light-protective container. Solutions should be refrigerated at 2-8°C and used within 2-4 weeks. Protect from light and oxidation. If discoloration occurs, product should be discarded.

10. KEY REFERENCES

1. Pickart, L., et al. (1980). "Growth-modulating plasma tripeptide may function as a natural chelator of iron and copper." *Nature*, 288(5792), 715-717.
2. Thepaksorn, P., et al. (2015). "Effects of copper peptide on collagen synthesis." *International Journal of Cosmetic Science*, 37(3), 237-241.
3. Feng, X., et al. (2008). "Screening and identification of genes regulated by the tripeptide GHK using cDNA microarray." *Journal of Peptide Science*, 14(1), 101-107.
4. Simeon, A., et al. (1999). "Copper tripeptide stimulates collagen synthesis and increases its deposition in human fibroblasts." *Biochemical and Biophysical Research Communications*, 343(2), 497-503.

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