GHK-Cu — Research Summary

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1. What It Is

GHK-Cu is a naturally occurring copper-binding tripeptide — glycyl-L-histidyl-L-lysine (GHK) complexed with a Cu(II) ion. It was first isolated from human plasma in 1973 by Dr. Loren Pickart. Naturally occurring GHK-Cu plasma levels decline substantially with age (reported roughly 60% lower by age 60 compared with levels in the 20s), which underlies much of the research interest in it as a topical and injectable research compound.

- **Research focus areas:** wound healing, dermal collagen remodeling, antioxidant/anti-inflammatory activity, and gene-expression modulation.

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2. Reported Effects in Research Literature

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GHK-Cu has the most extensive human-relevant evidence base of the common “regenerative” peptides, spanning roughly five decades of publications.

- **Wound healing / tissue remodeling:** Foundational studies (Pickart, from 1983) established that GHK-Cu accelerates wound healing and contraction, improves the take of transplanted skin, and has anti-inflammatory actions.
- **Antioxidant activity:** Reported to inhibit lipid peroxidation by binding to ferritin channels involved in iron release, preventing free-radical generation in damaged tissue; also reported to quench toxic lipid-peroxidation byproducts implicated in age-related conditions.
- **Gene expression:** Pickart and Margolina’s 2018 review reported GHK-Cu modulates expression of roughly 4,000 human genes, many linked to tissue repair and remodeling pathways.
- **Human topical/RCT-level data:** Studies report increased dermal collagen density (ultrasound-measured, ~28% average increase at 12 weeks in one study) with topical application, and a randomized controlled trial comparing GHK-Cu serum to topical minoxidil for androgenetic alopecia.
- **Diabetic ulcer studies:** Early pilot and controlled studies reported enhanced healing of diabetic ulcers with topical glycyl-L-histidyl-L-lysine copper treatment.
- **Neuroscience (early-stage):** Gene-expression studies report effects relevant to nervous system function and cognitive decline; effects in a mouse Alzheimer’s model have been studied in preprint form.

Research limitations to note: - The large majority of GHK-Cu’s human-relevant clinical data is in topical/dermatological contexts; injectable/systemic research use is far less studied in controlled human trials. - GHK-Cu remains classified primarily as a cosmetic ingredient rather than an FDA-approved drug; no prescription formulation has received FDA approval for any medical indication, and use in that context is off-label or investigational.

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3. Clinical & Preclinical Study References

- Pickart L, Vasquez-Soltero JM, Margolina A. “GHK Peptide as a Natural Modulator of Multiple Cellular Pathways in Skin Regeneration.” *Biomed Res Int.* 2015;2015:648108. PMID: 26236730
- Pickart L, Margolina A. “Regenerative and Protective Actions of the GHK-Cu Peptide in the Light of

the New Gene Data." *Int J Mol Sci.* 2018;19(7):1987. PMID: 29986520
- Park YM, et al. "GHK-Cu serum vs minoxidil for androgenetic alopecia: RCT." *J Dermatolog Treat.* 2022;33(6):2894-2901. PMID: 35549789
- Overview article: The Human Tripeptide GHK-Cu in Prevention of Oxidative Stress and Degenerative Conditions of Aging (PMC)

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4. Reconstitution Process

For research/laboratory handling purposes only.

Keep out of reach of children. Not for use by pregnant or nursing individuals. For laboratory research use by qualified personnel only.

1. **Materials needed:** lyophilized (freeze-dried) GHK-Cu powder, bacteriostatic water, alcohol swabs, syringe with needle.
2. **Bring the vial to room temperature** before reconstitution.
3. **Sanitize** the rubber stopper of both vials with an alcohol swab.
4. **Draw the bacteriostatic water** into the syringe.
5. **Add the water slowly** down the *inside wall* of the vial rather than directly onto the powder, to reduce shear/foaming.
6. **Do not shake.** Gently swirl or roll between palms until fully dissolved. The solution will typically show a light blue tint from the copper content — this is expected, not a sign of contamination.
7. **Inspect the solution** — it should be a clear, light blue solution free of particulates.
8. **Label the vial** with reconstitution date and concentration.
9. **Storage:** refrigerate (2–8°C); avoid freeze-thaw cycles.

Reference: Bacteriostatic Water Volume by Vial Size

Vial Size	BAC Water Added	Resulting Concentration
5 mg	1 mL	5 mg/mL
5 mg	2 mL	2.5 mg/mL
5 mg	5 mL	1 mg/mL
10 mg	1 mL	10 mg/mL
10 mg	2 mL	5 mg/mL
10 mg	4 mL	2.5 mg/mL
10 mg	5 mL	2 mg/mL
10 mg	10 mL	1 mg/mL

Notes: Higher water volume = more dilute solution; lower volume = more concentrated. Note the order sheet also carries 50mg/100mg GHK-Cu vial sizes — scale water volume proportionally, or consult the specific product's COA. Always use bacteriostatic water (0.9% benzyl alcohol) for multi-draw vials; sterile water without preservative should be discarded within 24 hours.

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