

PRESCRIPTION MONOGRAPH

Compounded Active Ingredients: Minoxidil/GHK-Cu

Form: Topical Solution

Drug Class:

- Minoxidil: Antihypertensive vasodilator
 - GHK-Cu: Peptide complex (endogenous tripeptide); Copper-binding growth factor analog
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Mechanism of Action^{1,2,3:}

When used in combination, GHK-Cu and Minoxidil offer a potential synergistic effect of enhancing hair survival and regrowth. Minoxidil can drive follicular activation and microcirculatory support; whereas, GHK-Cu may improve the scalp's condition by boosting circulation and supporting stronger hair follicles. Together they are intended to:

- Bind copper(II) ions, delivering them to tissues to support wound healing, tissue remodeling, and antioxidant defense.
 - Upregulate collagen and glycosaminoglycan synthesis in skin and connective tissue.
 - Modulate gene expression involved in inflammation, angiogenesis, hair growth, and cellular repair.
 - Scavenge free radicals, reducing oxidative damage.
 - Increase stem cell activation and supports epithelial regeneration.
 - Stimulate vascular and follicular activity by opening potassium channels in dermal papilla cells, to enhance blood flow and nutrient delivery to follicles, promoting local growth factors.
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Indications Commonly Prescribed For:

- Androgenetic alopecia
 - Post-inflammatory shedding
 - Cosmetic hair quality: To improve density, thickness, and retention.
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Before Use: Let your health care provider know if you have any medication allergies before you take this compounded preparation. Let your health care provider know if you have any liver or kidney problems. Let your healthcare provider know of all supplements you are currently taking.

Contraindications:

- Known allergy to GHK or copper compounds
 - Wilson's disease (copper metabolism disorder)
 - Scalp irritation or dermatitis where barrier is compromised
 - Systemic absorption of high minoxidil concentrations may cause hypotension
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Cautions: Let your Healthcare provider know if you experience any adverse side effects.

How to Use: This compounded preparation is provided as a topical solution in a spray bottle. Apply the directed number of sprays evenly to the affected areas of the scalp, usually once or twice daily as instructed by your provider. Gently massage the solution into the scalp if recommended. Wash your hands after application. Avoid getting the solution in your eyes, mouth, or on broken skin. If you miss a dose, apply it as soon as you remember, but do not double the application if it is nearly time for the next one. Consistent use is important, and desired results may take several weeks to become noticeable.

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Warnings and Precautions:

- Monitor for signs of copper overload with prolonged systemic use
 - Initial shedding: Minoxidil may cause early “shedding” as follicles transition.
 - Systemic absorption risk: monitor for hypotension and tachycardia.
 - Cumulative irritation: combining with retinoids or acids may increase scalp sensitivity—stagger products.
 - Scalp conditions: Use with caution when scalp has psoriasis, eczema, or other compromised barrier.
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Adverse Reactions:

Common:

- Mild skin irritation
- Transient erythema
- Itching, Dryness

Rare:

- Nausea,
 - Tachycardia
 - Dizziness
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Interactions:

- Chelating agents (e.g., EDTA) may reduce GHK-Cu effectiveness
 - Avoid combining with high-dose zinc (competes with copper binding)
 - Concurrent strong vasodilators or antihypertensives may have additive hypotensive effect if absorption is higher than expected.
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Use in Specific Populations:

- Pregnancy: Avoid if pregnant or planning pregnancy
 - Liver/Kidney Disease: No known hepatotoxicity or nephrotoxicity
 - Pediatrics: Avoid unless under dermatologic supervision.
 - Geriatrics: Start with the lower minoxidil strength (2%) and monitor tolerability.
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Storage:

- Store in original container at room temperature (up to 30°C or 86°F)
 - Store in a cool dry place away from heat, sunlight, and moisture
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Monitoring Parameters:

- Skin/hair response over 8–12 weeks
 - Liver function tests if used systemically long-term
 - Copper and ceruloplasmin levels in extended systemic protocols
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Citations:

1. Dou Y, Lee A, Zhu L, Morton J, Ladiges W. The potential of GHK as an anti-aging peptide. *Aging Pathobiol Ther.* 2020;2(1):58-61. doi:10.31491/apt.2020.03.014
 2. 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. doi: 10.1155/2015/648108. Epub 2015 Jul 7. PMID: 26236730; PMCID: PMC4508379.
 3. Li M, Marubayashi A, Nakaya Y, Fukui K, Arase S. Minoxidil-induced hair growth is mediated by adenosine in cultured dermal papilla cells: possible involvement of sulfonyleurea receptor 2B as a target of minoxidil. *J Invest Dermatol.* 2001;117(6):1594-1600. doi:10.1046/j.0022-202X.2001.01570.x
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