



AHK-Cu

Copper Tripeptide (Hair Follicle Research Compound)

What It Is & What It Does

AHK-Cu (alanine-histidine-lysine copper, Copper Tripeptide-3) is a synthetic copper peptide engineered specifically to target hair follicle biology, unlike the naturally-occurring GHK-Cu, which has broader skin/tissue-repair effects. The alanine substitution shifts its activity toward the dermal papilla, the signaling structure at the base of each follicle that drives the hair growth cycle.

What The Research Shows

- Pyo et al. (2007, Archives of Pharmacal Research): using ex vivo human hair follicle organ culture, AHK-Cu at picomolar-to-nanomolar concentrations (10^{-12} to 10^{-9} M) stimulated dermal papilla cell proliferation, elongated human hair follicles in culture, and shifted the Bcl-2/Bax ratio toward cell survival — meaning fewer follicle cells underwent programmed cell death.
- A 2024 ionic-liquid microemulsion delivery study found copper-peptide-treated follicles entered the early anagen (active growth) phase in as few as 6 days, versus roughly 8 days for conventional treatments and 9 days for minoxidil alone in the same model.
- Mechanistically, AHK-Cu's effects concentrate specifically at the dermal papilla, while GHK-Cu's broader anti-inflammatory and tissue-remodeling activity (documented in the Pickart & Margolina 2018 review) may incidentally support scalp health without being follicle-targeted in the same way — which is why many hair formulations combine both.

Reported Side Effects

- Topical irritation possible, particularly at higher concentrations
- Copper-peptide complexes are sensitive to freeze-thaw cycling and require careful formulation stability
- The evidence base above is ex vivo/organ-culture and animal-model data — no large-scale randomized human trial measuring visible hair regrowth from AHK-Cu specifically has been published to date, so the mechanism is well-supported but the human outcome data isn't there yet

Regulatory Status

Not FDA-approved as a drug. Used in cosmetic and research formulations; not evaluated by FDA for hair-growth efficacy claims in that context.