LONGEVITY SCIENCE · PLAIN-ENGLISH GUIDE · 2026 EDITION

GHK-Cu: the repair peptide your blood is slowly running out of.

GHK-Cu is a tiny three-amino-acid peptide bound to a copper atom. Your own blood carries it, and carries less of it every decade. It is the compound in this series with the longest human track record, mostly as a cream: forty years of small studies on wound healing, skin firmness and fine lines. It is also sold as an injection and a capsule, and those routes have almost no human evidence at all. This guide explains what it does, which form the evidence actually supports, and how to use it sensibly.

THINK OF IT LIKE THIS

When you cut yourself, damaged proteins in the wound release small fragments, and one of them is GHK carrying a copper atom. It works like a foreman's whistle: it calls repair cells to the site, tells them to lay down collagen and elastin and grow new small blood vessels, and then, just as importantly, tells them when to stop remodelling. A twenty-year-old's blood has more than twice as much of it as a sixty-year-old's, which is one reason the same cut heals slower and scars worse with age.

This may be for you if...

- You want firmer skin, better texture or fewer fine lines, and you are patient enough for a twelve-week trial
- You are healing from a wound, a procedure, or a stubborn tendon or joint and want to support the repair
- You would rather start with the route that has human data, a topical, than jump to a needle
- You will take photos, because the change is slow and visual

This probably is not for you if...

- You have Wilson's disease or any copper-storage disorder
- You are pregnant, breastfeeding, or trying to conceive
- You have an active cancer or are being investigated for one; it stimulates growth and blood-vessel signals
- You expect to feel something; you will not. You will see something, or you will not

EVIDENCE AT A GLANCE

Small human trials, most of them topical and most of them decades old, plus one independent gene-expression finding in 2012. Widely used as a cosmetic ingredient. No approval as a drug, and no human study of the injected or oral routes.

A copper-carrying fragment that tells tissue to rebuild, then to stop.

GHK is the sequence glycine-histidine-lysine. It was found in human blood in 1973, and its defining trick is that it grips a copper ion tightly, which is why it is written GHK-Cu. Copper is what the repair enzymes in skin and connective tissue run on, and the peptide is how the body delivers it exactly where damage has happened.

Once there, it recruits immune and repair cells, switches on collagen, elastin and the gel-like molecules that hold water in skin, encourages new capillaries, and dampens the inflammatory chemicals that keep a wound angry. Then it does what most growth signals cannot: it calms the remodelling down so tissue is repaired rather than scarred.

WHAT IT DOES, STEP BY STEP

STEP 1 · CALL

Recruits the repair crew

Immune cells and fibroblasts, the cells that make collagen, are drawn to where the peptide is.

STEP 2 · BUILD

Collagen, elastin, new vessels

Fibroblasts are told to lay down structure, and small blood vessels grow to feed it. This is what the skin studies measured.

STEP 3 · SETTLE

Calms inflammation and scarring

It lowers inflammatory chemicals and balances the enzymes that break tissue down against the ones that build it, so remodelling stops at repair.

A RESET SWITCH, IN A DISH

The most striking modern finding is not about skin. In 2012 a Boston University team screened thousands of compounds for one that could reverse the gene pattern of emphysema, and GHK came up, restoring damaged lung cells' ability to repair in the lab. Analyses of the same database suggest it nudges around a third of human genes toward a younger pattern. Remarkable, and so far a result in a dish.

THREE THINGS WORTH KNOWING

- **Your blood level falls with age**, from roughly 200 nanograms per millilitre at twenty to about 80 by sixty. That decline is the whole rationale for using it.
- **The human evidence is topical.** Twelve-week facial studies and older wound-healing trials used creams and gels. Nobody has run a human trial of injected or swallowed GHK-Cu.
- **It is a cosmetic ingredient, not a drug.** That is why it is easy to buy, and why nobody has been obliged to run the large trial that would settle what it does.

THE THREE FORMS IT IS SOLD IN, AND WHAT BACKS EACH ONE

	TOPICAL	INJECTED	CAPSULES
Human evidence	Small trials, decades of use	None	None
Used for	Skin, wounds, scalp	Tendons, joints, skin	General repair, by hope
Main risk	Mild irritation	Sting, dizziness, copper load	Digested before it acts

> PLAIN-ENGLISH NOTE
>
> For skin, use it on the skin, the way the studies did. For a tendon or a joint, the injection is what the community does and may well help, but know that you are ahead of the evidence, not behind it.

Forty years of small studies, almost all of them on skin.

GHK-Cu has a long paper trail, but most of it is small, old, or from a lab dish. Here is what actually exists in people, and the one modern finding that made researchers look again.

70%

of women showed more collagen after a month

A small 1998 facial study of a GHK-Cu cream, against 50 percent for vitamin C and 40 percent for retinoic acid. Small, but a real head-to-head.

12 wk

the length of the main skin studies

Facial creams improved laxity, clarity, fine lines and skin thickness over twelve weeks. Industry-run, small, and consistent with each other.

2×

the wound closure in a copper-peptide gel trial

In a randomised trial of difficult wounds, a copper-peptide gel roughly doubled closure and cut infections. Old, and the gel was not pure GHK-Cu.

~1/3

of human genes nudged in the gene database

Analyses of the Broad Institute's compound database. Striking, unreplicated in a living person, and the source of most of the hype.

What we know

- Topically, in small trials, it firms and thickens skin and softens fine lines over about twelve weeks
- In older wound-healing studies, copper-peptide gels sped closure and reduced infection
- In the lab it reliably increases collagen, calms inflammatory chemicals, and shifts gene patterns toward repair
- It is well tolerated on skin; forty years of cosmetic use with very few problems

What we are still learning

- Whether injecting it does anything a cream does not; no human study exists
- Whether the gene-resetting effect seen in a dish happens in a person at any dose
- The right dose and duration for anything but the face
- What long courses of injected copper peptide do to copper balance over months

WHAT THE HUMAN STUDIES ACTUALLY LOOKED LIKE

STUDY	WHO	FORM	RESULT
Facial cream, 1998	A small group of women	2% cream, one month	More collagen in 70 percent; beat vitamin C and retinoic acid
Facial cream, 2002	About 70 women	Cream, 12 weeks	Firmer, thicker, clearer skin; fewer fine lines; better than placebo
Wound gel, 1994	Difficult, poorly perfused wounds	Copper-peptide gel	About double the closure, fewer infections
Emphysema genes, 2012	Lung tissue and cells, not people	GHK in the dish	Reversed the disease gene pattern; restored cell function

MY HONEST TAKE

I like this compound more than most in the series, because it is your own molecule, it has a long safety record on skin, and the mechanism is elegant. My honesty has to run the other way too: the studies are small and old, the exciting gene data has never been tested in a person, and the injected route everyone talks about has zero human evidence. Use the form the evidence supports first. Photograph it. Then decide.

Topical first, because that is where the evidence is.

The skin studies ran twelve weeks with twice-daily application, so the topical courses follow that. The injected course is what the community uses for tendons, joints and general repair; it has no human study behind it and is shown as what it is. The vendor sells a 100 mg vial, a ready-made topical spray in 100 and 200 mg, and 2 mg capsules.

COURSE	DOSE	WHAT YOU NEED	WHAT TO EXPECT
Topical starter 4 weeks	One spray to clean skin or scalp, morning and night	**1 × 100 mg spray**	Enough to check you tolerate it and to see early texture changes. Real firmness changes took the full twelve weeks in the studies.
Topical standard 12 weeks	One spray, morning and night, or a 1% serum mixed from the vial	**3 × 100 mg sprays** (or 2 × 200 mg; or 2 vials mixed into serum)	The studied course. Photos at weeks 0, 6 and 12 are how you judge it, because you will not feel a thing.
Injected 4 to 8 weeks	1 to 2 mg under the skin, once daily, near the area if there is one	**1 × 100 mg vial** (8 weeks at 1 mg, 4 weeks at 2 mg)	What forums suggest for tendons and joints. No human study has used this route. It stings; dilute it well. Judge it with the pain score on page 7.

Which one? If the goal is skin or scalp, topical, full stop; it is the route with data and the one with the fewest risks. If the goal is a tendon or a joint, the injection is the community answer, and you should go in knowing it is uncharted and log it properly.

HOW TO USE IT, IN FOUR STEPS

01 **Topical spray.** Clean, dry skin. One spray, spread with a fingertip, let it dry. Morning and night. Keep it away from vitamin C serums; use those at a different time of day.

02 **Mixing a serum from the vial.** 100 mg in 10 mL of a plain, unscented serum base makes a 1 percent serum, close to the studied creams. Fridge, used within a month. It will be blue; your skin will not.

03 **Injection.** Mix a 100 mg vial with 3 mL of bacteriostatic water: about 33 mg per mL, so 1 mg is 3 units. Inject slowly under the skin; the sting is well known and dilution helps. Rotate sites.

04 **Store.** Sealed vials in the fridge or freezer. Any mixed solution in the fridge, in the dark. A clear blue-violet is right; green, brown or cloudy means discard it.

DOSE TO UNITS

DAILY DOSE	DRAW
1 mg	3 units
2 mg	6 units
3 mg	9 units

At about 33 mg per mL, a 100 mg vial with 3 mL of water. With 2 mL it is 50 mg per mL and 1 mg is 2 units, but expect more sting.

COMMON QUESTIONS

Why does it sting when injected?
Copper peptide solutions are known for it. More water, room temperature, and a slow push are the fixes. It fades in a minute.

Can I just take the capsules?
They exist, at 2 mg. A three-amino-acid peptide taken by mouth is largely digested, and no human study has tested oral GHK-Cu. If you want no needles, the topical route is the one with data.

Will it turn my skin blue?
No. The solution is blue because of the copper; skin does not take up the colour. Copper and vitamin C do interfere with each other, so keep them apart.

Topical regimens reflect the published skin studies; the injected regimen reflects common research-market practice and has no human trial behind it. None of this is a prescription. Talk to your doctor before starting.

Read this page before you order anything.

On skin, GHK-Cu has one of the cleanest safety records in this series. Injected, you are delivering copper past the gut's controls, at a dose nobody has studied, so the second list gets longer. Read both honestly.

Do not use this if...

- You have Wilson's disease or any other copper-storage disorder
- You are pregnant, breastfeeding, or trying to conceive
- You have an active cancer or are being investigated for one; it stimulates growth and new blood-vessel signals
- You are allergic to copper
- You plan to inject it and cannot get a certificate showing identity by mass spectrometry

Be cautious, and talk to your doctor first, if...

- You have low blood pressure or take blood-pressure medicine; higher injected doses have caused dizziness and drops in pressure
- You have liver or kidney disease; copper is handled by the liver
- You plan long injected courses; each 2 mg dose carries about 0.3 mg of copper, and it adds up
- You take zinc supplements; copper and zinc compete, so space them out
- You have eczema, rosacea or broken skin where you would apply it; patch test first

Stop and get medical help if...

- Dizziness, fainting, or a racing heart after an injection
- Spreading redness, or a hot, hard lump at an injection site
- Hives, swelling of the face or throat, or trouble breathing
- Nausea, vomiting or belly pain that persists; that is what copper excess feels like
- A rash, or skin that looks grey-green, where you apply it

Common, and usually mild

- A sharp sting or burn at the injection site for a minute; dilute more, inject slowly
- Mild redness where you spray or inject, gone within the hour
- Slightly loose stools in the first days at higher injected doses
- Nothing you can feel. Topically the change is slow and visual, which is why the photos matter

BEFORE YOU START

- ☐ Take the day-0 photos: same light, same angle, no makeup, or the joint at rest
- ☐ Patch test the spray or serum on your inner forearm for 24 hours
- ☐ Tell your doctor if you take blood-pressure medicine and plan to inject
- ☐ Read the certificate: identity by mass spectrometry, and the copper content
- ☐ Decide the route before you buy: skin means topical; a tendon or joint means the unstudied injected route

These lists are drawn from the cosmetic safety literature, case reports of injected use, and the chemistry of copper, because no human trial of the injected route exists. They are not complete, and they are not a substitute for a conversation with your own doctor.

Where I source it, in the three forms it comes in.

The vendor I use stocks GHK-Cu three ways: a 100 mg vial you can inject or mix into a serum, a ready-made topical spray, and 2 mg capsules. For this compound the certificate matters in one extra way: it should confirm the copper is actually bound, not just the peptide. Here is the main listing, the cart for each course, and the two other forms.

DIRECT LINK · GHK-CU 100 MG VIAL

Limitless Life · GHK-Cu, 100 mg

limitlesslifenootropics.com/product/ghk-cu

Use code **PEPTIDESCIENCE** at checkout for 15 percent off. A 100 mg lyophilised vial, for injection or for mixing your own serum. The catalogue is behind a free account, so the listing appears once you have signed in. Shipping runs three to five business days.

Open GHK-Cu with 15% off →

01 Open the link or scan the code, and create the free account.

02 Search “GHK-Cu.” Pick the vial for injection or home-made serum, or the spray for the ready-made topical route; the cart for each course is below.

03 Enter the code at checkout. On arrival, match the lot number to the certificate and check the copper line.

limitlesslifenootropics.com

CODE PEPTIDESCIENCE · 15% OFF

Scan to open the listing with the code applied

WHAT TO ORDER FOR EACH COURSE

COURSE	ADD TO CART
Topical starter, 4 weeks	1 × GHK-Cu Spray 100 mg (see below) · your usual moisturiser · a phone for day-0 photos
Topical standard, 12 weeks	3 × 100 mg or 2 × 200 mg spray bottles; or 2 × 100 mg vials plus a 10 mL bottle of plain serum base
Injected, 4 to 8 weeks	1 × 100 mg vial · 3 mL bacteriostatic water · 30 to 60 insulin syringes (31G, 1 mL) · swabs · a sharps container

THE OTHER TWO FORMS, AND WHERE THEY STAND

GHK-Cu Spray · 100 or 200 mg

The ready-made topical, and the closest thing on the shelf to the route the studies used. No mixing, no needles. Spray, spread, let dry, morning and night.

EVIDENCE: TOPICAL, SMALL HUMAN TRIALS

limitlesslifenootropics.com/product/ghk-cu-spray

GHK-Cu Capsules · 2 mg × 60

They exist, and you will see them. A three-amino-acid peptide taken by mouth is largely digested, and no human study has tested it. If you go this way, treat it as the experiment it is.

EVIDENCE: NONE FOR THE ORAL ROUTE

limitlesslifenootropics.com/product/ghk-cu-capsules-2mg

HOW TO CHECK ANY VENDOR, IN FIVE POINTS

- ☐ **A certificate for your exact batch**, with a lot number you can match to the vial in your hand. “We test” is not a certificate.
- ☐ **A named, independent lab.** Janoshik and MZ Biolabs are the ones the community trusts. An unnamed in-house lab is a red flag.
- ☐ **The right tests:** identity (is it the right molecule), quantity (how much is really in the vial), and endotoxin (is it clean). Purity alone is not enough.
- ☐ **Sensible pricing.** Far below market usually means the corner was cut inside the vial.
- ☐ **A reputation you checked yourself**, on the big peptide forums and on finnrick.com, an independent site that publishes test results and sells nothing.

06 GHK-CU · 12-WEEK PHOTO AND PAIN LOG

You will not feel this working. Photograph it.

Skin changes are slow and your memory of your own face is unreliable. Take the same photo every two weeks: same room, same light, same angle, no makeup, phone at arm's length. **Skin score:** 1 rough or slack · 3 normal · 5 the best it has looked. **Pain score** (if you are injecting for a tendon or joint): 0 to 10, first thing in the morning. **Reaction:** 0 none · 1 pink · 2 itchy lump · 3 hot or spreading, which ends the course. Print this, or screenshot it and mark it up on your phone.

Week 0
Photos. Skin score. Pain score if relevant. Patch test done. Write the route and the lot number.

Week 4
Topical starter ends. Compare photos side by side, not from memory. Reorder if continuing.

Week 6
Photos. The 1998 study saw collagen changes by one month; the 12-week studies saw firmness change from here on.

Week 12
Photos. Put weeks 0, 6 and 12 next to each other. That comparison is the whole answer.

WK	DATE	ROUTE + DOSE	PHOTO ✓	SKIN 1–5	PAIN 0–10	REACTION 0–3	NOTES
0							*Day-0 photos. Patch test. Lot number: _____*
1							
2							*Photo.*
3							
4							*Photo. Topical starter ends. ↻ Reorder if continuing.*
5							
6							*Photo. First honest comparison with week 0.*
7							
8							*Photo. Injected course ends here at the latest.*
9							
10							*Photo.*
11							
12							*Photo. Compare 0, 6 and 12 side by side.*

NOTES: WHAT ELSE CHANGED THIS MONTH (SLEEP, SUN, PRODUCTS)

If you are injecting for a joint, the pain column is your result; a two-point drop that holds two weeks after you stop is meaningful, a one-point wobble is noise. If you are treating skin, the photos are your result and the skin score is your memory aid. Write down anything you changed at the same time, because sunscreen, sleep and a new moisturiser all move the same needle.