GHK-Cu/BPC-157/TB-500 — Research Summary

Research Use Only. Not for human consumption. For laboratory/research reference purposes only.

Internal Research Use Only — Not Labeling or Marketing Copy. This document is for internal research reference. Content must not be copied to product pages, packaging, or customer-facing marketing without compliance review.

---

1. What It Is

GHK-Cu/BPC-157/TB-500 is a research-formulation blend combining three separately studied peptides into one lyophilized vial, formulated for its proposed tissue-repair, skin, and regenerative research applications.

Composition note: Ratios vary by supplier — there is no single industry-standard formula. Commonly seen blends include 50mg GHK-Cu / 10mg BPC-157 / 10mg TB-500 (70mg total) and 35mg GHK-Cu / 5mg BPC-157 / 10mg TB-500 (50mg total, a 1:7:2 ratio). Confirm and disclose the specific ratio used in your own product's Certificate of Analysis (COA), since this affects reconstitution math for any customer-facing documentation.

The three components:

Component	Class	Structure
GHK-Cu	Copper-binding tripeptide	Glycyl-L-histidyl-L-lysine (GHK) complexed with a Cu(II) ion; naturally occurring, first isolated from human plasma in 1973
BPC-157	Pentadecapeptide (gastric-derived)	15-amino-acid synthetic fragment (GEPPPGKPADDAGLV) derived from a partial sequence of a human gastric juice protein; MW ~1,419 Da
TB-500	Actin-binding synthetic fragment	Commonly a 17-amino-acid N-terminal-acetylated fragment of thymosin beta-4 (Ac-LKKTETQ-OH), covering the actin-binding domain of the parent 43-amino-acid protein

---

2. Reported Effects in Research Literature

Reminder: Research Use Only. Not for human consumption. The following is a summary of published research findings, not a therapeutic claim.

Each component has an independent research base; there is essentially no published data on the *combined blend itself* as a formulation — the "synergy" rationale is a mechanistic argument (three complementary pathways), not a tested outcome.

GHK-Cu: - The most clinically documented of the three components, with roughly five decades of published research. Reported effects include accelerated wound healing and contraction, improved graft take, anti-inflammatory activity, and antioxidant action via inhibition of ferritin-mediated iron release. - Human topical/RCT-level data exists: studies report increased dermal collagen density with topical application over 12 weeks, and a randomized trial comparing GHK-Cu serum to topical minoxidil for androgenetic alopecia. - GHK-Cu has been reported to modulate expression of roughly 4,000 human genes in gene-expression studies, many linked to tissue remodeling pathways. Naturally occurring plasma levels of GHK-Cu decline substantially with age.

BPC-157: - The largest evidence base (100+ studies) is preclinical/animal, concentrated heavily in work from a single research group at the University of Zagreb, Croatia, which limits independent replication. - Reported preclinical effects include gastroprotective and anti-ulcer activity, angiogenesis (VEGFR2 pathway involvement), soft-tissue and tendon-ligament repair, and anti-inflammatory signaling. - Human data is very limited: a Phase II trial for ulcerative colitis (under the designation PL-14736/PL-10) was reported as showing efficacy with no toxicity, but full trial data was never published as a standalone peer-reviewed paper. A 2015 Phase I safety trial (NCT02637284, 42 healthy volunteers) was registered but never published results after being discontinued. A small 2025 IV pilot safety study (n=2) reported tolerability. As of 2026, no completed, published randomized controlled efficacy trial exists in humans for any indication. - A registered interventional trial (NCT07437547) is currently evaluating subcutaneous BPC-157 for acute hamstring strain repair, reflecting continued clinical interest but not yet completed data.

TB-500 / Thymosin Beta-4: - Important distinction: most completed human clinical trials were conducted on the full-length 43-amino-acid Thymosin Beta-4 protein, not specifically on TB-500 (the shorter, 17-amino-acid synthetic fragment sold under that name). Evidence for TB-500 itself is overwhelmingly preclinical. - Full-length Thymosin Beta-4 has been studied in human Phase 2 trials for chronic wounds (pressure ulcers, venous stasis ulcers) with reported accelerated healing rates, and in ophthalmic trials for dry eye and neurotrophic keratopathy. - A Phase I safety trial of synthetic Thymosin Beta-4 (doses 42–1260 mg over 14 days) reported no toxicity or serious adverse events. - As of 2026, no completed, published human trials exist specifically for the shorter TB-500 fragment for any musculoskeletal or tissue-repair indication.

General research limitations to note: - No published human data exists for the GHK-Cu/BPC-157/TB-500 blend as a combined formulation — everything above is component-level evidence. - Independent replication is a recurring gap across all three peptides, particularly BPC-157 (single-group-dominated literature) and TB-500 (fragment-specific human data is essentially absent). - None of the three components is FDA-approved for any indication. Regulatory status is actively shifting — BPC-157 and TB-500 (as the thymosin beta-4 fragment) have both been subject to FDA compounding-list reclassification actions in 2026 discussions; check current status before making regulatory claims in your documentation. - **PCAC update (July 23, 2026):** The FDA's Pharmacy Compounding Advisory Committee voted to recommend both BPC-157 and TB-500 for inclusion on the 503A Bulk Drug Substances List (8–6, one abstention, for each), overriding FDA staff's own recommendation against inclusion. GHK-Cu was not part of this review; a separate PCAC session on GHK-Cu (non-injectable routes) is expected before the end of February 2027. This is a non-binding advisory recommendation only — it does not add either substance to the list, does not authorize compounding, and does not change RUO sale status for this blend. A formal rulemaking process, expected to take 8–12 months, would be required before any actual change takes effect. - TB-500/thymosin-beta-4-class peptides are on the WADA Prohibited List, relevant for any customers in tested athletic contexts.

---

3. Clinical & Preclinical Study References

GHK-Cu: - 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)

BPC-157: - Sikiric P, et al. "Stable gastric pentadecapeptide BPC 157: novel therapy in gastrointestinal tract." *Curr Pharm Des.* 2011;17(16):1612-32. PMID: 21548867 - Phase I safety trial registration (unpublished results): NCT02637284 - Ongoing musculoskeletal trial: NCT07437547 — BPC 157 for Acute Hamstring Muscle Strain Repair

TB-500 / Thymosin Beta-4: - Ehrlich HP, Hazard SW 3rd. "Thymosin beta4 enhances repair by organizing connective tissue and preventing the appearance of myofibroblasts." *Ann N Y Acad Sci.* 2010;1194:118-24. PMID: 20536458 - Malinda KM, Sidhu GS, Mani H, et al. "Thymosin beta4 accelerates wound healing." *J Invest Dermatol.* 1999;113(3):364-8. - Scoping review: "Thymosin Beta-4 and TB-500 in Tissue Healing, Regeneration, and Musculoskeletal Repair: A Scoping Review." *[MDPI, 2026]* — full text - Phase 2 cardiac trial (full-length recombinant thymosin beta-4, related compound class, included for

context): NCT05984134

---

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) blend powder, bacteriostatic water (preferred over sterile water for multi-use vials, due to the antimicrobial preservative), alcohol swabs, syringe with needle.
2. **Bring the vial to room temperature** before reconstitution to reduce peptide degradation from condensation/temperature shock.
3. **Sanitize** the rubber stopper of both the blend vial and the bacteriostatic water vial with an alcohol swab.
4. **Draw the bacteriostatic water** into the syringe.
5. **Add the water slowly**, directing the needle stream down the *inside wall* of the vial rather than injecting it directly onto the lyophilized powder — this reduces mechanical shear/foaming that can degrade the peptides.
6. **Do not shake the vial.** Instead, gently swirl or roll it between your palms until the powder is fully dissolved into solution. Note: GHK-Cu's copper content gives the reconstituted solution a light blue tint — this is expected and not a sign of contamination.
7. **Inspect the solution** — it should be a clear, light blue solution free of particulates. Discard and do not use if cloudy, discolored beyond the expected blue tint, or contains visible particles.
8. **Label the vial** with the blend name, ratio, reconstitution date, and concentration for tracking.
9. **Storage:** refrigerate the reconstituted solution (typically 2–8°C), or freeze at ≤ –20°C for longer-term aliquot storage; avoid repeated freeze-thaw cycles, which degrade peptide integrity. Use within the timeframe indicated by your quality/stability documentation.

Blend-specific handling notes: - Because this is a multi-peptide blend, uniform dissolution matters more than with a single-peptide vial — swirl thoroughly to avoid concentration gradients between draws from a multi-dose vial. - BPC-157 is noted in the literature for unusual stability (including gastric-fluid stability), while TB-500 and GHK-Cu should still be handled with standard cold-chain and light-protection precautions for peptides. - If your supplier's COA specifies a particular reconstitution volume for a given lot, follow that over generic guidance, since blend ratios vary by supplier.

Reference: Bacteriostatic Water Volume by Vial Size

The table below applies to the *total* lyophilized powder weight in the vial (not each component individually), for the two most common total fill weights seen in supplier listings.

Vial Size (Total Blend)	BAC Water Added	Resulting Total 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 on selecting a volume: - A higher BAC water volume produces a more dilute solution, which allows for finer-grained volume adjustments when using a 1 mL (100-unit) insulin syringe for measurement, at the cost of requiring more storage volume per vial. - A lower BAC water volume produces a more concentrated solution, useful when minimizing solution volume per use is preferred. - Note that many GHK-Cu/BPC-157/TB-500 vials on the market ship at higher total fills (e.g., 50mg or 70mg total) than the 5mg/10mg reference sizes above — scale the water volume proportionally, or consult your

specific product’s COA/label for the intended reconstitution volume. - Always use bacteriostatic water (containing 0.9% benzyl alcohol) rather than plain sterile water for multi-draw vials, as it inhibits bacterial growth across repeated punctures. Sterile water without a preservative should be used within 24 hours of reconstitution and discarded thereafter.

Document created: July 16, 2026. **Revision 1:** July 29, 2026. Regulatory status (FDA compounding lists, WADA lists) is actively shifting; re-verify against current sources before any customer-facing use.

This document is intended for research and internal reference use only. It does not constitute medical advice, dosing guidance, or an endorsement of human use. GHK-Cu, BPC-157, and TB-500 are not approved by the FDA for the diagnosis, treatment, cure, or prevention of any disease, and the GHK-Cu/BPC-157/TB-500 blend as a combined formulation has not been independently studied.