

BPC-157 + GHK-Cu + Thymosin β -4 + KPV (Combined Preparation)

A four-component lyophilized research preparation combining a gastric-derived angiogenic pentadecapeptide, an endogenous copper-tripeptide complex, an actin-binding-domain fragment of a G-actin sequestering protein, and a melanocortin-derived anti-inflammatory tripeptide — assembled into a multi-axis regenerative and inflammation-modulating combination.

CATALOG REFERENCE

BM-LY0-022

FORM FACTOR

Lyophilized vial

STRENGTH

80 mg total

DATE OF ISSUE

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This research preparation is a four-component lyophilized combination of **BPC-157**, **GHK-Cu**, **Thymosin β -4 (TB-500 designation)**, and **KPV** co-lyophilized at 80 mg total mass per vial. The combination spans four mechanistically distinct regenerative and inflammation-modulating peptide chemistries assembled into a single multi-component preparation. **BPC-157** is a gastric-derived pentadecapeptide with characterised effects on angiogenesis and tissue repair. **GHK-Cu** is an endogenous tripeptide-copper(II) complex originally isolated from human plasma albumin by Pickart in 1973, with characterised effects on extracellular matrix remodelling. **Thymosin β -4 (TB-500)** is the actin-binding-domain fragment of the full-length parent protein, contributing G-actin sequestration and cell migration support. **KPV** is the C-terminal tripeptide of α -melanocyte-stimulating hormone, identified by Hiltz and Lipton in 1989 as the minimal anti-inflammatory pharmacophore of the parent α -MSH hormone. The combination is intended for laboratory study of multi-axis regenerative peptide pharmacology. **This monograph summarises published cellular pharmacology and preclinical findings for laboratory research reference only.**

01 Component Composition

COMPONENT A — BPC-157	Pentadecapeptide GEPPPGKPADDAGLV · CAS 137525-51-0 · gastric juice protein-derived
COMPONENT B — GHK-CU	Glycyl-L-histidyl-L-lysine copper(II) complex · CAS 49557-75-7 · Pickart endogenous tripeptide-copper
COMPONENT C — THYMOSIN B-4 (TB-500 DESIGNATION)	Actin-binding-domain fragment of the full-length parent protein · CAS 885340-08-9
COMPONENT D — KPV	Lys-Pro-Val tripeptide · CAS 67727-97-3 · α -MSH(11-13) C-terminal fragment
TOTAL MASS PER VIAL	80 mg lyophilized solid (component-level distribution per BIOMOD Labs internal formulation specification)
FORM FACTOR	Lyophilized vial · sterile water reconstitution
PHYSICAL FORM	Blue-tinted lyophilized solid (the blue colour reflects the Cu(II) d-d electronic transition of the GHK-Cu component) co-lyophilizate
ANALYTICAL SPECIFICATION	Component-level ≥ 95 % purity by HPLC; composition verified by HPLC quantification of each component (BIOMOD Labs internal release specification)

02 Rationale for Combined Composition

THE FOUR-COMPONENT COMBINATION ENGAGES FOUR DISTINCT MOLECULAR-TARGET AXES CONVERGING ON TISSUE repair and inflammation modulation. **BPC-157** contributes early-phase angiogenesis and granulation tissue formation through eNOS pathway engagement and growth factor receptor effects. **GHK-Cu** contributes extracellular matrix remodelling through MMP/TIMP regulation, fibroblast collagen and elastin synthesis stimulation, and copper-dependent lysyl oxidase cofactor function. **Thymosin β -4 (TB-500)** contributes G-actin sequestration and cell migration support through actin biology, with additional VEGF-pathway and Akt/mTOR signalling effects. **KPV** contributes anti-inflammatory activity through both partial MC1R engagement and receptor-independent IL-1 β -pathway interaction, supporting inflammation resolution during tissue repair.

03 Critical Chemistry-Handling Notes for the Combined Preparation

CRITICAL: GHK-CU COPPER CHELATE PRESERVATION

The most critical handling consideration for this four-component preparation is preservation of the GHK-Cu Cu(II) chelate. The biological activity of GHK-Cu is the activity of the intact peptide-copper complex, not of the free peptide or free copper. **Bacteriostatic water (containing benzyl alcohol) MUST NOT be used for reconstitution** — acidic conditions disrupt the Cu(II) chelate. **Acetic acid solutions MUST NOT be used. Chelating buffer components (EDTA, EGTA, high-concentration citrate) must be excluded** — these compete with the GHK peptide for Cu(II) and destroy the active chemistry of the GHK-Cu component. Sterile water for injection at neutral pH is the only acceptable reconstitution vehicle. The other three components (BPC-157, Thymosin β -4, KPV) are not damaged by these constraints, so the GHK-Cu preservation requirement governs the handling of the combined preparation.

04 Laboratory Handling, Reconstitution, and Storage

LYOPHILIZED SOLID STORAGE AT $-18\text{ }^{\circ}\text{C}$, DESICCATED, LIGHT-PROTECTED (THE GHK-CU COMPONENT IS MILDLY photo-reactive). **Reconstitute with sterile water for injection at neutral pH only.** Bacteriostatic water, acetic acid, and chelating buffers (EDTA, EGTA) are excluded due to the GHK-Cu chemistry preservation requirement. Reconstituted solutions held refrigerated $2\text{--}8\text{ }^{\circ}\text{C}$ for short-term work; aliquoted long-term storage at $-18\text{ }^{\circ}\text{C}$ with minimised freeze-thaw. Working concentrations are determined by the investigator's experimental design.

05 References

- 1 Sikiric P, Seiwerth S, Rucman R, et al. Stable gastric pentadecapeptide BPC 157: novel therapy in gastrointestinal tract. *Curr Pharm Des.* 2011;17(16):1612–1632. PMID: 21548867
- 2 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. PMC6073405
- 3 Goldstein AL, Hannappel E, Sosne G, Kleinman HK. Thymosin β 4: a multi-functional regenerative peptide. *Expert Opin Biol Ther.* 2012;12(1):37–51. PMID: 22074294
- 4 Hiltz ME, Lipton JM. Antiinflammatory activity of a COOH-terminal fragment of the neuropeptide alpha-MSH. *FASEB J.* 1989;3(11):2282–2284. PMID: 2550299
- 5 Brzoska T, Luger TA, Maaser C, Abels C, Böhm M. α -Melanocyte-stimulating hormone and related tripeptides. *Endocr Rev.* 2008;29(5):581–602. PMID: 18612139

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