Recombinant Human Type I Collagen, Lyophilized

Structural Protein / Collagen

Cat. No. EV-COL-004 | Version 1.1 | May 2026

Cat. No. EV-COL-004 Size 50 g / 100 g / 1 kg per bag Storage ≤-20°C, sealed (custom pack sizes up to 10 kg-class available)

1. Overview

Recombinant Human Type I Collagen (EV-COL-004) is a high-purity 26.9 kDa structural protein produced by recombinant expression in a microbial yeast platform carrying the cloned human type I collagen gene. The product is supplied as a sterile lyophilized sponge with electrophoretic purity ≥90% (SDS-PAGE) and protein content ≥90% (Lowry). It is fully water-soluble at 100 g/L, forming a clear, particle-free solution after 24 hours, and is suitable for hydrogel formulation, 3D bioprinting matrices, scaffold fabrication, tissue engineering, wound healing studies, and regenerative medicine research. Manufactured on a 28,000-liter yeast expression platform with advanced chromatographic purification, providing a microbial-derived, animal-component-free collagen source with low impurity profile.

2. Mechanism of Action

Type I collagen is the most abundant structural protein in mammalian tissues, forming the fibrillar scaffold of skin, bone, tendon, and connective tissue. Native Type I collagen assembles into triple-helical molecules that further organize into staggered fibrils, providing tensile strength and structural support. The recombinant 26.9 kDa product represents a humanized fragment expressed in yeast, retaining hydrophilic and biocompatible properties of the native protein while eliminating the immunogenicity and pathogen risk associated with animal-sourced collagen. In aqueous solution the product remains soluble across the working pH range 6–8 and serves as a substrate for cell attachment, hydrogel network formation, and scaffold coating in tissue engineering applications.

3. Applications

- Hydrogel formulation for tissue engineering and cell culture matrices
- 3D bioprinting bioinks and scaffold fabrication
- Scaffold coating for cell attachment and proliferation studies
- Wound healing and skin regeneration research
- Medical device coating research and development
- In vitro models of fibrosis, fibroblast biology, and extracellular matrix research

4. Recommended Protocol

Step	Details
1. Equilibrate the sealed package to room temperature (20–25°C) for 10–15 minutes before opening, then transfer the required mass of lyophilized material into a sterile container in a laminar flow hood.	Hygroscopic — keep sealed

Step	Details
2. Reconstitute in sterile ultrapure water or appropriate buffer (pH 6–8) at the concentration required by the downstream application. Fully soluble up to at least 100 g/L.	Per application
3. Swirl or rotate gently for 2–3 minutes to initiate dissolution. Avoid vortexing to prevent denaturation and foaming.	Gentle mixing
4. Stand at room temperature for 10–15 minutes to complete hydration; pipette up and down 5–10 times for homogeneous mixing.	Complete hydration
5. Verify pH 6–8 with a calibrated meter; adjust dropwise with sterile 0.1 M HCl or 0.1 M NaOH if needed.	pH verification
6. Aliquot reconstituted solution and store at -20°C; working solution stable on ice for up to 8 hours.	Aliquot and store

Application-specific formulation parameters — including final concentration, crosslinking strategy (e.g., genipin, transglutaminase), and co-formulation with other biopolymers (alginate, hyaluronic acid) — should be selected and optimized per the requirements of the specific downstream application.

5. Quality Control

Test / Parameter	Specification	Status
Appearance	White or off-white sponge-like lyophilized powder	**PASS**
Electrophoretic Purity	≥90% (SDS-PAGE); band at ~26.9 kDa	**PASS**
Protein Content	≥90% (Lowry method)	**PASS**
Solubility	≥100 g/L in water; clear, particle-free solution after 24 h	**PASS**
Moisture Content	<10% (Karl Fischer)	**PASS**
Endotoxin	<0.5 EU/mg (LAL assay)	**PASS**
Nucleic Acid Residue	<1 ppm	**PASS**
Total Aerobic Bacterial Count	<100 CFU/g	**PASS**
Total Fungal Count	<10 CFU/g	**PASS**
Pathogen Testing	E. coli, S. aureus, P. aeruginosa — not detected	**PASS**
Heavy Metals (total, as Pb)	<10 ppm; As <1 ppm; Hg <2 ppm; Pb <5 ppm; Cr <5 ppm; Cd <2 ppm	**PASS**

6. Storage & Stability

- Storage temperature: sealed at ≤-20°C recommended; short-term room-temperature transport and storage acceptable
- Shelf life: at least 1 year from receipt when stored sealed at ≤-20°C
- Formulation: sterile lyophilized sponge (no buffer salts or excipients added)
- Shipping: ambient or cold-chain shipping acceptable per logistics route
- General: avoid repeated freeze-thaw of reconstituted material; aliquot upon reconstitution; working solution stable on ice for up to 8 hours; maximum 3 freeze-thaw cycles recommended

7. Troubleshooting

Problem	Possible Cause	Suggested Action
Incomplete dissolution after standard hydration time	Insufficient mixing time; excessive concentration; cold buffer	Extend hydration to 30 min at 20–25°C; reduce target concentration; verify buffer is at room temperature; gently pipette to homogenize
Cloudy or particle-containing solution	Aggregation from vigorous mixing or out-of-range pH	Centrifuge 10,000 × g, 5 min at 4°C and transfer supernatant; verify pH is 6–8; replace solution if persists
Loss of activity or premature gelation	Repeated freeze-thaw; extended room-temperature exposure	Aliquot reconstituted material; limit to 3 freeze-thaw cycles; keep working solution on ice (≤8 h)
Moisture absorption / clumping of lyophilized powder	Package opened in humid environment; not resealed promptly	Open and weigh in laminar flow hood; reseal package immediately after sampling; store with desiccant

8. Safety Information

For Research Use Only. Not for diagnostic or therapeutic use. Handle according to standard laboratory safety guidelines. Wear laboratory coat, protective gloves, and safety eyewear when handling this product. Lyophilized powder is hygroscopic — keep sealed when not in use. Refer to the accompanying Safety Data Sheet (SDS) for full hazard information. Dispose in accordance with local, state, and federal regulations.