HUGRO®

Recombinant Human Collagen Type III

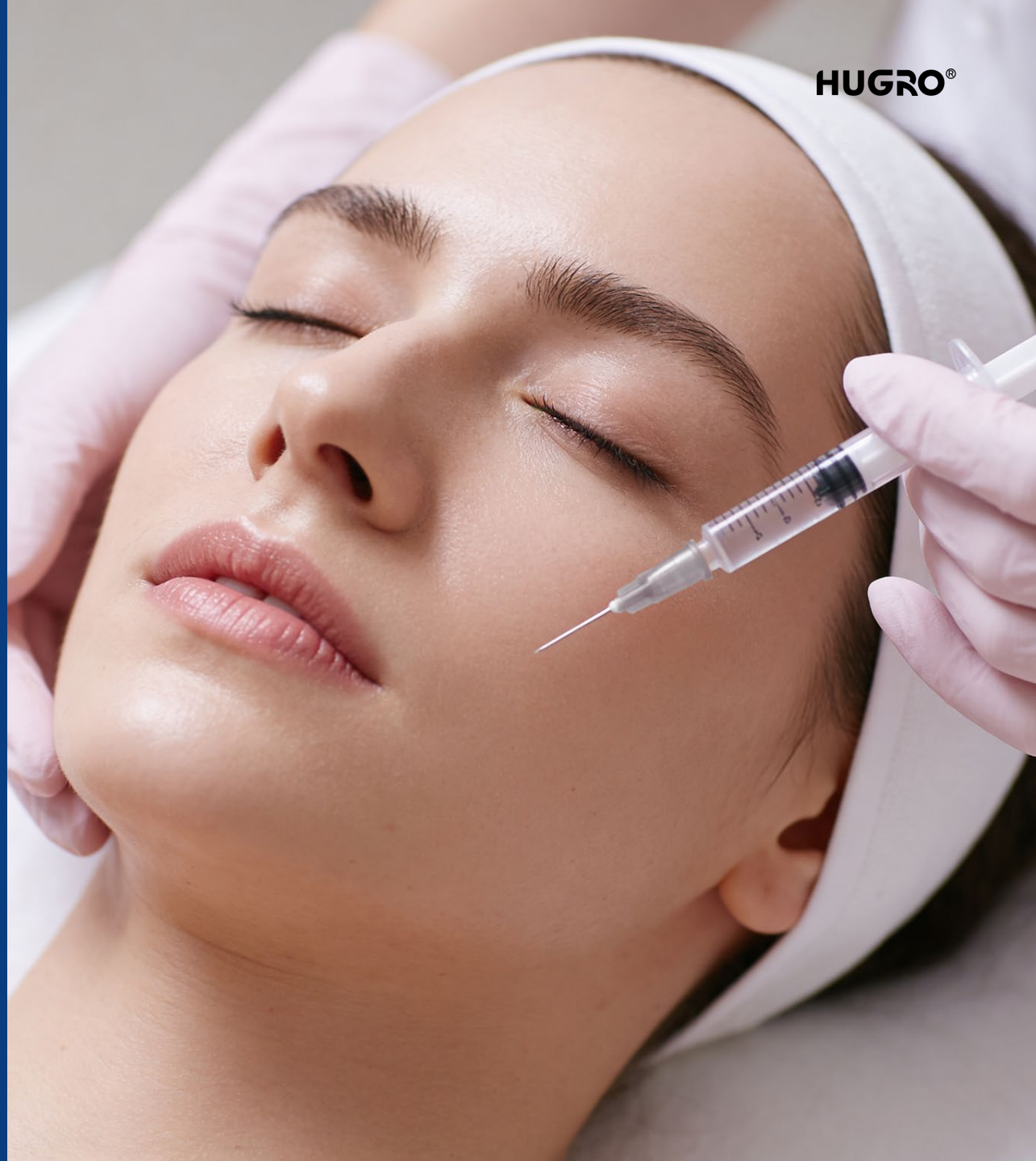
HUGRO Elastin Collagen | HUGRO Elastin CollagenPlus

BioPlus Co. Ltd.

rh-Collagen III

Collagen is a key ingredient in medical, aesthetic,
and wellness applications, with global demand projected to grow strongly.
The market is forecast to expand from USD 10.4B (2024) to USD
26.2B (2033), CAGR of 11% in the market report by Grand View Research.

Recombinant Human Collagen Type III represents the next generation:
animal-free, high-purity, and biofunctional, positioned for rapid
growth in advanced healthcare and premium beauty markets.



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01

Human Collagen Type III is a fibrillar extracellular matrix (ECM) collagen composed of three identical α1(III) chains encoded by COL3A1, forming a long triple-helical molecule that assembles into fibrillar networks.

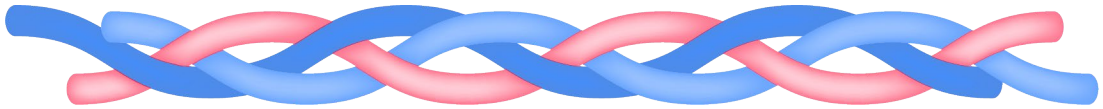
02

It is a major structural component of extensible, compliant connective tissues (notably blood vessels, uterus, and bowel) and is commonly found alongside Type I Collagen, where it can influence fibril formation and tissue-level mechanical organization.

03

Clinically, pathogenic COL3A1 variants cause vascular Ehlers–Danlos syndrome (vEDS), underscoring the essential role of Collagen Type III in maintaining connective tissue integrity.

Triple Helix



Biosynthesis

COL3A1 transcription → Translation into preprocollagen → ER processing (OH, Glycosylation) → Fibrillogenesis + cross-linking → Secretion & propeptide cleavage → Triple helix procollagen

01

Fibrillar collagens

Forms classic (Gly–X–Y)n triple helix

02

Gene

COL3A1 (chromosome 2q32.2) encodes the α1(III) chain

03

Biosynthesis

Produced as pre-procollagen → procollagen (pro-peptides are cleaved extracellularly)

04

Role in ECM

Contributes to tensile strength and compliance in extensible connective tissues

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Application & Positioning

01

Recombinant Human Collagen Type III can be positioned as a human ECM-mimicking matrix material that provides structural support and a cell-interactive surface.

02

Aesthetic (topical / non-therapeutic)

A film-forming, skin-conditioning matrix concept to help maintain a favorable skin surface microenvironment.

03

Pharmaceutical / R&D

A biomimetic scaffold/coating for studying cell–ECM interactions and skin biology using a more physiological matrix context than inert surfaces

04

Medical devices / biomaterials

A biocompatible scaffold/coating component intended to support cell attachment and tissue interfacing as a material property; collagen-based wound materials are widely explored in wound-care biomaterials (final claims depend on device design/indication/regulatory clearance).

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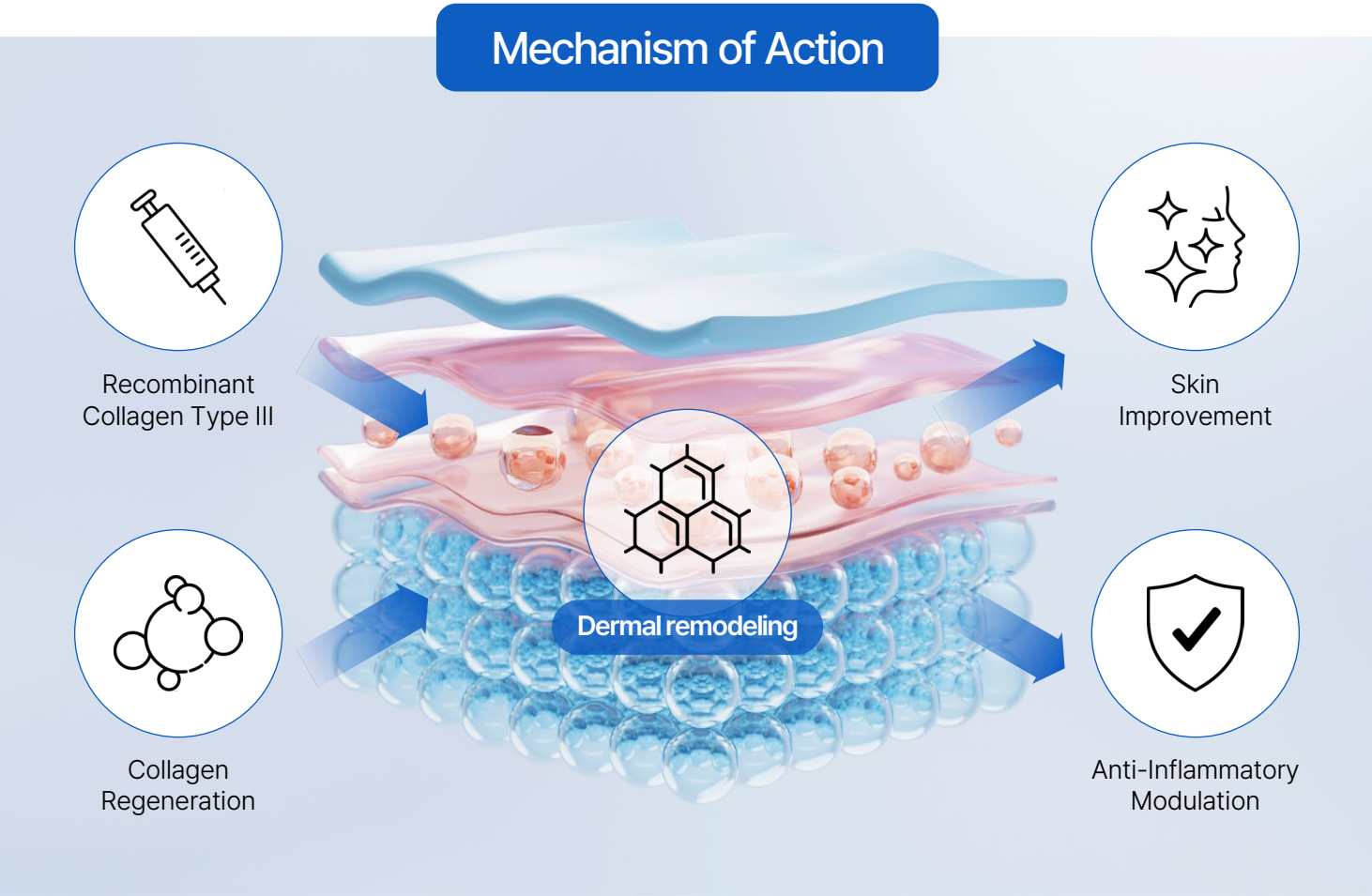
MoA of rh-Collagen Type III



1. Direct injection of Collagen (fast onset)
2. Promoting fibroblast activation
3. Stimulating endogenous collagen synthesis
4. Restoring dermal matrix integrity
5. Dermal remodeling
6. Enhancing ECM density & elasticity
7. Reducing wrinkles & improving skin texture
8. Suppressing inflammation & oxidation
9. Accelerating skin repair

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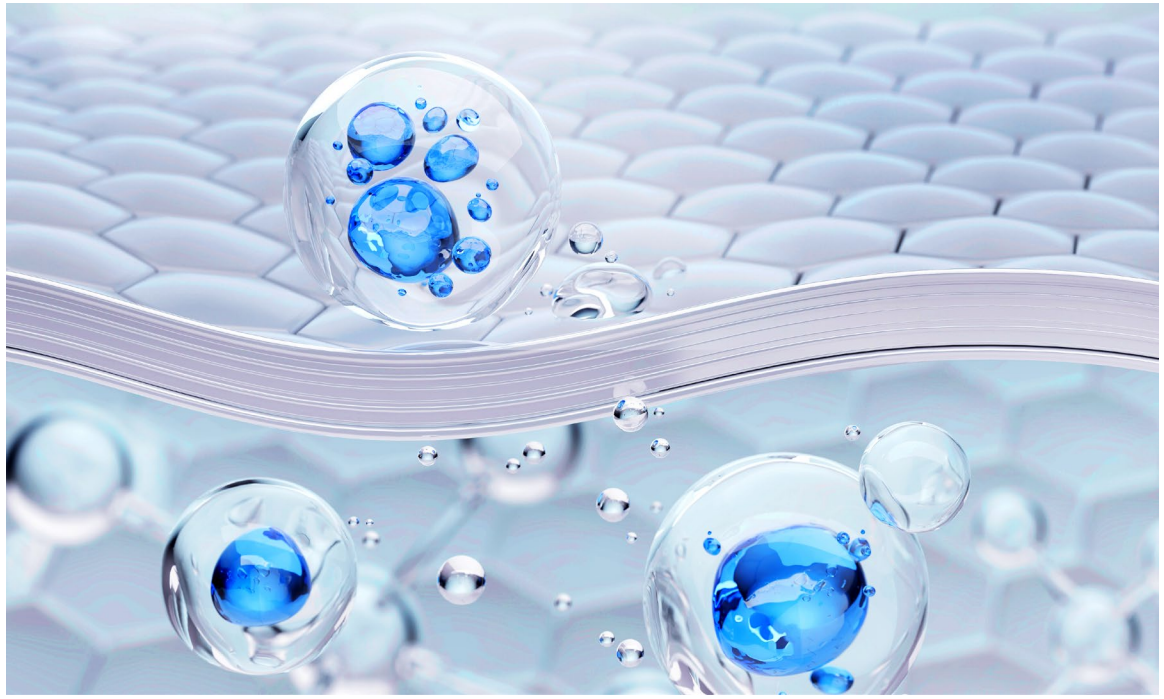
Why



Type III = Regeneration

Dynamic regeneration
Fibroblast Activation Matrix Renewal
Superior Anti-wrinkle
Improving Skin Texture
Promoting Rapid Rejuvenation

Type I = Structure

Structural strength
Maintaining dermal framework
Long-term stability
Limited
Anti-wrinkle

Collagen Type III has superior skin regeneration effects compared to Type I.
Type III provides more natural beauty by restoring ECM integrity than Type I.

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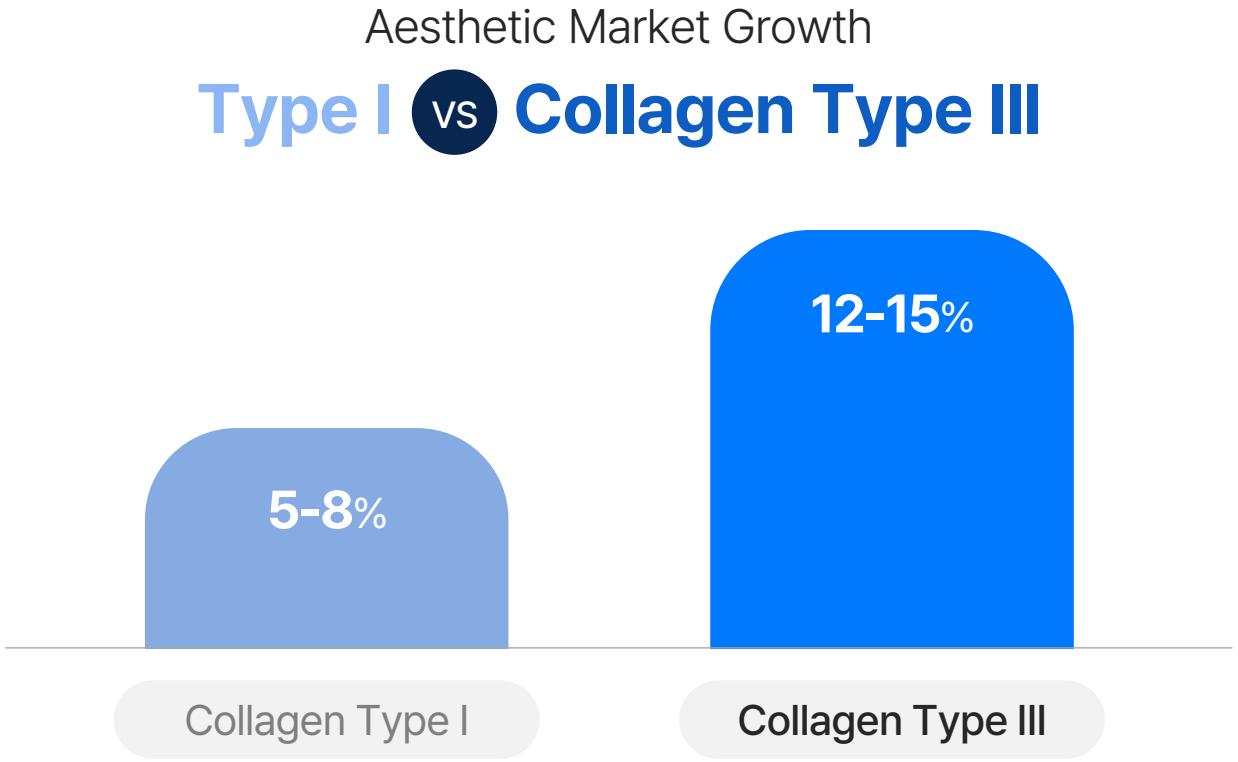
Opportunity



Collagen Type III is rapidly gaining market share in premium aesthetic applications due to its dynamic regeneration, biocompatibility, and injectable suitability.

It is outpacing Collagen Type I in growth rate and clinical adoption, especially in skin rejuvenation and anti-aging treatments.

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Recombinant vs. Animal Origin

Recombinant Human Collagen

offers superior purity, safety, and consistency compared to animal-derived collagen, making it ideal for advanced medical and aesthetic applications. It is produced without animal sourcing, ensuring ethical and scalable manufacturing.

Feature	Recombinant Human Collagen	Animal Collagen
Source	**Produced in *E. coli*, yeast**	Extracted from animal
Purity	**Highly consistent**	High risk of low purity
Safety	**No risk (endotoxin-free)**	High risk of infection
Immunogenicity	**Low (humanized)**	High risk
Scalability	**High**	Limited
Applications	**Injectable, biomedical**	Limited in therapies

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Recombinant Human Collagen Type III

High Quality & Safety

- No risk of immunogenicity
- Native-like triple helix stability
- ≥99.9% purity
- Produced in GMP facilities
- Mass production for reliable supply
- No tag, natural molecule
- Strict quality management

Next-Generation Cell Booster

For Natural Rejuvenation

The state-of-the-art recombinant Human Collagen Type III formulation designed to restore youthful skin architecture through natural regeneration and tissue remodeling. Developed using advanced recombinant biotechnology, it offers superior biocompatibility and regenerative performance.

HUGRO Elastin Collagen

Rejuvenation

Repair

Main composition rh-Collagen with rh-Elastin

10mg / 1 vial / 1 pack
Skin Booster

HUGRO Elastin CollagenPlus

Matrix

Repair

rh-Collagen(BMTS™) with rh-Elastin (BMTS™)

10mg / 1 vial / 1 pack
Skin Booster

BOOSTER

HUGRO Elastin Collagen

Elastin + Collagen(90 kDa)

Rejuvenation | **Repair**

Soluble Collagen, Elastin, Sodium Chloride
Sodium Phosphate, Potassium Phosphate
Potassium Chloride

10mg | 1 vial | 1 pack

BOOSTER

HUGRO Elastin CollagenPlus

Elastin + Collagen(9 kDa)

Matrix | **Repair**

Soluble Collagen, Elastin, Sodium Chloride
Sodium Phosphate, Potassium Phosphate
Potassium Chloride

10mg | 1 vial | 1 pack

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What is the difference?

Strength

The recombinant Human Collagen Type III and Elastin produced from *E. coli* system that ensures :
Safety Biocompatible, non-animal derived, low immunogenicity, free from viral infection
High Purity : ≥99.9% purity
Triple Helix : Stable structure of Collagen Type III
Scalability and Consistency : Large-scale production with batch-to-batch uniformity
Quality Assurance : Stringent quality control standards guarantee safety, stability, and efficacy
Human-Identical Sequence : Structurally and functionally identical to native human Collagen Type III.

Mechanism of Action

Collagen Type III plays a pivotal role in tissue regeneration, cellular proliferation,
and extracellular matrix remodeling, distinguishing it from Collagen Type I,
which primarily contributes to structural maintenance and tensile strength.
Collagen Type III forms a flexible, supportive network that facilitates fibroblast activity, angiogenesis,
and new tissue formation-key processes in skin rejuvenation and repair.

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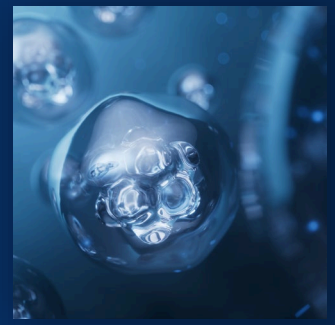
Function of Collagen Type III in Tissue Regeneration & Elasticity

rh-Collagen Type III
rh-Elastin



Cell Proliferation
ECM Regeneration

Dermal Remodeling
Restoring Elasticity

Benefits

- Stimulates natural collagen synthesis and tissue regeneration
- Restores skin elasticity, firmness, and smoothness
- Reduces fine lines, wrinkles, and atrophic scars
- Enhances dermal density and hydration
- Mimics the natural composition of youthful skin

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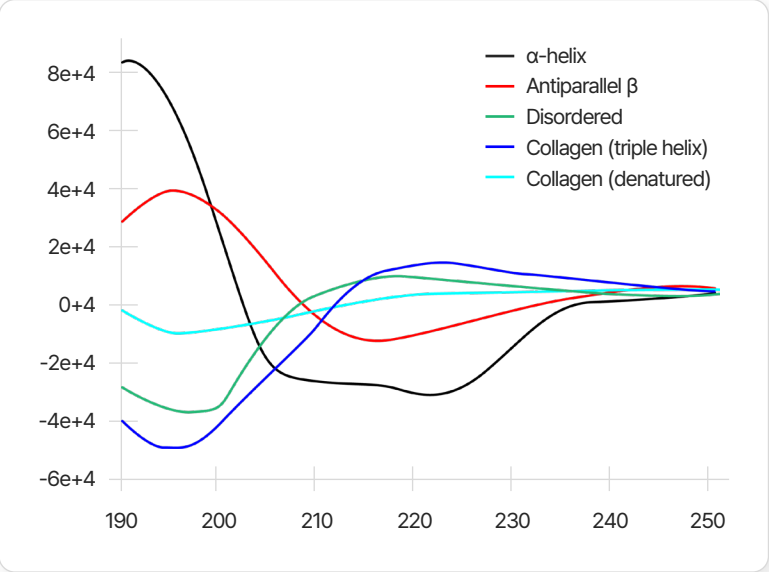
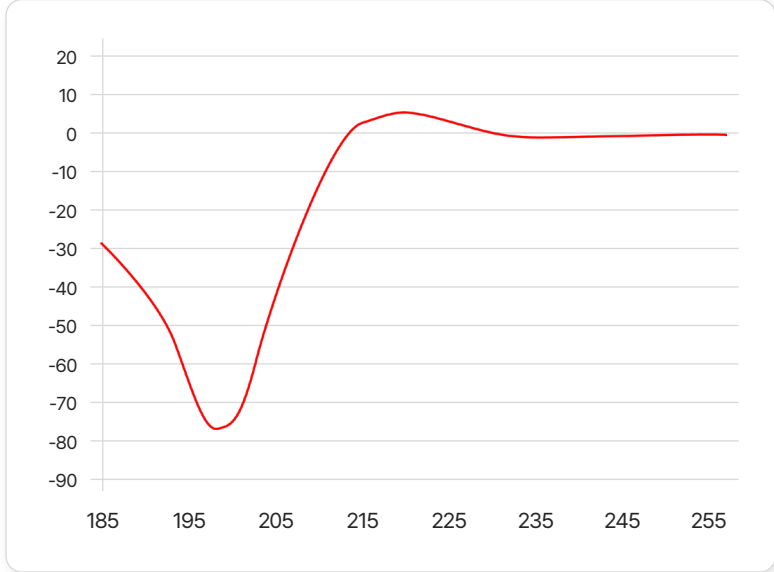
rh-Collagen Type III of BioPlus

Forms a Triple Helix



Wavelength (nm)



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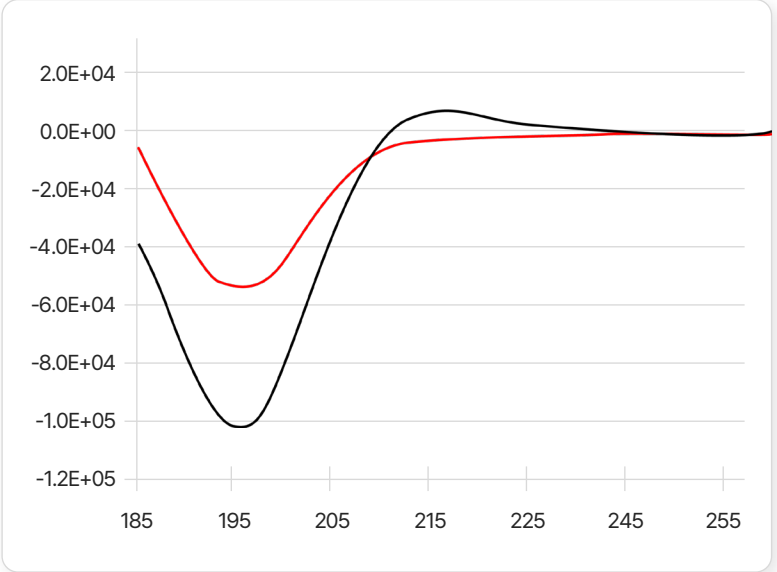

Wavelength (nm)

Figure 1. Triple-helix Formation of Recombinant Human Collagen Type III

(A) Representative circular dichroisms (CD) spectrum of triple-helix collagen reported in the literature. (Ref 1.) | (B) CD spectrum of BP recombinant Human Collagen Type III, showing a collagen-like structure with a triple-helix conformation.
(C) CD spectrum of the same recombinant collagen after denaturation, demonstrating the loss of the triple-helix associated spectral features compared with panel (B).
These results support that BP recombinant Human Collagen Type forms correct higher-order folding the native recombinant preparation is triple-helical.

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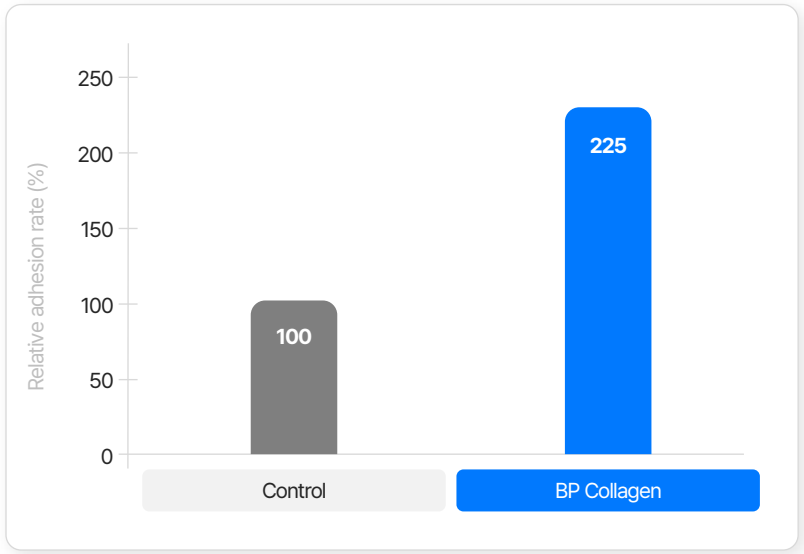
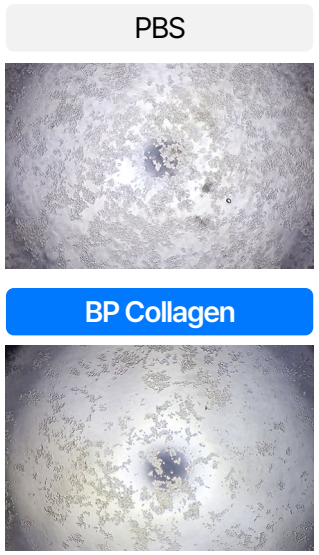
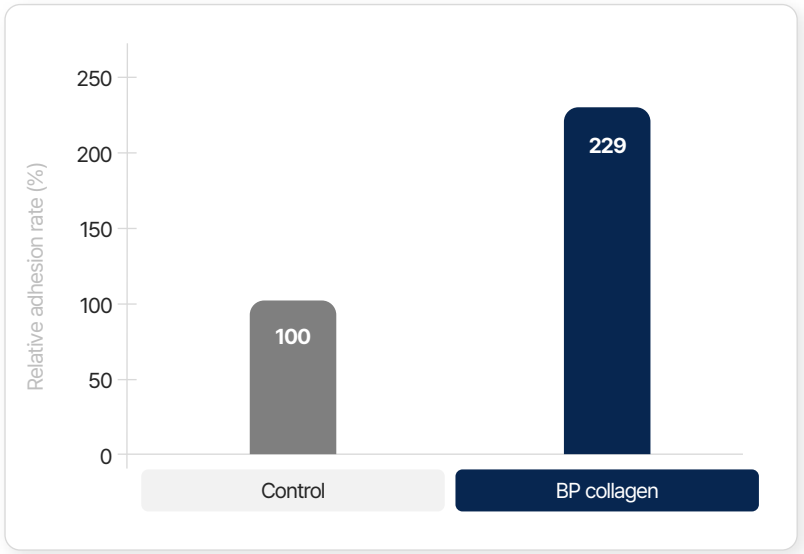
rh-Collagen Type III of BioPlus

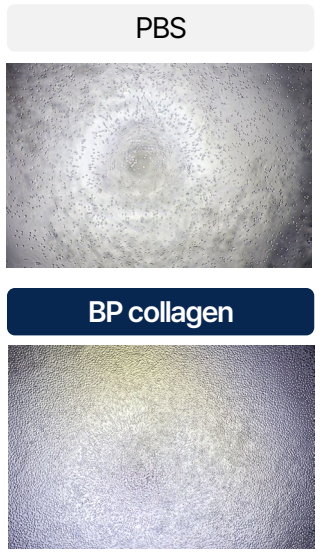
Enhances Cell Adhesion





(A) Fibroblast





(B) Keratinocyte

Figure 2. Recombinant Human Collagen Type III Promotes Cell Adhesion in Fibroblasts and Keratinocytes

Fibroblast adhesion (A) and Keratinocyte adhesion (B) on Collagen Type III-coated surfaces compared with the control (PBS) and BP Collagen Type III (0.5 mg/mL).
BP Collagen Type III increased cell adhesion by approximately 2.2-fold relative to the control.
These results indicate that Collagen Type III provides a favorable substrate for skin-resident cell attachment, supporting its functional bioactivity as an extracellular matrix component..

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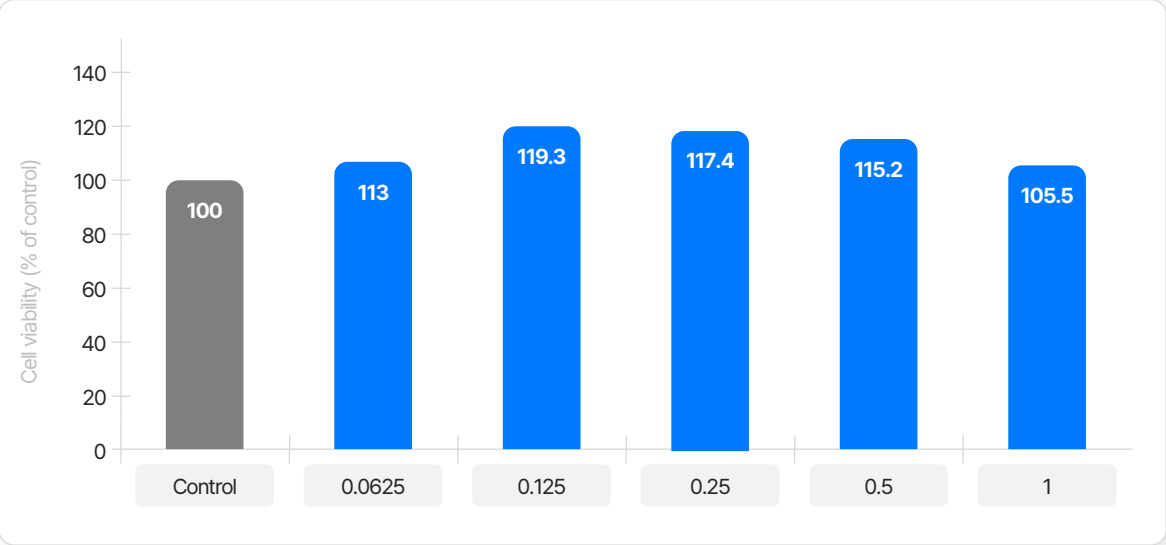
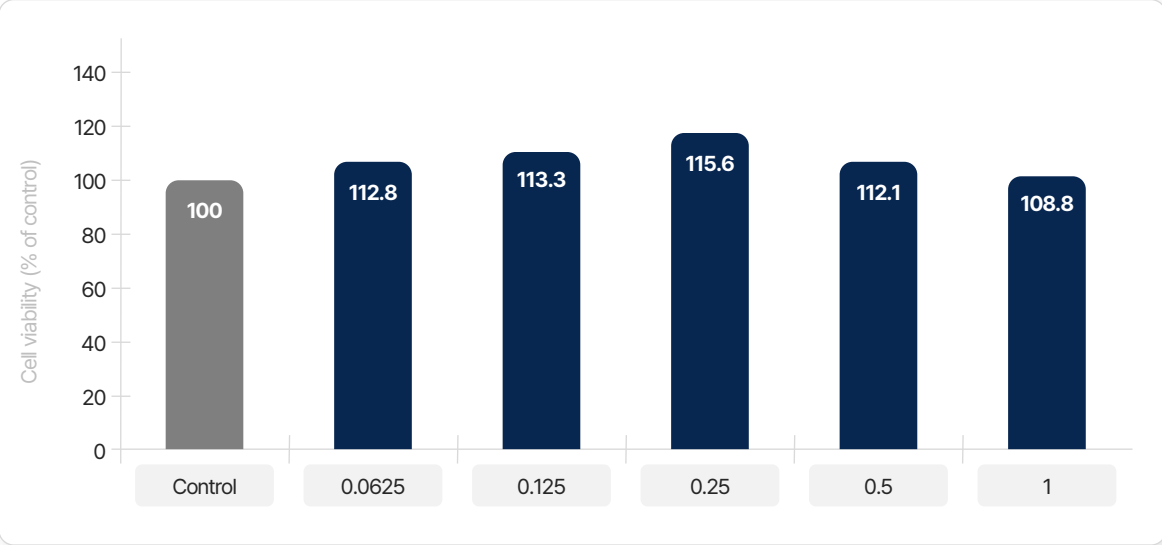
rh-Collagen Type III of BioPlus

Enhances Cell Proliferation



(A) Fibroblasts



(B) Keratinocytes

Figure 3. Dose-dependent Effects of Collagen Type III on Cell Proliferation and Viability

Cells were treated with BP Collagen Type III at control and 0.0625~1 mg/mL and cultured for 48 h, after which cell viability and proliferation were assessed. Fibroblasts (A) showed a modest proliferation response, reaching approximately 1.2-fold relative to the control, while Keratinocytes (B) exhibited an approximately 1.15-fold increase. Across the intermediate concentrations (0.125~0.5 mg/mL), viability at the lowest (0.0625 mg/mL) and highest (1.0 mg/mL) concentrations was slightly reduced compared with the 0.125 ~ 0.5 mg/mL group, suggesting an optimal concentration at intermediate doses for maintaining cell viability while supporting modest proliferation.

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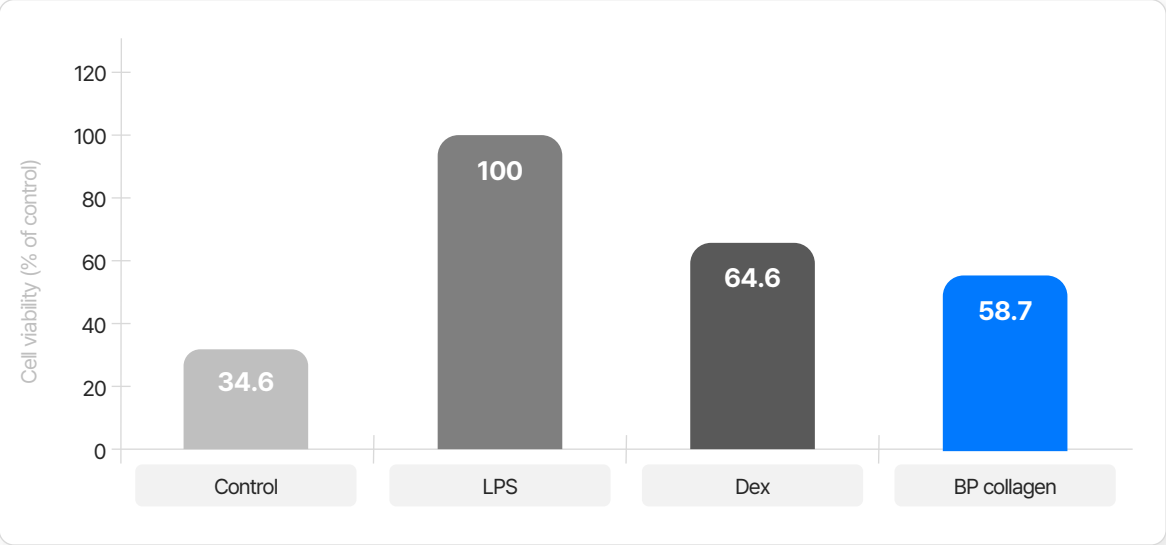
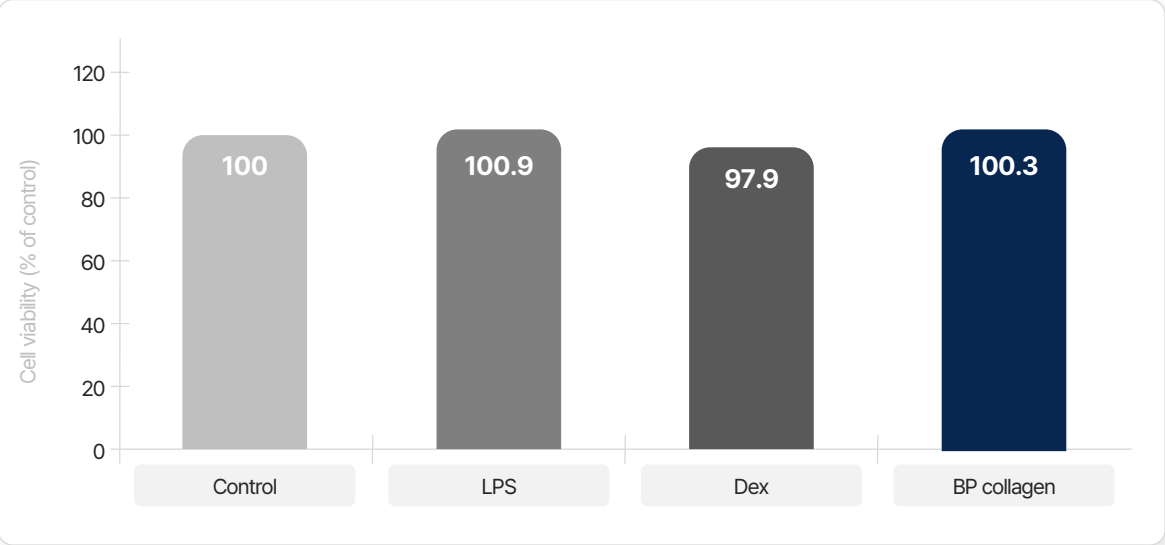
rh-Collagen Type III of BioPlus

Suppresses LPS-induced Nitric Oxide production Without Cytotoxicity



(A) NO assay



(B) Cytotoxicity

Figure 4. Effects of BP Recombinant Collagen Type III on Nitric Oxide (NO) Production and Cytotoxicity Under LPS-induced Inflammatory Conditions

Cells were stimulated with lipopolysaccharide (LPS) and subsequently treated with BP recombinant Human Collagen Type III (1 mg/mL). Dexamethasone was included as a positive control.
(A) NO assay: BP recombinant Human Collagen Type III reduced NO production by about 2.2-fold relative to the LPS-stimulated condition, indicating attenuation of LPS-driven inflammatory activation.
(B) Cytotoxicity assay: BP recombinant Human Collagen Type III showed no detectable cytotoxicity under the tested conditions, supporting that the reduction in nitric oxide(NO) was not attributable to decreased cell viability.

SUMMARY

01

BP recombinant human Collagen Type III shows structural integrity, adopting a triple-helical conformation as verified by CD spectroscope.

02

BP recombinant human Collagen Type III demonstrates **multi-dimensional bioactivity** relevant to skin-resident cells: it enhances **cell adhesion** in fibroblasts and keratinocytes (about 2.2-fold vs control; PBS sample/BP Collagen) and modestly increases **proliferation** (fibroblasts about 1.2-fold, keratinocytes about 1.15-fold), with a relatively stable response across 0.125~0.5 mg/mL and slightly reduced viability at 0.0625 and 1 mg/mL. Its **anti-inflammatory potential** is further supported by about 2.2-fold suppression of LPS-induced nitric oxide(NO) at 1 mg/mL, **without cytotoxicity**, benchmarked against dexamethasone as a positive control.

These results indicate that BP recombinant human Collagen Type III is properly folded, bioactive, and non-cytotoxic under the tested conditions, supporting cell attachment and growth while also attenuating an inflammatory nitric oxide(NO) readout.

Thus highlighting its promise as a functional extracellular matrix component for skin-focused regenerative and inflammation-modulating applications.

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E.O.D

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