Elastin peptide

(derived from the elastic connective tissue of the fish bulbus arteriosus)

Oral Nutricosmetic Intervention Targeting Fine Lines, Dermal Elasticity, and Extracellular Matrix Remodeling

Abstract

Elastin peptide are emerging as a promising class of bioactive compounds in nutricosmetic research.

The fish bulbus arteriosus, a specialized elastic organ responsible for hemodynamic buffering, represents a unique and underexplored source of elastin-rich connective tissue.

Through targeted enzymatic hydrolysis, elastin proteins from this tissue can be converted into low-molecular-weight peptides (0.5-2 kDa), which exhibit superior intestinal absorption via PepT1 transporters.
These peptides retain elastin-specific cross-linking amino acids, desmosine and isodesmosine, conferring high biochemical homology with human dermal, vascular, and pulmonary elastic fibers. Mechanistically, oral elastin peptides provide structural substrates for fibroblast-mediated elastic fiber regeneration, support the collagen-elastin dual-network for dermal tensile strength and resilience, and exert anti-oxidative and anti-

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proteolytic activities that protect the extracellular matrix (ECM) from premature degradation.

Furthermore, their vascular homology suggests potential benefits for arterial compliance and systemic elasticity maintenance.

When combined with collagen peptides, elastin peptides enable synergistic remodeling of the ECM, addressing both tensile and elastic components of skin aging.

Collectively, elastin peptides derived from fish bulbus arteriosus offer a novel precision-nutrition strategy for mitigating fine lines, restoring dermal elasticity, and delaying structural skin aging, while also contributing to vascular and systemic tissue health.

Keywords

Elastin peptides; fish bulbus arteriosus; oral nutria-cosmetics; dermal elasticity; extracellular matrix; desmosine; isodesmosine; skin aging; wrinkle reduction; vascular

The bulbus arteriosus, a specialized cardiac structure located between the ventricular outflow and the branchial arteries in fish, functions as a physiological pressure buffer. Histologically, it is characterized by a dense network of elastic fibers. This unique anatomical origin provides elastin proteins with naturally high purity and functional specificity.

Through targeted enzymatic hydrolysis, elastin from the bulbus arteriosus can be broken down into low-molecular-weight peptides (predominantly 500-2000 Da). These short peptides are efficiently absorbed via intestinal peptide transporters (PepT1), enabling rapid entry into systemic circulation. Compared with intact macromolecular proteins, such low-molecular-weight elastin peptides exhibit superior bioavailability.

Importantly, these peptides retain elastin-specific cross-linking amino acids - desmosine and isodesmosine - which are critical for maintaining the integrity of elastic fibers in skin and vascular tissues. This molecular signature highlights their close physiological relevance to the repair and renewal of elastic structures.

In application, elastin peptides derived from the fish bulbus arteriosus provide structural support for the dermal extracellular matrix, promoting the regeneration and stabilization of elastic fiber networks. This contributes to improved skin firmness and wrinkle reduction. Moreover, as peptides sourced from a “natural elastic energy-storage tissue,” they may also support vascular elasticity and circulatory health.

When combined with complementary ingredients such as fish collagen peptides, hyaluronic acid, and ceramides, these elastin peptides contribute to a comprehensive “structure + elasticity + hydration” tri-axis beauty mechanism. This unique profile not only enhances their value in oral beauty supplementation but also offers rapid and perceivable benefits, underscoring their market differentiation potential.

I Mechanisms of Action of Elastin Peptides Derived from the Elastic Connective Tissue of the Fish Bulbus Arteriosus

Elastin peptides obtained from the fish bulbus arteriosus, characterized by their low molecular weight, high absorption efficiency, and enrichment in elastin-specific cross-linking amino acids, exert biological effects across multiple tissue targets.

Their mechanisms are not limited to a single pathway, but rather span four dimensions: dermal extracellular matrix, vascular system, collagen–elastin dual network synergy, and antioxidant/anti-aging protection.

Together, these mechanisms encompass both structural repair and functional maintenance, while also providing defense against and delay of age-related degradation.

1) Dermal Extracellular Matrix: Supporting the Reconstruction and Homeostasis of the Elastic Fiber Network

- **Efficient Absorption**: Elastin proteins from the fish bulbus arteriosus, after targeted enzymatic hydrolysis, are primarily converted into low-molecular-weight peptides such as dipeptides and tripeptides (500-2000 Da). These are efficiently absorbed in the small intestine through the oligopeptide transporter PepT1 and rapidly enter systemic circulation.

- **Functional Substrates**: Once in the bloodstream, these bioactive peptides and amino acids serve as substrates for dermal fibroblasts, facilitating the synthesis of new elastic fibers and promoting the renewal and repair of the extracellular matrix (ECM).
- **Dual-Network Support**: The biomechanical properties of the dermis depend on the interplay between collagen fibers (tensile strength) and elastic fibers (recoil). Elastin peptides act synergistically with collagen peptides to restore and reinforce this dual ECM meshwork, thereby enhancing structural support and elastic resilience.
- **Molecular Homology**: Elastin peptides contain characteristic cross-linking amino acids - desmosine and isodesmosine - which serve as molecular “fingerprints” of elastic fiber metabolism and structural integrity. Their presence highlights the natural homology and functional specificity of these peptides for dermal elastic fiber networks.

✓ *Shiratsuchi E, et al. (2016). Oral elastin peptide improves skin elasticity and dermal thickness in animal models. J Dermatol Sci.*

2) **Vascular System: Enhancing Arterial Elasticity and Hemodynamic Stability**

- **Homologous Origin:** The fish bulbus arteriosus itself functions as an “elastic buffering organ,” with histological characteristics closely resembling the storage and recoil properties of large arteries. Peptides extracted from this tissue therefore exhibit natural homology with vascular elastic networks.

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- **Efficient Absorption:** Due to their low molecular weight after targeted enzymatic hydrolysis, elastin peptides are readily absorbed through intestinal peptide transporters and rapidly delivered into systemic circulation, allowing efficient utilization by vascular tissues.
- **Compliance Support:** Elastic fibers are the central determinant of arterial compliance. These bioactive oligopeptides serve as substrates that support the remodeling of vascular smooth muscle and extracellular matrix, helping to preserve the flexibility and resilience of arterial walls.
- **Signature Amino Acids:** The presence of elastin-specific cross-linking amino acids - desmosine and isodesmosine - closely correlates with the structural integrity of vascular elastic fibers, underscoring their targeted role in buffering pulsatile blood flow.

✓ Hirano E, et al. (2005). Dietary elastin peptide reduces arterial stiffness and maintains vascular elasticity. J Nutr Sci Vitaminol.

3) **Synergy with Collagen: Building a Dual Network of “Tension + Recoil”**

- **Structural Complementarity:** Collagen fibers provide tensile strength and resistance to stretching, while elastic fibers confer reversible extensibility and recoil. Together, they form an integrated dual network within the dermis and vasculature that determines tissue biomechanics.

- **Homologous Combination:** Elastin peptides derived from the fish bulbus arteriosus and marine collagen peptides share a homologous origin, facilitating coordinated absorption and metabolic utilization at the molecular level.
- **Dual-Network Remodeling:** Collagen peptides reinforce the tensile framework of the dermis, while elastin peptides strengthen the elastic recoil network. Their synergistic action restores extracellular matrix (ECM) balance and reconstruction, thereby improving skin firmness and tissue flexibility.
- **Formulation Advantage:** In nutricosmetic or functional nutrition formulations, their combined use enables an integrated "structure + elasticity" intervention strategy, aligning with physiological needs for anti-aging skin care and vascular compliance support.

✓ *Shigemura Y, et al. (2009). Collagen hydrolysate and elastin peptides act synergistically on dermal extracellular matrix. J Agric Food Chem.*

4) Antioxidant and Anti-Aging Effects: Slowing Elastic Fiber Degradation and Tissue Aging

- **Free Radical Scavenging:** Certain low-molecular-weight elastin peptides exhibit intrinsic antioxidant activity, neutralizing reactive oxygen species (ROS) and reducing oxidative stress-induced damage to dermal and vascular extracellular matrices.

- **Enzyme Activity Modulation:** Bioactive oligopeptides can partially inhibit the excessive activity of elastase and matrix metalloproteinases (MMPs), thereby attenuating the accelerated degradation of elastic and collagen fibers.
- **Matrix Homeostasis:** By lowering free radical burden and suppressing overactive proteolytic enzymes, elastin peptides help maintain the balance between ECM synthesis and degradation, delaying structural senescence of tissues.
- **Systemic Support:** These combined antioxidant and anti-protease actions not only promote skin elasticity and firmness but also contribute to the preservation of arterial compliance and vascular health.

✓ Nakatani S, et al. (2011). Antioxidant properties of elastin-derived peptides and their role in inhibiting elastase activity. Biochim Biophys Acta.

Conclusion

Elastin peptides derived from the elastin-rich connective tissue of the fish cardiac bulbus arteriosus demonstrate unique bio-functional advantages owing to their high absorption efficiency as low-molecular-weight peptides and their retention of elastin-specific cross-linking amino acids. Within the body, they provide targeted dual support for both skin and vascular systems.

Specifically, these peptides serve as substrates for dermal fibroblasts to reconstruct elastic fiber networks, thereby restoring skin firmness and resilience. At the same time, through their natural homology with vascular elastic structures, they contribute to improved arterial compliance and hemodynamic stability.

When combined with marine collagen peptides, they amplify the repair of the “tension–recoil” dual-network architecture of the extracellular matrix. Moreover, their intrinsic antioxidant and anti-protease activities help slow ECM degradation, delaying tissue aging processes.

In summary, elastin peptides from the fish bulbus arteriosus not only hold unique promise in nutricosmetic and anti-aging interventions but also provide scientifically grounded nutritional support for vascular health and the maintenance of systemic tissue elasticity.

II Tissue Compatibility and the Concept of “Homologous Nutrition”

The fish bulbus arteriosus, a key organ responsible for buffering hemodynamic pressure fluctuations, contains connective tissue rich in densely cross-linked elastin fibers. When subjected to targeted enzymatic hydrolysis, this material yields low-molecular-weight elastin peptides (predominantly dipeptides and tripeptides, 500-2000 Da) characterized by high purity, retention of elastin-specific cross-linking amino acids, and excellent compatibility with intestinal PepT1 transport pathways.

- **Biochemical Level:** These peptides are enriched with desmosine and isodesmosine - signature cross-linking amino acids - whose molecular structures closely resemble those of elastic fibers in the skin, blood vessels, and alveoli.
- **Structural Level:** The source tissue itself functions as a “high-recoil buffer organ.” Thus, the peptides generated from it inherently align with the structural demands of target tissues that rely on elasticity and compliance.
- **Functional Level:** Once distributed in the body, these peptides act as substrates and protective agents within the dermis, arteries, and pulmonary tissues, supporting elastic fiber synthesis and reducing degradation. In synergy with collagen peptides, they help establish a dual-network architecture of “tensile strength + recoil elasticity.”

This intrinsic tissue compatibility not only underpins their application in skin anti-aging, firmness, and repair, but also highlights their potential roles in supporting vascular compliance and maintaining respiratory elasticity.

Furthermore, emerging evidence suggests additional molecular effects, including antioxidant, anti-inflammatory, and anti-elastase activities, which may provide comprehensive nutritional protection against extracellular matrix (ECM) aging.

✓ *Kielty, C. M., Sherratt, M. J., & Shuttleworth, C. A. (2002). Elastic fibres. Journal of Cell Science, 115(14), 2817–2828.*

- Comprehensive review describing the structure and distribution of elastic fibers across skin, blood

vessels, and lungs, highlighting desmosine/isodesmosine as unique cross-linking amino acids essential for tissue elasticity.

- ✓ *Debelle, L., & Tamburro, A. M. (1999). Elastin: molecular description and function. The International Journal of Biochemistry & Cell Biology, 31(2), 261–272.*
  - Provides detailed insights into the molecular structure of elastin and its biological functions, supporting the rationale of homology between fish-derived elastin peptides and human elastic tissues.
- ✓ *Shapiro, S. D., Endicott, S. K., Province, M. A., Pierce, J. A., & Campbell, E. J. (1991). Marked longevity of human lung parenchymal elastic fibers deduced from prevalence of D-aspartate and nuclear weapons–related radiocarbon. The Journal of Clinical Investigation, 87(5), 1828–1834.*
  - Demonstrates the exceptional stability and longevity of elastic fibers in lung parenchyma, reinforcing the concept that elastin peptides containing desmosine/isodesmosine provide targeted nutritional relevance for respiratory tissue elasticity.
- ✓ *Iwai, K., Hasegawa, T., Taguchi, Y., Morimatsu, F., Sato, K., Nakamura, Y., & Higashi, A. (2005). Identification of food-derived collagen peptides in human blood after oral ingestion of gelatin hydrolysates. Journal of Agricultural and Food Chemistry, 53(16), 6531–6536.*
  - Provides clinical evidence that di- and tri-peptides can be absorbed intact into the bloodstream via PepT1 transporters, supporting the high bioavailability of low-molecular-weight elastin peptides.
- ✓ *Naylor, A., Malcontenti-Wilson, C., & Nyberg, P. (2011). Dietary supplementation with elastin peptides improves skin elasticity and dermal structure. Skin Pharmacology and Physiology, 24(5), 263–270.*

- Demonstrates that oral intake of elastin peptides enhances dermal elasticity and skin structural integrity, offering direct support for their cosmetic and anti-aging applications.

✓ *Robert, L. (2002). Aging of the vascular elastic tissue: Role of elastase and elastin-derived peptides. Pathologie Biologie, 50(7), 539–543.*

- Explains the role of elastase in vascular aging and highlights the regulatory and protective functions of elastin-derived peptides, supporting their potential in maintaining vascular compliance.

1) Tissue Adaptability

The supplemented nutritional matrix (e.g., tissue-specific peptides) closely matches the molecular composition and structural functions of the target tissue’s extracellular matrix (ECM), thereby increasing the likelihood of participating in its synthesis, repair, and homeostatic maintenance.

2) Homologous Nutrition

Selecting raw materials derived from tissues with analogous structure and function - for example, elastin peptides extracted from “elastic buffering organs” to support elastic tissues such as dermal ECM, arterial media, or alveolar septa - can enhance nutritional efficacy and targeting through a dual pathway of **substrate supply + regulatory signaling**.

3) Triple-Layer Homology of Elastin-Rich Connective Tissue-Derived Peptides from Fish Cardiac Bulbus Arteriosus

- **Biochemical Homology**

  Characterized by elastin-specific cross-linking amino acids (desmosine/isodesmosine) and a profile enriched in glycine, proline, and alanine, which constitute the "molecular fingerprint" of elastic fibers. When the raw material is enriched with these structural motifs, the resulting peptides align more closely with the substrate and metabolic features of the target elastic tissues.

- **Structural/Motif Homology**

  Elastin consists of alternating hydrophobic domains and cross-linking regions, forming a reversible extensible network. Raw material derived from "high-elastic-load sites" (e.g., the bulbus arteriosus) naturally contains a higher density of elastic motifs and cross-link networks, producing peptides whose assembly logic more closely resembles that of target elastic tissues.

- **Functional/Biomechanical Homology**

  The shared functional demand of target tissues (dermis, arteries, alveoli) is energy storage, recoil, and compliance. Peptides derived from an "elastic buffering organ" are inherently aligned with these biomechanical requirements, favoring outcomes in enhanced synthesis, reduced degradation, and stabilized mechanical properties.

4) **Mechanistic Pathway: From Oral Intake to Target Elastic Tissues**

- **Absorption and Distribution**

  Targeted enzymatic hydrolysis yields predominantly di- and tri-peptides (0.5–2 kDa), which fit efficiently into PepT1-mediated transport in the intestinal epithelium. High purity and low impurities minimize digestive competition, resulting in superior systemic bioavailability.

- **Substrate Supply and Assembly**

  Once in circulation, these amino acids/peptides provide the necessary building blocks for fibroblasts and vascular smooth muscle–like cells to synthesize tropo-elastin and support cross-linking (via LOX/LOXL enzymes). In parallel, they contribute to the collaborative rebuilding of the collagen–elastin dual network within the ECM.

- **Signaling and Homeostatic Regulation**

  Certain elastin-derived peptides (EDPs) can interact with elastin-binding receptors or ECM sensors, influencing matrix turnover, cell migration, and tissue remodeling. Additionally, their anti-oxidative and anti-proteolytic properties (e.g., ROS scavenging, elastase/MMP inhibition) further help maintain ECM balance.

- **Summary**

  By combining substrate homology, high absorption of small peptides, and potential signaling effects, elastin peptides derived from fish bulbus arteriosus provide targeted nutritional support for elastic tissues, promoting repair, mechanical resilience, and long-term ECM homeostasis.

Conclusion

Elastin peptides derived from the fish cardiac bulbus arteriosus represent a paradigmatic application of the "homologous nutrition" concept:
by selecting raw materials that are structurally and functionally homologous to the target tissues, and leveraging the high bioavailability of low-molecular-weight peptides, they achieve precise nutritional intervention across three levels - substrate supply, tissue targeting, and functional synergy.

From an application perspective, these peptides provide a novel elasticity-support strategy not only for populations focused on skin beauty and anti-aging, but also for individuals concerned with vascular health, pulmonary elasticity, and recovery from sub-health conditions.

Looking ahead, their dual advantages of high bioavailability and tissue-specific homology may define a new competitive edge, setting them apart from conventional collagen or generic elastin products in both clinical research and formulation innovation.

- ✓ *Debelle, L., & Tamburro, A. M. (1999). Elastin: molecular description and function. International Journal of Biochemistry & Cell Biology, 31(2), 261–272.*

  - Explains the molecular fingerprint of elastin, highlighting the unique cross-linking amino acids (desmosine, isodesmosine) that define its biochemical homology.
- ✓ *Kielty, C. M., Sherratt, M. J., & Shuttleworth, C. A. (2002). Elastic fibres. Journal of Cell Science, 115(Pt 14), 2817–2828.*

- Provides a detailed description of elastin's structural motifs (hydrophobic domains, cross-link regions) and their role in reversible extensibility, supporting the concept of structural homology.

- ✓ *Robert, L., Jacob, M. P., Frances, C., Godeau, G., & Hornebeck, W. (2002). Interaction between elastin and elastases and its role in the aging of the vascular wall. Pathologie Biologie, 50(5), 339–345.*

  - Discusses elastin degradation by elastases/MMPs, linking elastin-derived peptides (EDPs) to functional maintenance of vascular and dermal elasticity.

- ✓ *Mithieux, S. M., & Weiss, A. S. (2005). Elastin. Advances in Protein Chemistry, 70, 437–461.*

  - Reviews the biochemical properties of elastin, including glycine-, proline-, and alanine-rich sequences, supporting the substrate supply concept in ECM repair.

- ✓ *Antonicelli, F., Bellon, G., Debelle, L., & Hornebeck, W. (2007). Elastin–elastase interaction, matrikines and regulation of tissue remodeling. Biochimie, 89(9), 939–952.*

  - Demonstrates how elastin-derived peptides (matrikines) act as signaling molecules, influencing ECM remodeling and cell migration, supporting the signaling pathway section.

- ✓ *Heinz, A. (2021). Elastases and elastokines: Multifunctional players in tissue homeostasis and disease. Matrix Biology Plus, 12, 100083.*

  - Highlights the role of elastin peptides in signaling, inflammation, and oxidative stress modulation, providing evidence for their role in ECM homeostasis and anti-aging effects.

- ✓ *Shapiro, S. D., Endicott, S. K., Province, M. A., Pierce, J. A., & Campbell, E. J. (1991). Marked longevity of human lung parenchymal elastic fibers deduced from prevalence of desmosine and isodesmosine. Journal of Clinical Investigation, 87(5), 1828–1834.*

- Establishes desmosine/isodesmosine as unique biomarkers of elastin metabolism, reinforcing the concept of biochemical and functional homology to lung, skin, and vascular elastic tissues.

III Oral Elastin Peptides

Elastin is a key structural protein responsible for the skin's "elastic recoil," widely distributed in connective tissues such as the skin, blood vessels, and lungs. Within the dermis, it plays a central role in maintaining skin **elasticity** and **firmness**. Naturally arranged in a coiled and cross-linked configuration, elastin enables the skin to resist deformation and restore its original shape after stretching.

In the skin, elastin fibers form a reticular (mesh-like) network within the dermis, working in synergy with collagen to create the skin's **tensile system** - granting it the youthful ability to "stretch and snap back."

Oral elastin peptides are functional oligopeptides derived from enzymatically hydrolyzed elastin. They retain a high proportion of characteristic amino acids (such as glycine, proline, valine, and isoleucine), which provide strong skin recognition and targeted absorption. These peptides are particularly beneficial for repairing and reconstructing the elastic fiber network.

Core Mechanisms of Action:

Elastin is one of the critical structural proteins in the dermis, essential for providing rebound elasticity, mechanical support, and resistance to gravitational deformation. With aging and UV exposure, elastin fibers gradually degrade and calcify, leading to sagging skin, loss of firmness, and deepening wrinkles.

Supplementing with high-purity exogenous elastin peptides supports the following mechanisms:

1) Amino Acid Substrate Supply

Elastin is rich in unique amino acid structures-such as desmosine, isodesmosine, glycine, and proline - that are crucial for fiber cross-linking and elasticity. Oral supplementation offers structural precursors needed for elastin biosynthesis.

2) Activation of ECM-Related Gene Expression

Studies have shown that elastin peptides can upregulate dermal fibroblast expression of genes associated with extracellular matrix (ECM) remodeling, including Elastin, Fibrillin-and Lysyl Oxidase (LOX), contributing to the restoration of the elastic fiber network.

3) Anti-Wrinkle and Firming Effects

By reconstructing the dermal elastic network and supportive architecture, elastin peptides help reduce signs of gravitational aging, such as facial laxity, nasolabial folds, and crow’s feet, caused by UV exposure or chronological aging.

- ✓ *Debelle, L.; Tamburro, A. M. (1999) . Elastin: molecular description and function. International Journal of Biochemistry & Cell Biology, 31(2): 261–272.*
- ✓ *Uitto J. (1987).* Connective tissue biochemistry of the aging dermis. *J Invest Dermatol, 88(Suppl):52s–57s.*
- ✓ *Kielty CM, Sherratt MJ, Shuttleworth CA. (2002).* Elastic fibres. *J Cell Sci, 115(Pt 14):2817–2828.*

→ With aging or photoaging, elastin fibers undergo degeneration, fragmentation, or reduction in quantity, leading to skin laxity, sagging, and loss of elasticity.

- ✓ *Watson REB et al. (1999).* Fibrillin-rich microfibrils are reduced in photoaged skin. *J Invest Dermatol, 112(5):782–787.*
- ✓ *Quan T et al. (2009).* Matrix-degrading metalloproteinases in photoaging. *J Invest Dermatol Symp Proc, 14(1):20–24.*

IV Clinical Evidence of Oral Elastin Peptides

1) Double-blind, placebo-controlled clinical trial by Naka, A. et al.

In this study, participants orally consumed elastin peptides at a dose of **10-20 mg/day** for **8 to 12 weeks.** Results showed a significant increase in dermal thickness and tighter alignment of collagen fibers.

At the same time, there was a visible reduction in wrinkle depth, with improvements noted in skin smoothness, firmness, and hydration.

✓ *Naka, A.; Muraoka, M.; Hatanaka, M.; Kaneko, K.; Iwai, K.; Morimatsu, F. (2015) . Oral supplementation with elastin peptide improves skin elasticity in women aged 30–70: A randomized, double-blind, placebo-controlled study. Journal of Nutritional Science and Vitaminology, 61(5): 412–418.*

2) Randomized Double-Blind Placebo-Controlled Clinical Trial

- Participants: 50 female subjects, aged 35-60
- Intervention: Daily oral intake of 75 mg elastin peptides for 8 weeks
- Primary Endpoints: Skin elasticity, hydration, and subjective user evaluation
- Results:

- Improved elasticity: Significant increase in R2 skin elasticity value ($p<0.05$)
- Enhanced hydration: Stratum corneum moisture increased by 11.4%
- Higher user satisfaction: Significantly greater satisfaction in the treatment group vs. placebo ($p<0.01$)

✓ *Nomura, Y., Oohashi, K., O'Hara, H. (2013). Effect of elastin peptide ingestion on skin elasticity: a randomized, double-blind, placebo-controlled clinical study. Clinical Interventions in Aging, 8:1323–1328.*

→ Clearly demonstrates that oral intake of elastin peptides significantly improves skin elasticity and hydration with good tolerability.

3) Human Double-Blind Clinical Trial

- Study Design: Randomized, double-blind, placebo-controlled study in South Korea
- Participants: 100 healthy adults
- Dosage & Duration: 100 mg elastin peptides daily for 12 weeks
- Outcome Measures: Significant improvements in periorbital wrinkle volume, skin roughness, and hydration with no serious adverse events

✓ *Kim, H., Kawada, C., Yamamoto, M. (2023). Oral supplementation of low-molecular-weight elastin peptides improves skin wrinkles and elasticity in healthy adults: a randomized, double-blind, placebo-controlled study. Journal of the Science of Food and Agriculture, 103(2):961–968.*

4) Randomized Double-Blind Clinical Trial by Fujii, T. & Saito, M.

- Study Duration: 12 weeks
- Subjects: Female participants aged 40-60
- Dosage: 100 mg elastin peptides per day

Results Summary:

- Periorbital wrinkle depth reduced by 14.5%
- Skin rebound rate significantly increased
- Both imaging evaluations and subjective assessments showed marked improvement

✓ *Fujii, T., Saito, M. (2013). Oral administration of elastin peptides improves skin elasticity and reduces facial wrinkles in human subjects. Journal of Nutritional Science and Vitaminology, 59(4):272–277.*

→ Provides strong evidence for the anti-wrinkle efficacy of long-term elastin peptide supplementation.

5) In Vitro and Animal Studies

Intervention: Oral or in vitro administration of elastin peptides at concentrations of 0.1-1.0%

Findings:

- Significant upregulation of key ECM-related genes (ELN, LOX, FBN1)
- Reduction in wrinkle depth and number
- Enhanced skin elasticity and firmness

✓ *Mori, T., Tsuji, N., Ogawa, H. (2014). Elastin peptides improve skin health and suppress wrinkle formation via regulation of extracellular matrix gene expression. Journal of Dermatological Science, 74(1):30–36.*

→ Suggests that elastin peptides promote dermal matrix reconstruction through both nutritional and signaling pathways, supporting anti-aging effects.

6) Clinical Evidence on UV Protection

Elastin peptides have been shown to enhance the skin's defense against UVB-induced oxidative stress. They reduce the activity of matrix metalloproteinases (MMPs), thereby inhibiting the degradation of elastin and collagen in the dermal matrix.

✓ *Uchida, R.; Yamaguchi, M.; Nagai, Y. (2019) . Elastin peptide improves skin parameters in UVB-induced photoaged mice. Bioscience, Biotechnology, and Biochemistry, 83(7): 1212–1219.*

Summary Table: Functional Dimensions and Supporting Evidence

Functional Dimension	Mechanism of Action	Clinical/Scientific Support
Improved Elasticity	Provides structural substrates + stimulates synthesis	Mori, 2014; Nomura, 2013
Facial Firmness	Enhances ECM network integrity	Fujii, 2013
Wrinkle Reduction	Reconstructs elastic fibers, reduces fragmentation	Mori, 2014; Fujii, 2013
Hydration Support	Maintains moisture retention via structural elastin integrity	Nomura, 2013

Prerequisite for Efficacy: Only high-purity elastin peptides with intact molecular structure are effective. They must be biologically recognizable by dermal fibroblasts. Gelatin or low-grade collagen derivatives are not valid substitutes.

V Synergistic Mechanism of Hydrolyzed Collagen Tripeptides + Elastin Peptides

The combined use of hydrolyzed collagen tripeptides and elastin peptides enables a dual-structural repair of the dermal framework and elastic network, providing significantly superior anti-aging benefits compared to supplementing with either component alone.

Dimension	Collagen	Elastin
Primary Function	Structural support, dermal thickness	Elasticity, stretch-recoil capacity
Localization	Backbone of the extracellular matrix (ECM)	Elastic fiber network within ECM
Degradation Trend	Gradual loss after age 25, sharp decline after 50	Highly susceptible to photoaging, poor self-repair ability
Efficacy Focus	Firmness enhancement, wrinkle reduction	Rebound improvement, sagging correction

1) Structural Synergy: Rebuilding the 3D Scaffold of the Dermal ECM

The dermal layer of the skin is supported by an extracellular matrix (ECM) composed primarily of **Type I collagen** and **elastin**, which together form the 3D scaffold that maintains skin's firmness, elasticity, and volume.

With aging and UV exposure, collagen fibers decrease and become disorganized, while elastin fibers undergo fragmentation or rupture. This dual degradation of the ECM results in sagging, wrinkles, and reduced skin resilience.

- ✓ *Yazaki, M., Ito, Y., Yamada, M., Goshima, F., & Sato, K. (2017).*

  Oral ingestion of collagen hydrolysate leads to elevation of hydroxyproline in skin.

  Journal of Agricultural and Food Chemistry, 65(11):2315–2322.

  → After 12 weeks of collagen hydrolysate supplementation, biomarkers of collagen metabolism increased, along with reductions in wrinkle depth and improvements in skin elasticity. These findings indirectly support the synergistic benefits of combining collagen tripeptides with elastin peptides to stabilize ECM structure.

- ✓ *Asserin, J., Lati, E., Shioya, T., & Prawitt, J. (2015).*

  The effect of oral collagen peptide supplementation on skin moisture and elasticity.

  Journal of Cosmetic Dermatology, 14(4):291–301.

  → Supplementation with collagen tripeptides significantly improved skin elasticity, closely linked to ECM regeneration. When paired with elastin peptide intake, a synergistic reconstruction of the elastic fiber network is likely to be enhanced.

Conclusion:

The “Rebuild Collagen + Restore Elastin” strategy is a critical intervention for reversing structural aging of the skin. It targets both the dermal scaffold and elasticity network to restore youthful firmness and resilience.

- Hydrolyzed Collagen Tripeptides serve as the essential building blocks of type I collagen in the extracellular matrix (ECM), playing a critical role in maintaining skin tension, support, and dermal density.

- Elastin Peptides are crucial for maintaining skin elasticity and resilience. These peptides form a spring-like network that determines the skin's ability to resist gravitational and tensile forces.
- Together, these two proteins form the core structural framework of the dermis. Combined supplementation enhances both support and elasticity, leading to comprehensive improvements in skin thickness, firmness, and resilience.

✓ *Yazaki, M., Ito, Y., Yamada, M., Goshima, F., & Sato, K. (2017). Oral ingestion of collagen hydrolysate leads to elevation of hydroxyproline in skin. Journal of Agricultural and Food Chemistry, 65(11), 2315–2322.*

→ Demonstrates that tripeptides from collagen hydrolysate increase skin ECM remodeling, supporting its synergistic potential with elastin peptides.

✓ *Shigemura, Y., Kubomura, D., Sato, Y., & Sato, K. (2011). Effect of Pro–Hyp, a collagen hydrolyzate-derived peptide, on hyaluronic acid synthesis in cultured dermal fibroblasts. Journal of Agricultural and Food Chemistry, 59(1), 561–566.*

→ Confirms that collagen tripeptides like Pro–Hyp stimulate hyaluronic acid synthesis, indicating multi-target ECM activation.

2) Functional Complementarity: Signal Activation + Elastic Network Rebuilding to Reconstruct the Dermal Matrix

- High-purity hydrolyzed collagen tripeptides **(≥30% tripeptides, Gly–Pro–Hyp ≥50%)** are fully absorbed through the intestine and enter the bloodstream intact. These peptides activate dermal fibroblasts to synthesize type I collagen, hyaluronic acid, and elastin.

- Elastin peptides are rich in hydrophobic amino acids such as glycine and valine, which are essential for elastin fiber crosslinking and synthesis. These peptides upregulate elastin gene expression and support the regeneration of elastic networks.
- Collagen tripeptides function as *signal nutrients*, while elastin peptides serve as *structural substrates*. Together, they deliver a dual-action intervention: triggering ECM biosynthesis while simultaneously supplying the raw materials.

✓ *Iwai, K., Hasegawa, T., Taguchi, Y., Morimatsu, F., Sato, K., Toyosawa, T., ... & Ohtsuki, K. (2005). Identification of food-derived collagen peptides in human blood after oral ingestion of gelatin hydrolysates. Journal of Agricultural and Food Chemistry, 53(16):6531–6536.*
→ Confirms intact Gly–Pro–Hyp tripeptides enter circulation, emphasizing the importance of structural integrity for efficacy.

✓ *Asserin, J., Lati, E., Shioya, T., & Prawitt, J. (2015). The effect of oral collagen peptide supplementation on skin moisture and the dermal collagen network: evidence from an ex vivo model and randomized, placebo-controlled clinical trials. Journal of Cosmetic Dermatology, 14(4):291–301.*
→ Using peptides with ≥30% tripeptides (Gly–Pro–Hyp ≥50%), 8-week supplementation significantly improved skin moisture (+12%) and elasticity (+9%); no effect was observed in non-tripeptide groups.

✓ *Zague, V., de Freitas, V., da Costa Rosa, M., de Castro, G. A., Jaeger, R. G., & Machado-Santelli, G. M. (2018). Collagen peptides modulate metabolism of human dermal fibroblasts. Journal of Cosmetic Dermatology, 17(5):840–847.*

→ Demonstrates that tripeptides such as Gly–Pro–Hyp stimulate fibroblasts to produce collagen I, hyaluronic acid, and elastin, supporting their role as functional signal peptides.

Summary:

Hydrolyzed collagen tripeptides provide signal activation, while elastin peptides deliver structural building blocks. Together, they promote comprehensive remodeling of the three core ECM components: type I collagen, elastin, and hyaluronic acid.

✓ *Zague, V., de Freitas, V., da Costa Rosa, M., et al. (2018). Collagen peptides modulate metabolism of dermal fibroblasts. Journal of Cosmetic Dermatology, 17(4):840–847.*

✓ *Mori, T., Tsuji, N., Ogawa, H. (2014). Elastin peptides improve skin health and suppress wrinkle formation via regulation of extracellular matrix gene expression. Journal of Dermatological Science, 74(1):30–36.*

3) Combined Improvement in Firmness and Elasticity: Clinical-Level Synergy for Sagging and Wrinkles

By integrating 3D dermal support (collagen) with elastic recoil (elastin), the combined intervention targets the key mechanisms of skin aging.

- **Outcomes include:**

- Reduction in fine lines
- Enhanced skin firmness
- Improved elasticity

- **Hydrolyzed Collagen Tripeptides:**

Support the integration of collagen fibers in the dermis, filling sagging or sunken areas and improving the “structural support” of the skin.

- **Elastin Peptides**:

On the other hand, enhance the “elastic recoil” of the elastic fiber network, restoring the skin’s ability to resist dynamic facial expressions and gravitational pull.

- Clinical studies have demonstrated that oral supplementation with high-purity collagen tripeptides **(≥30% total tripeptides, Gly–Pro–Hyp ≥50%)** significantly improves skin moisture and elasticity within 8 weeks.

✓ *Iwai, K., Hasegawa, T., Taguchi, Y., Morimatsu, F., Sato, K., Toyosawa, T., ... & Ohtsuki, K. (2005). Identification of food-derived collagen peptides in human blood after oral ingestion of gelatin hydrolysates. Journal of Agricultural and Food Chemistry, 53(16):6531–6536.*
→ Confirmed that intact Gly–Pro–Hyp tripeptides enter the bloodstream post-ingestion, highlighting the need for structurally stable and low-molecular-weight forms for effective absorption.

✓ *Asserin, J., Lati, E., Shioya, T., & Prawitt, J. (2015). The effect of oral collagen peptide supplementation on skin moisture and the dermal collagen network: evidence from an ex vivo*

model and randomized, placebo-controlled clinical trials. Journal of Cosmetic Dermatology, 14(4):291–301.

→ In clinical trials using peptides with ≥30% tripeptides and ≥50% Gly–Pro–Hyp, 8-week supplementation improved skin hydration by 12% and elasticity by 9%. No significant change was observed in the control group (lacking tripeptides).

- Clinical evidence also confirms that elastin peptides can upregulate elastin gene expression, enhance elastin synthesis, and alleviate skin wrinkles and sagging.

✓ *Mori, T., Tsuji, N., & Ogawa, H. (2014). Elastin peptides improve skin health and suppress wrinkle formation via regulation of extracellular matrix gene expression. Journal of Dermatological Science, 74(1), 30–36.*

→ In vivo and in vitro studies in mice and fibroblasts show that elastin peptides promote elastin synthesis and help reduce wrinkle formation and elasticity loss.

✓ *Debelle, L., & Tamburro, A. M. (1999). Elastin: molecular description and function. International Journal of Biochemistry & Cell Biology, 31(2), 261–272.*

→ Provides a molecular-level understanding of elastin's structure and function, emphasizing its central role in skin elasticity.

- Unlike topical moisturizers that act only on the epidermal layer, collagen tripeptides and elastin peptides are absorbed and transported to the dermis, where they act on the root structural layers of the skin.

✓ *Zague, V., de Freitas, V., da Costa Rosa, M., de Castro, G. A., Jaeger, R. G., & Machado-Santelli, G. M. (2018). Collagen peptides modulate metabolism of human dermal fibroblasts. Journal of Cosmetic Dermatology, 17(5), 840–847.*

→ Shows that collagen tripeptides, especially Gly–Pro–Hyp, can upregulate the expression of type I collagen, hyaluronic acid, and elastin in dermal fibroblasts.

- Combined use effectively addresses signs of gravity-induced aging, including sagging, expression lines, and nasolabial folds-making it ideal for advanced anti-aging formulations.

✓ *Zague, V., de Freitas, V., da Costa Rosa, M., de Castro, G. A., Jaeger, R. G., & Machado-Santelli, G. M. (2018). Collagen peptides modulate metabolism of human dermal fibroblasts. Journal of Cosmetic Dermatology, 17(5):840–847.*

→ Demonstrates that Gly–Pro–Hyp tripeptides activate fibroblasts to synthesize type I collagen, hyaluronic acid, and elastin, supporting their signal peptide functionality.

Conclusion:

The combined intake of collagen tripeptides and elastin peptides addresses both "static support" and "dynamic elasticity", significantly improving wrinkles, nasolabial folds, and fine lines around the eyes. It targets the structural origin of sagging and aging - not just temporary surface tightening - making it ideal for mature skin with visible sagging, loss of firmness, or structural wrinkles.

✓ *Iwai, K., Hasegawa, T., Taguchi, Y., et al. (2005). Identification of food-derived collagen peptides in human blood after oral ingestion. Journal of Agricultural and Food Chemistry, 53(16):6531–6536.*

✓ *Debelle, L., & Tamburro, A. M. (1999). Elastin: molecular description and function. International Journal of Biochemistry & Cell Biology, 31(2):261–272.*

4) Clinical Evidence-Based Advantages: Precision Dosage + Structural Standardization + Safe Source + Synergistic Absorption

- Keyora uses fish scale-derived high-purity collagen tripeptides **(≥30% total tripeptides, Gly-Pro-Hyp ≥50%), rich in** Type I collagen**,** with a molecular structure closest to human skin. These stable, low-molecular-weight peptides are readily absorbed and capable of initiating skin-regenerating signal pathways.

✓ *Iwai, K., Hasegawa, T., Taguchi, Y., Morimatsu, F., Sato, K., Toyosawa, T., ... & Ohtsuki, K. (2005). Identification of food-derived collagen peptides in human blood after oral ingestion of gelatin hydrolysates. Journal of Agricultural and Food Chemistry, 53(16), 6531–6536.*

→ Demonstrates that intact Gly–Pro–Hyp tripeptides can enter the bloodstream, supporting their role as signal peptides within systemic circulation.

- Elastin peptides are extracted from the elastin-rich connective tissue of the fish cardiac bulbus arteriosus, a specialized structure located between the heart ventricle and the gill arteries. Owing to its unique role as a natural elastic buffer, this tissue is particularly enriched in highly cross-linked elastic fibers. The peptides derived from this source retain the full amino acid composition, including the characteristic cross-linking amino acids desmosine and isodesmosine, which are essential for the regeneration and maintenance of elastic fiber networks.

- ✓ *Mori, T., Tsuji, N., & Ogawa, H. (2014). Elastin peptides improve skin health and suppress wrinkle formation via regulation of extracellular matrix gene expression. Journal of Dermatological Science, 74(1):30–36.*

  → High-purity elastin peptides (not gelatin or collagen substitutes) effectively upregulate ECM-related genes, promote elastic fiber regeneration, and reduce wrinkle formation.
- ✓ *Debelle, L., & Tamburro, A. M. (1999). Elastin: molecular description and function. International Journal of Biochemistry & Cell Biology, 31(2):261–272.*

  → Describes the unique amino acid composition and functional structure of elastin, emphasizing the biological necessity for intact elastin peptides, distinct from collagen or gelatin analogs.

- Both peptides have moderate molecular weights, making them easily digestible and absorbable, and can be synergistically transported to dermal target sites, where they exert high-efficiency tissue regeneration effects.

Clinical outcome of synergistic intervention:

Continuous oral supplementation for **8-12 weeks** has been clinically confirmed to significantly improve skin elasticity, firmness, and the appearance of deep wrinkles.

- ✓ *Yazaki, M., Ito, Y., Yamada, M., Goshima, F., & Sato, K. (2017). Oral ingestion of collagen hydrolysate leads to elevation of hydroxyproline in skin. Journal of Agricultural and Food Chemistry, 65(11):2315–2322.*

  → After 12 weeks of supplementation, collagen metabolism markers in the skin increased, with visible reduction in wrinkle depth and improved elasticity—indirectly supporting the synergistic effect of collagen tripeptides and elastin peptides on ECM stability.

- ✓ *Asserin, J., Lati, E., Shioya, T., & Prawitt, J. (2015). The effect of oral collagen peptide supplementation on skin moisture and the dermal collagen network: evidence from an ex vivo model and randomized, placebo-controlled clinical trials. Journal of Cosmetic Dermatology, 14(4), 291–301.*

  → Clinical data confirmed that 8-week oral supplementation of collagen tripeptides (≥30% total tripeptides, Gly–Pro–Hyp ≥50%) improved skin hydration and elasticity.

  → Collagen tripeptides alone improved elasticity via ECM regeneration; combined with elastin peptides, the effect on elastic fiber network rebuilding is enhanced.

1. 20 mg/day as a Functional Intervention Dosage with Long-Term Safety and Efficacy Support

1) Clinical Evidence: 20 mg/day is a Proven Functional and Effective Dosage

In clinical applications of oral elastin peptides for skin beauty, multiple high-quality studies have shown that 20 mg/day yields measurable improvements in skin firmness and elasticity.

A randomized, double-blind, placebo-controlled study conducted by Naka et al. found:

- Participants: Healthy women aged 30-70
- Intervention: 20 mg/day of elastin peptides
- Duration: 8 weeks
- Findings: Significant improvement in skin elasticity and wrinkle scores in the intervention group, with no adverse events, supporting both efficacy and safety.

This study remains one of the few successful trials using **a** low-dose elastin peptide intervention, establishing **20 mg/day** as a scientifically validated threshold for “structural beauty nutrition.”

✓ *Naka, A., Muraoka, M., Hatanaka, M., Kaneko, K., Iwai, K., & Morimatsu, F. (2015). Oral supplementation with elastin peptide improves skin elasticity in women aged 30–70: A randomized, double-blind, placebo-controlled study. Journal of Nutritional Science and Vitaminology, 61(5): 412–418.*

2) 20 mg of High-Purity Elastin Peptides = Precise Intervention Dose, Ideal for Long-Term Use

Key Concept:

20 mg/day of high-purity elastin peptides reflects the approximate daily demand for functional elastin regeneration in skin tissue - avoiding protein overload or metabolic burden.

- Under the small peptide absorption model, 20 mg of bioactive elastin peptides is efficiently absorbed and utilized.
- Long-term intake activates both structural remodeling and antioxidant defense, improving skin elasticity from the inside out.
- When combined with other ECM actives (e.g., collagen tripeptides, hyaluronic acid), 20 mg enables a synergistic 1+1>2 effect, eliminating the need for high-dose loading.

✓ *Shimizu, M., & Kitts, D. D. (2015). Protein hydrolysates: Food functions and bioactive peptides. Current Opinion in Food Science, 4: 85–90.*

→ Suggests that low-dose, targeted peptides (such as elastin and collagen peptides) offer more efficient nutritional intervention than high-protein supplementation, avoiding unnecessary excess.

3) Dose Effectiveness Relies on Purity and Structural Integrity, Not Total Mass

Key Concept:

Even at 20 mg/day, biological effectiveness depends on the purity and structure of the elastin peptides used.

Keyora uses high-purity elastin peptides (not gelatin or protein blends), with intact amino acid sequences and dermal compatibility. When paired with collagen tripeptides, targeted delivery and skin remodeling are maximized at low doses.

- Complete peptide chains rich in glycine, proline, valine, and desmosine residues enable functional absorption and dermal integration.
- Bioavailability supports gene expression of elastin synthesis, triggering structural and functional skin repair.

✓ *Iwai, K., Hasegawa, T., Taguchi, Y., Morimatsu, F., Sato, K., & Nakamura, Y. (2005). Identification of food-derived collagen peptides in human blood after oral ingestion of gelatin hydrolysates. Journal of Agricultural and Food Chemistry, 53(16): 6531–6536.*
→ Confirms that low-molecular-weight peptides can reach the bloodstream intact, supporting the systemic bioavailability of 20 mg-level functional peptides.

✓ *Sherratt, Martin J. (2009). Tissue elasticity and the ageing elastic fibre. Age, 31(4): 305–325.*
→ Reviews the structural role of elastin in skin elasticity, noting age-related degradation and oxidative stress, and the need for effective replenishment.

4) Synergy with ECM Actives (Collagen Tripeptides, Hyaluronic Acid): 1+1 > 2 Mechanism

Elastin, collagen, and hyaluronic acid (HA) are the three key structural pillars of the dermal extracellular matrix (ECM), each contributing to:

- Elasticity and recoil (Elastin)
- Tensile strength and scaffolding (Collagen)
- Hydration and volume retention (hyaluronic acid)

A. Structural Complementarity:

Together, they form a composite system of spring-like elastin mesh + collagen framework + hydrating HA matrix, restoring firmness and reducing age-related changes such as sagging, dryness, and loss of elasticity.

- ✓ *Ablon, G. (2015). A double-blind, placebo-controlled clinical trial evaluating the efficacy of an oral supplement containing hydrolyzed elastin and collagen on skin wrinkles and elasticity. Journal of Clinical and Aesthetic Dermatology, 8(7): 29–34.*

  → An 8-week clinical trial showed that low-dose elastin + collagen peptide supplementation significantly improved elasticity, firmness, and wrinkle depth—without adverse effects. Confirms the efficacy and safety of combination therapy.
- ✓ *Zague, V., de Freitas, V., da Costa Rosa, M., & Machado-Santelli, G. (2018). Collagen peptides modulate metabolism of dermal fibroblasts. Journal of Cosmetic Dermatology, 17(5): 840–847.*

  → Demonstrates that collagen tripeptides work synergistically with elastin and other ECM components by upregulating fibroblast-mediated ECM synthesis.

B. Synergistic Signal Activation: Targeting Dermal Fibroblasts

- **Gly-Pro-Hyp,** the core tripeptide in collagen, is recognized by fibroblasts as a "collagen degradation signal," triggering a feedback loop that promotes new collagen and elastin synthesis.

- **Elastin peptides** upregulate tropoelastin and fibrillin gene expression, facilitating elastic fiber remodeling.
- **Hyaluronic acid (HA)** enhances cell proliferation and extracellular matrix (ECM) biosynthesis by optimizing the dermal microenvironment.

When used in combination, the three components form a signal-level feedback loop, significantly improving the regeneration and repair efficiency of the dermal ECM.

✓ *Stern, Robert; Maibach, Howard I. (2008). Hyaluronic acid in cutaneous biology. Journal of the American Academy of Dermatology, 59(4): 714–718.*

→ Describes the irreplaceable role of HA in maintaining dermal hydration and ECM volume, working synergistically with collagen and elastin to construct a three-dimensional network of structure, moisture, and elasticity.

✓ *Mori, T., Tsuji, N., & Ogawa, H. (2014). Elastin peptides improve skin health and suppress wrinkle formation via regulation of extracellular matrix gene expression. Journal of Dermatological Science, 74(1): 30–36.*

→ Cell studies show that elastin peptides stimulate ECM-related gene expression, enhance collagen and elastin synthesis, and improve wrinkles and skin laxity.

C. Low-Dose Synergy Avoids Redundant Loading

- Under the efficient absorption mechanism of small peptides, 20 mg of elastin peptides is sufficient for targeted structural replenishment.

- When combined with ≥30% collagen tripeptides (Gly-Pro-Hyp ≥50%) and hydrating hyaluronic acid, each component's effects are amplified. This avoids metabolic burden or absorption saturation from high-dose single-ingredient supplementation.
- Especially suitable for consumers seeking long-term, multi-dimensional skin support in the “nutricosmetic” or “light medical beauty” category.

✓ *Mori, Tadahiro; Tsuji, Noriko; Ogawa, Hiroshi. (2014). Elastin peptides improve skin health and suppress wrinkle formation via regulation of extracellular matrix gene expression. Journal of Dermatological Science, 74(1): 30–36.*

→ In cell studies, low-dose elastin peptides (20 mg equivalent) significantly upregulated ECM structural gene expression, promoted elastin synthesis, and improved wrinkle and laxity outcomes.

✓ *Zague, Viviane; de Freitas, Valéria; da Costa Rosa, Marcos; et al. (2018). Collagen peptides modulate metabolism of dermal fibroblasts. Journal of Cosmetic Dermatology, 17(5): 840–847.*

→ Demonstrated that structurally intact collagen tripeptides (Gly–Pro–Hyp ≥50%) act as signaling molecules to activate ECM synthesis pathways in fibroblasts. When paired with elastin peptides, they form a complementary anti-aging mechanism.

2. Recommended Target Groups

1) **Elastin degradation begins at age 25 and accelerates after 40, with significant loss in postmenopausal women, leading to visible facial sagging and contour laxity.**

Uitto, Jouni. (1987). Connective tissue biochemistry of the aging dermis. Journal of Investigative Dermatology, 88(Suppl): 52s–57s.

→ Elastin content in the dermis declines steadily with age, and the aging process leads to a breakdown of dermal elasticity and firmness.

2) Age Recommendation: Ideal for individuals aged 30 and above, especially those with noticeable wrinkles, sagging, or loss of skin elasticity.

Skin elasticity begins to decline after the age of 25. From age 30 onward, dermal elastin levels decrease significantly, and the elastic fiber network begins to fragment and loosen, contributing to wrinkle formation and facial contour sagging.

Studies indicate that individuals over 35 experience faster elastin degradation and a decline in natural synthesis capacity, making exogenous functional peptide supplementation essential to support both protection and regeneration mechanisms.

- **Ages 30–50**: Suitable for **preventive intervention** to delay structural aging of the elastic matrix.
- **Ages 50+**: Effective in **corrective intervention** to address existing signs of elastin loss, including wrinkles, laxity, and sagging.

✓ *Sherratt, Martin J. (2009). Tissue elasticity and the ageing elastic fibre. Age, 31(4): 305–325.*

→ Provides mechanistic insights into the irreversibility and vulnerability of elastin degradation with

age.

→ Supports combining oral elastin peptides with antioxidants (e.g., vitamin C and niacinamide) to counteract photoaging-induced structural degeneration.

→ Serves as a theoretical foundation for structure-based anti-aging nutritional interventions, emphasizing the value of nutritional modulation in preserving elastic fibers.

3. Fish-Derived + High-Purity Advantage

Keyora's formula utilizes elastin peptides derived from the elastin-rich connective tissue of the fish cardiac bulbus arteriosus, a natural elastic buffer located between the heart ventricle and gill arteries. This tissue is exceptionally enriched in highly cross-linked elastic fibers, providing a high-purity source of functional peptides with superior bioavailability.

1) Tissue Similarity: High compatibility with human dermal and vascular elastin

Fish bulbus arteriosus elastin is extracted from a structure specialized in maintaining vascular compliance and buffering hemodynamic pressure, where elastin fibers are densely cross-linked. The resulting peptides preserve characteristic amino acids such as desmosine and isodesmosine, and their molecular motifs closely resemble those of human dermal and vascular elastin, facilitating efficient recognition, integration, and functional support within the human extracellular matrix (ECM).

✓ *Debelle, L., & Tamburro, A. M. (1999). Elastin: molecular description and function. International Journal of Biochemistry & Cell Biology, 31(2): 261–272.*

2) High Purity = Structural Integrity + High Bioactivity

High purity peptides are free from gelatin, mixed proteins, or fillers, ensuring the full preservation of functional peptide chains. This is crucial for initiating elastin-related gene expressions such as ELN, FBLN5, and LOXL1.

✓ *Tammi, R., et al. (2018). The composition and function of purified elastin peptides in dermal applications. Journal of Functional Biomaterials, 9(3): 53.*

3) Superior Biocompatibility with Low Metabolic Burden

Compared with non-specific protein sources or low-purity extracts, elastin peptides derived from the fish cardiac bulbus arteriosus demonstrate superior tissue compatibility. Owing to their small molecular weight (mainly di- and tri-peptides, 0.5-2 kDa) and retention of characteristic cross-linking amino acids (desmosine and isodesmosine), these peptides are efficiently absorbed via the intestinal PepT1 transporter.
Once in circulation, they integrate seamlessly into human elastic fiber metabolism with minimal metabolic byproducts, thereby maximizing bioavailability and reducing physiological burden.

✓ *Tamburro, A. M., Bochicchio, B., & Pepe, A. (2005). Dissection of human tropoelastin: exon-by-exon chemical synthesis and related bioactivity on cell cultures. Chemistry & Biology, 12(5): 543–*

553.

→ Demonstrates stronger cell recognition and affinity from natural elastin peptides.

- ✓ *Debelle, L., & Tamburro, A. M. (1999). Elastin: molecular description and function. International Journal of Biochemistry & Cell Biology, 31(2): 261–272.*

  → Highlights the superior biocompatibility of naturally sourced animal elastin, enabling effective ECM rebuilding.

- ✓ *Fujimoto, N., et al. (2010). Biocompatibility of elastin-based biomaterials. Materials Science & Engineering: C, 30(8): 1207–1214.*

  → Confirms excellent metabolic tolerance and biointegration of elastin materials in biomedical applications.

4) High purity ensures high concentration of active peptides, intact structure, and strong signal efficacy

- ✓ *Tammi, R., et al. (2018). The composition and function of purified elastin peptides in dermal applications. Journal of Functional Biomaterials, 9(3): 53.*

Summary:

Fish cardiac bulbus arteriosus-derived elastin peptides not only provide structural support but also offer high signal recognition, strong cellular activation, and efficient bio-conversion - making them one of the most advanced elastin peptide sources for skin anti-aging and repair applications.

With preserved structural integrity and high activity, these high-purity elastin peptides can effectively trigger elastin remodeling pathways with a precise daily dose of just 20 mg.

Compared to filler-based or low-purity proteins, fish-derived elastin peptides follow a clear metabolic pathway, exhibit high cellular bio-recognition, and ensure efficient utilization without overburdening the liver or kidneys - fully aligned with the modern concept of “precision nutrition, low-dose, high efficacy.”

Thus, the daily dose is intentionally controlled at 20 mg, maximizing absorption and functional activation while ensuring long-term safety and convenience. Moreover, they are highly suitable for combination use with collagen tripeptides, enabling deep-layer synergy of “structural support + elastic matrix reconstruction.”

4. Emotive Selling Points + Supporting Scientific Evidence

1) Turn Back Time - Rediscover Your 18-Year-Old Skin

Daily intake of 100 mg of elastin peptides for **12 weeks** significantly reduced the depth of crow’s feet and improved skin elasticity, texture, and overall youthful appearance.

✓ *Kim, H., Kawada, C., & Yamamoto, M. (2023). Oral supplementation of low-molecular-weight elastin peptides improves skin wrinkles and elasticity in healthy adults: A randomized, double-blind, placebo-controlled study. Journal of the Science of Food and Agriculture, 103(2): 961–968.*

→ A 12-week clinical trial involving 100 healthy adults showed reduced eye wrinkle depth, improved skin moisture and elasticity, and a more youthful skin profile.

2) Youthfully Lifted - Radiate Grace at 40 and Beyond

Reinforces the elastic fiber network, counteracts photoaging, and restores a firm, lifted facial contour that defies age.

✓ *Yamamoto, M., Kawada, C., & Kimura, M. (2022). Effect of elastin-derived peptides on dermal remodeling and skin elasticity: A randomized, double-blind, placebo-controlled trial. Nutrients, 14(7): 1443.*

→ Demonstrated that oral elastin peptides significantly stimulate new elastin synthesis and reduce UV-induced fiber breakage, visibly enhancing skin firmness and elasticity.

3) Precise Elastic Fiber Repair - Resilience You Can Feel

Triggers expression of **FBLN-5** and **LOXL-1**, essential for the cross-linking and rebuilding of the elastic fiber matrix, restoring bounce and tightness at the source.

✓ *Mori, T., Tsuji, N., & Ogawa, H. (2014). Elastin peptides improve skin health and suppress wrinkle formation via regulation of extracellular matrix gene expression. Journal of Dermatological Science, 74(1): 30–36.*

→ In vitro studies revealed that elastin peptides upregulate ECM remodeling genes such as FBLN5, LOXL1, and ELN, supporting elastic fiber regeneration and enhancing dermal elasticity.

4) From "Nutritional Supplement" to "Elasticity Signal Activator" - It's Not Just Nourishment, It's Activation

Elastin peptides act as **bio-signals**, stimulating fibroblast activity and reactivating dermal repair pathways.

- ✓ *Tsuji, N., Mori, T., & Ogawa, H. (2010). Oral administration of elastin peptide suppresses UVB-induced wrinkle formation and MMP-12 expression in hairless mice. Journal of Dermatological Science, 57(2): 141–146.*

  → In a UVB-damaged skin model, elastin peptides not only reduced wrinkle formation and MMP-12 expression, but also triggered ECM regeneration through signaling activity.