

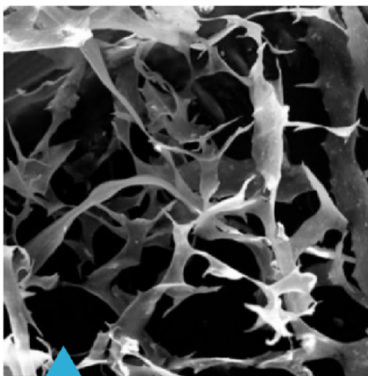
WHITE PAPER - ATELOCOLLAGEN PRODUCTS

COMPANY INFORMATION

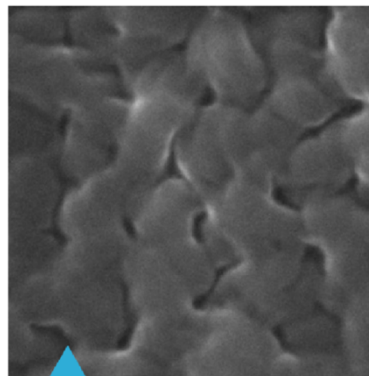
Promed Bioscience is a highly innovative, EU-based biotech company developing collagen-based biomaterials, such as highly purified medical grade atelocollagen from animal tissues, for a wide range of research, clinical and cosmeceutical applications. The company is committed to providing science-based solutions in order to address the growing demand for collagen, propped by recent scientific discoveries into its role in disease and as the aging of the population presents new challenges to health and wellbeing.

COLLAGEN

Collagen is one of the most abundant proteins in the human body and serves as the main structural protein of the extracellular matrix (ECM) in connective tissues such as ligaments, tendons, cartilage and skin. The protein exists in a triple-helix formation that confers the necessary mechanical resistance to tensile forces and provides the capacity to bind a variety of macromolecules that form the extracellular matrix network. It is naturally assembled in several configurations, ranging from networks to fibrils, all of which serve various structural, mechanical and organizational roles to define local tissue architecture and influence cellular behavior. Collagen is continuously produced and replaced to combat the breakdown and loss of connective tissue from daily wear and tear, injury or disease. However, as we age, that natural regenerative ability diminishes and our bodies are able to produce less and less collagen. Thus, highly purified collagen extracted from animal tissues can be used in clinical applications and in various formulations to replace the body's native collagen:



Lyophilized collagen -
exhibits structural
rigidity and stability



Collagen for gel
formation, ideal for cell
culture



Collagen fibrils retain
mechanical strength
and elasticity

COLLAGEN APPLICATIONS

Research Applications

Collagen is used in research to create gels for cell culture, scaffolds for tissue engineering and in assays that study cell behavior and cellular interactions with the extracellular environment

- in vitro assays
- tissue engineering/regenerative medicine
- in vivo studies
- 3D matrices and bioprinting

Cosmeceuticals & Nutraceuticals

Collagen and collagen peptides are major components of high-end skincare products and nutraceuticals for skin and joint health

- cosmeceuticals and specialty skincare products
- nutraceuticals and nutricosmetics

Medical Applications

Collagen scaffolds, coatings, implants and fillers can be used in clinical practice for skin regeneration, in wound care products and in surgical, dental, and orthopedic applications.

- wound care (dressings, wound healing gels, hemostatic agents)
- dermatological/skin regeneration
- Dental, orthopedic, surgical implants, membranes and grafts

EXTRACTION PROCESS

Our collagen products are purified from porcine tendons via a multi-step process involving chemical soaking, enzymatic extraction, filtration, and dialysis. Highlights of our production process:

- Proprietary extraction methods leading to superior yields of Type I atelocollagen and telocollagen that maintain the triple helical structure and fibrillar form of the protein
- Extraction process preserves the structural and mechanical properties of the native collagen found in tissue (strength, elasticity, etc)
- Enzyme treatment and dialysis purification lead to highly purified atelocollagen products through the complete removal of degradation byproducts and impurities
- Chemically and thermally stable products, provided either in lyophilized form to remove water content, allowing for an extended shelf life or in ready to use solution
- Atelocollagen products with enhanced biocompatibility/biodegradability and low antigenicity
- Custom formulations developed according to strict customer specifications

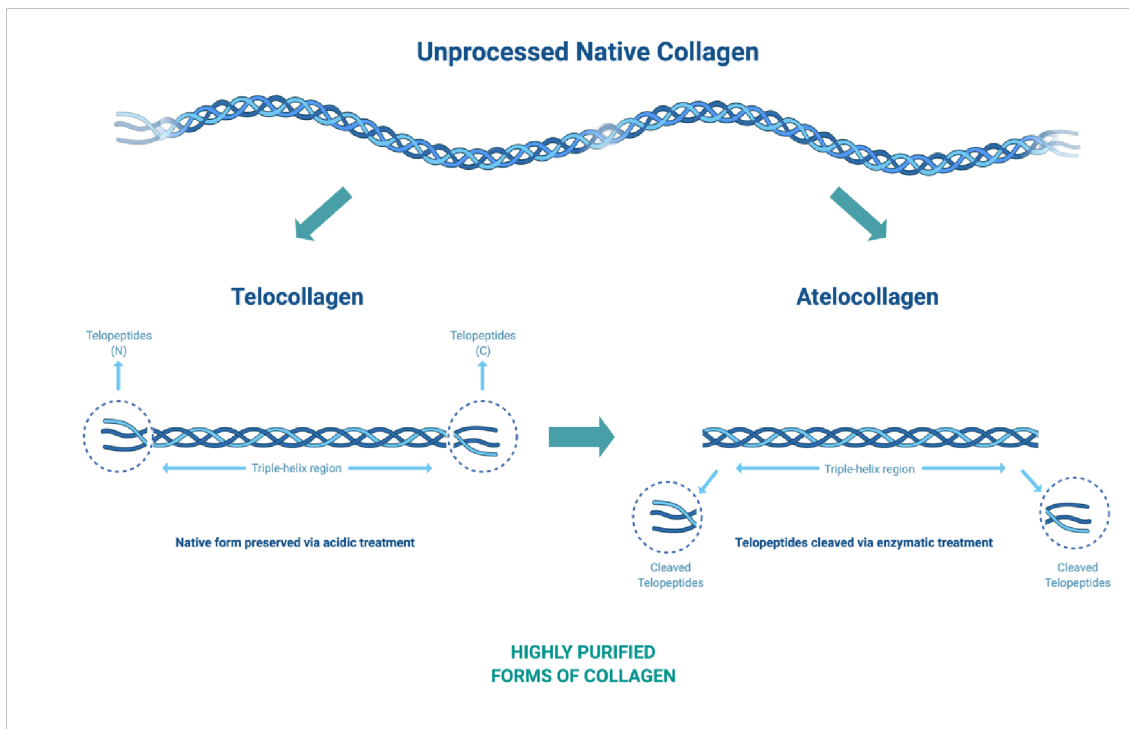


Figure 1. Acid extraction is used to produce collagen from animal tissue that maintains the telopeptide ends of the collagen chains. Enzyme-based extraction removes telopeptides resulting in atelocollagen that exhibits reduced immunogenicity.

COLLAGEN PURITY

- Collagen extracted from EU-sourced porcine tissues, with negligible BSE risk and from veterinary-controlled herds
- Extraction process utilizing collagen-rich tissues such as tendons (no skin or bone tissue) that results in highly pure Type I collagen products
- Production facilities operating under strict EU controls and regulations, with GMP-compliance and ISO certification in progress
- Extensive microbiological testing and analysis at all stages of extraction
- Collagen quality & purity assessed and quantified via SDS-Page and amino acid analysis
- Biomechanical parameters and properties (stiffness, tensile strength) assessed in state-of-the-art university research facilities

PRODUCT INFORMATION

Atelocollagen (Lyophilized)

Product Name:	Atelocollagen, lyophilized
CAS Number:	9007-34-5
Catalog Number:	PRO-2001
Animal Source:	Porcine
Source origin:	Cyprus
Storage:	15 - 25°C
Certificates available:	Certificate of Analysis, Certificate of Origin

PRODUCT ANALYSIS

Test/Requirement/Method	Data
Package size	5, 10, 20, 50, or 100 mg in vials
Appearance	White/Off-white powder
Form	Freeze-dried powder
Type	Collagen Type I
Source	Porcine tendon
Extraction method	Enzymatic extraction (pepsin)
Purity	> 95%
Amino Acid Analysis	Typical/characteristic profile
Electrophoretic Pattern - Coomassie Blue	Characteristic pattern, visible $\alpha 1$, $\alpha 2$, β and γ bands
Sterility/Microbiological testing <ul style="list-style-type: none"> • Total Viable Count (T.V.C) • E.coli • Coagulase positive staphylococci • Coliforms • Yeast and Moulds 	0 cfu/mL
Heavy metals analysis	< 1 ppm
Sterilization method	Produced under aseptic conditions
Cell Attachment Assay	Pass
Cell Toxicity Assay	Pass

COLLAGEN TESTING

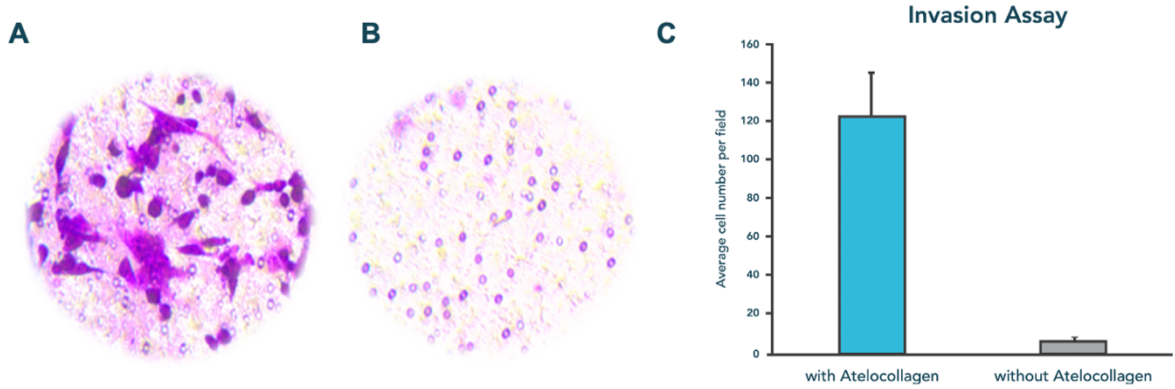


Figure 2. Promed atelocollagen used as chemoattractant in cell invasion assay. Addition of atelocollagen to the substrate (A) promotes cell migration more efficiently than regular substrate (B) as quantified in graph (C).

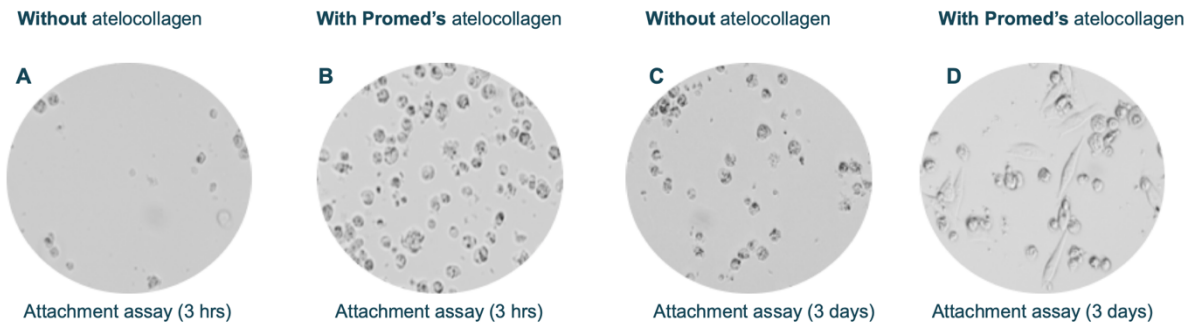


Figure 3. Promed atelocollagen used as cell culture coating in cell attachment assays. Addition of atelocollagen to the culture vials promotes cell growth and proliferation.

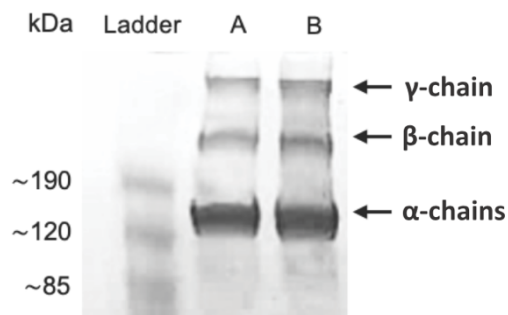


Figure 4. Molecular weight distribution by SDS-PAGE. Figure shows highly purified atelocollagen product, both in lyophilized form (A) and in solution (B), without the presence of other protein impurities or extraction by-products.