Enabling a Healthier World

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From Source to Structure: Ensuring Collagen Integrity

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Business Use Only

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Collagen types and sources

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Types	Location
Type I	Bone, skin, dentin, cornea, blood vessels
Type II	**Cartilaginous tissues**
Type III	Skin, ligaments, blood vessels and internal organs
Type IV	Basement membrane in various tissues
Type V	Blood vessel wall, synovium, corneal stoma, tendon, lung, bone, cartilage and skeletal muscle

Type II is the major supporting collagen of articular cartilage.

Corresponds to 90-95% of the collagen that exists in the joint.

Collagen Source

- Animal
- Marine
- Egg Shell

UC-II®

Undenatured type II collagen is different from denatured or hydrolyzed collagen

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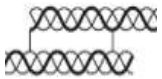
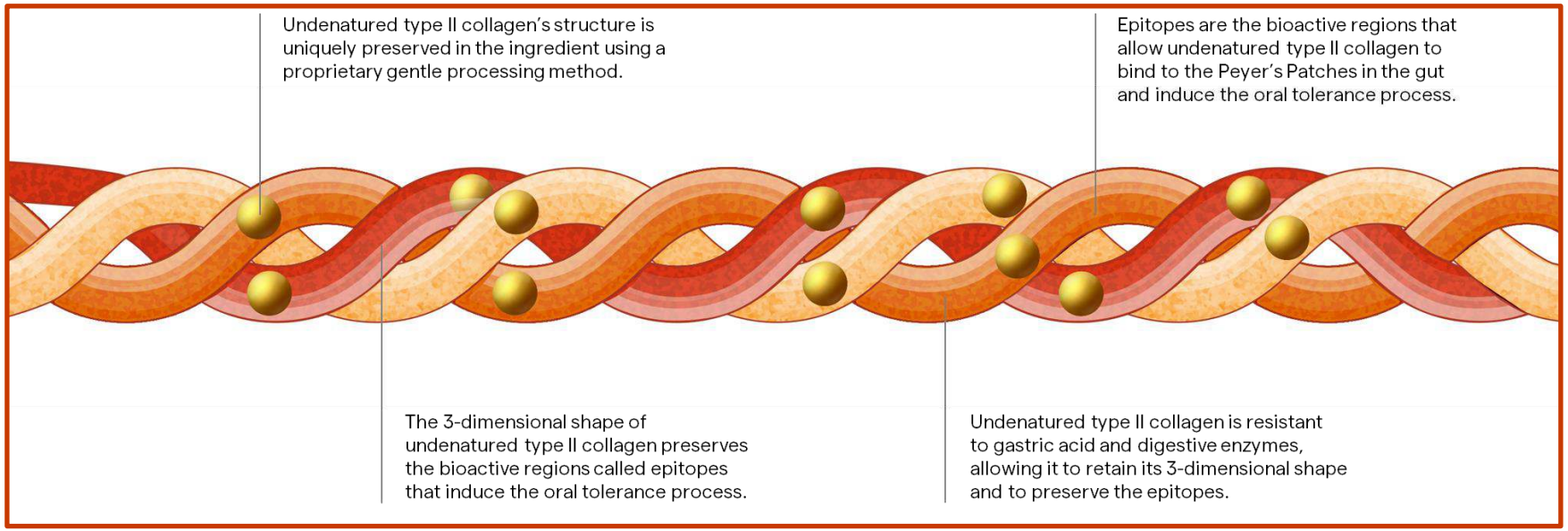
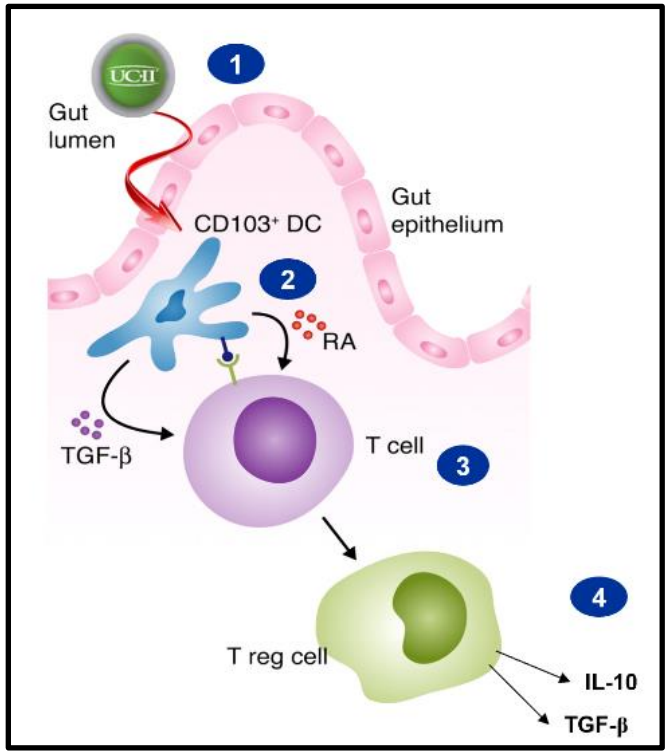
Undenatured vs Denatured (Hydrolyzed) Collagen			
	Undenatured (Native)	**Denatured**	
		Gelatin	**Hydrolyzed collagen**
Preparation method	No enzyme Gentle processing	Partial hydrolysis (heat) Harsh processing	Partial/complete hydrolysis (Heat/Enzyme/Chemical solvents)
Triple helical structure	Retained	Disrupted	Disrupted
Structural representation			
Molecular weight	300 kDA	20kDa to 220 kDa	2 to 9kDA
Product form	Intact polypeptides Active epitopes	Mixture of peptides and polypeptides No active epitopes	Amino acids and small peptides No active epitopes
Mechanism of action	Oral tolerance	Building block	Building block
Efficacious daily amount	UC-II® undenatured type II collagen 40 mg	2-10 g	2-10 g

How does undenatured type II collagen work? Capsugel® | Lonza

The next generation solution to support joint health and maintain mobility





Adapted from: von Boehmer H. *J Exp Med.* 2007;204(8):1737-9.

Triggers the immune system to support natural cartilage repair and promote building of new cartilage. **

**Note: Animal studies suggest that the likely mechanism of action is that it promotes normal inflammatory response while helping to support cartilage regeneration.

Pan, P., et al. (2024). Undenatured type II collagen protects against collagen-induced arthritis by restoring gut-joint homeostasis and immunity. Communications biology, 7(1), 804.
Bagi et al. (2017). Oral administration of undenatured native chicken type II collage (UC-II) diminished deterioration of articular cartilage in a rat model of osteoarthritis (OA). Osteoarthritis Cartilage, 25(12), 2080-2090.
Bagchi, D., et al. (2002). Effects of orally administered undenatured type II collagen against arthritic inflammatory diseases: a mechanistic exploration. International journal of clinical pharmacology research, 22(3-4), 101–110.

Quantification of undenatured type II collagen versus total collagen

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Comparison of ELISA vs HPLC Methods		
Details	**ELISA immunoassay**	**HPLC/Hydroxyproline**
Assay purpose	Quantifies the amount of **undenatured type II collagen**	Quantifies the amount of **total collagen**—does NOT differentiate hydrolyzed from undenatured form, which have two different mechanisms of action
Method principle	Immunoassay that specifically measures undenatured type II collagen	Amino acid analysis method – using hydroxyproline
Sensitivity	Monoclonal antibodies are utilized for undenatured type II collagen	Amino acid analysis method is sensitive to quantitate protein content
Validation	Yes – ELISA assay is a documented process to measure undenatured type II collagen	Yes – HPLC is a documented process to measure total collagen

Thank You