



## JOINT SUPPLEMENT

### CONSUMERS WANT TO MAINTAIN THEIR MOBILITY



**87% of Boomers and 85% of Gen X taking supplements in the United States would like to use dietary supplements for joint health.\***

\* NMI SORD Consumer Survey, 2017

### UNIQUE MODE OF ACTION

**UC-II® UNDENATURED TYPE II COLLAGEN: MAY TRIGGER THE NATURAL REBUILD OF CARTILAGE IN YOUR JOINTS**

#### WEAR & TEAR

Daily activities, exercise, or normal stress could lead to joint wear and inflammation

#### REPAIR

UC-II® product triggers anti-inflammatory cascade

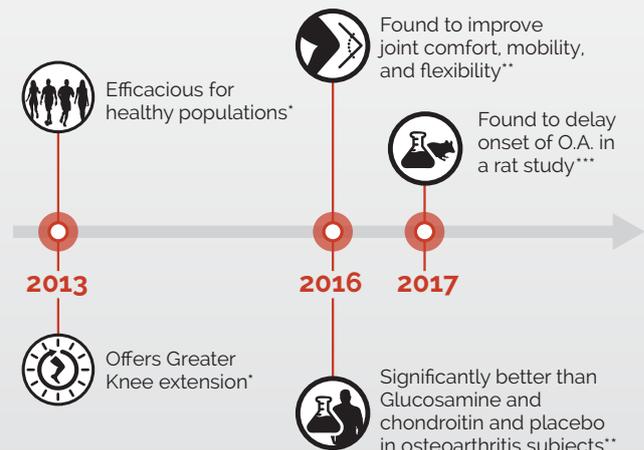


#### CLEAN

Enzymes are upregulated to remove damaged cartilage

### BACKED BY SCIENCE

**UC-II® UNDENATURED TYPE II COLLAGEN DELIVERS CLINICALLY STUDIED JOINT-HEALTH BENEFITS**



\* Lugo JP, et al. *J Int Soc Sports Nutr.* 2013;10:48.

\*\* Lugo JP, et al. *Nutr J.* 2016;15:14.

\*\*\* Bagi CM, et al. *Osteoarthritis Cartilage.* 2017;25:2080.

### SUPERIOR CONVENIENCE

JUST ONE TINY EASY TO SWALLOW CAPSULE DAILY



**• 87% OF THE CONSUMERS CONSIDER EASY TO SWALLOW IS IMPORTANT IN THEIR BUYING DECISION OF DIETARY SUPPLEMENTS**

**• UC-II® UNDENATURED TYPE II COLLAGEN SUPPORTS JOINT HEALTH IN ONE, 40 mg DOSE**



**1** SMALL CAPSULE CONTAINING 40mg UC-II® UNDENATURED TYPE II COLLAGEN

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**3** TABLETS CONTAINING GLUCOSAMINE AND CHONDROITIN

For more information call +1 707 751 2800, send an email to [info.benicia@lonza.com](mailto:info.benicia@lonza.com) or contact your Lonza Consumer Health & Nutrition Sales representative



# JOINT SUPPLEMENT

## 7 THINGS YOU NEED TO KNOW

### HOW UC-II® UNDENATURED TYPE II COLLAGEN WORKS



#### 1 WHAT IS THE MODE OF ACTION?

UC-II® undenatured type II collagen appears to exert joint-health benefits by a process called oral tolerance, based on pre-clinical research.

#### 2 WHAT IS ORAL TOLERANCE?



Oral tolerance is an immune process the body uses to distinguish between harmless compounds (e.g., dietary proteins, intestinal bacteria) and potentially harmful foreign invaders. It occurs in the gut-associated lymphoid tissue (GALT).

#### 3 WHAT IS THE GALT?

The GALT is mostly made up of parts of the body's immune system that surrounds the small intestine (Peyer's patches). Peyer's patches take in and screen compounds from the gut and, depending on the compound, turn the body's immune response on or off.

#### 4 WHAT HAPPENS AFTER ORAL INTAKE?

When taken orally, UC-II® undenatured type II collagen is likely taken up by the Peyer's patches where it activates immune cells (e.g., Tregs) known to inhibit inflammation. Once activated, these immune cells migrate throughout the body and eventually target areas of inflammation where they secrete anti-inflammatory molecules like, interleukin 4 (IL-4), interleukin 10 (IL-10) and transforming growth factor-beta (TGF-β). This action helps reduce joint inflammation and promotes cartilage repair.

#### 5 WHY UNDENATURED COLLAGEN?

Undenatured type II collagen contains active epitopes that are able to interact with Peyer's patches and induce oral tolerance. Denatured type II collagen, by contrast, lacks these essential structural components.

#### 6 WHAT IS THE SUPPORTIVE RESEARCH?

Preclinical studies support oral tolerance as the mode of action of UC-II® undenatured type II collagen and confirm the undenatured form of type II collagen is critical for joint-health benefits:

In an animal model (mouse) of rheumatoid arthritis, only undenatured type II collagen protects against joint damage, an action attributed to oral tolerance.



(Nagler-Anderson C, et al. *Proc Natl Acad Sci.* 1986;83(19):7443-6.)



In an animal model (rat) of rheumatoid arthritis, undenatured type II collagen provides symptom relief, an action attributed to oral tolerance and modulating inflammatory pathways.

(Tong T, et al. *Inflamm Res.* 2010;59(5):369-77.)

In a cell study, Treg cells specific for type II collagen secrete anti-inflammatory cytokines that play a key role in the cells' ability to induce oral tolerance.



(Asnagli H, et al. *Arthritis Res Ther.* 2014;16(3):R115.)



In a cell study with human chondrocytes (cells that make up cartilage), the anti-inflammatory action of IL-10 protects against damage from TNF-alpha, a pro-inflammatory mediator elevated in osteoarthritis.

(Müller RD, et al. *Cytokine.* 2008;44(3):377-85.)

Clinically validated lab assays confirm active epitopes in UC-II® undenatured type II collagen resist digestion and retain the undenatured 3D-structure needed to interact with Peyer's patches and induce oral tolerance.



(Bagchi D, et al. *Int J Clin Pharmacol Res.* 2002;22(3-4):101-10.)

#### 7 WHAT IS THE BOTTOM LINE?



UC-II® undenatured type II collagen initiates cartilage protective pathways that help prevent the immune system from damaging its own joint cartilage, while promoting cartilage repair and regeneration.

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