



The Story behind the Discovery of UC-II®

Interest in the use of chicken collagen for joint health began two decades ago following the initial investigation and discovery by a researcher who was searching for relief of his daughter's crippling arthritis. Dr. Moore's young daughter, Anne Marie, was diagnosed with rheumatoid arthritis at age 8, and her condition worsened over the years, with swollen joints and pain so bad that by the time she was in her late 20s she had to use an electric wheelchair to perform daily tasks.

Then one day Dr. Moore read about some initial studies which showed that chicken collagen could ameliorate the pain due to rheumatoid arthritis. Dr. Moore, a chemical engineer, began to investigate what forms of chicken collagen might produce these effects.

Dr. Moore's investigations showed that only when small amounts of chicken collagen were ingested did it produce a preventative effect. Armed with this information, Dr. Moore turned his own kitchen into a laboratory, and began developing collagen preparations from store-bought chickens. He found that if he cooked the collagen, it became ineffective. So he developed a recipe for a native or *undenatured* form of the chicken sternum cartilage that was effective for improving his daughter's condition.

Dr. Moore also gave his chicken collagen preparation to his good friend, Roger, who had crippling osteoarthritis. Within a few weeks after consuming daily quantities of the chicken collagen preparation Roger began to feel much better and began to move about with a greater ease of mobility.

Anne Marie and Roger describe their transformation as extraordinary. Their quality of life improved dramatically. Dr. Moore has gone on to strengthen the research behind his discovery in dedication to the hope of bringing relief to others similar to what he did for his own daughter.

The Science behind UC-II®

Almost two decades since Anne Marie experienced her improvement, the science behind *undenatured* type II collagen has grown and has contributed to a new understanding of T-cell regulators. Several human clinical studies were conducted through Harvard University. In these studies, *undenatured* type II collagen showed efficacy in improving the symptoms of people with rheumatoid arthritis. The studies found that not only did symptoms improve, but in some cases there was complete remission after administration of *undenatured* type II collagen.^{1,2,3}

Building on this science, but utilizing a novel manufacturing process, UC-II brand *undenatured* type II collagen was developed and patented. UC-II's low-heat, non-enzymatic manufacturing process ensures the natural levels of *undenatured* type II collagen. Clinical and preclinical studies conducted on UC-II have found that UC-II is effective for promoting joint health.

Most recently, UC-II® was studied in a randomized, double-blind, placebo-controlled study to investigate the effects of UC-II on alleviating joint discomfort in HEALTHY subjects who experienced joint pain upon strenuous exercise but not during rest. Neither a diseased population nor disease-centric endpoints were employed in this study. As part of the protocol design, all subjects were medically evaluated to confirm that they did not meet the American College of Rheumatology criteria



for osteoarthritis. Healthy adults comprised of 23 males and 32 females, with an average age of 46 years, 16 years younger than the typical age for an OA study. Joint stress was induced via a standardized stepmill protocol. Subjects took 40 mg of UC-II or a placebo for 120 days. UC-II subjects had significantly greater knee extension compared to placebo and exercised longer before experiencing joint discomfort and recovered faster from joint discomfort after exercising compared to baseline.⁴

In a second pivotal study, 40 mg of UC-II was shown to increase joint comfort, mobility and flexibility in people with osteoarthritis. Research from this randomized, double-blind, 53-subject, 90-day study showed that UC-II reduced WOMAC, VAS and Lequesne scores by 33%, 40% and 20%, respectively. The same research study showed that 1,500 mg glucosamine and 1,200 mg chondroitin reduced WOMAC, VAS and Lequesne by 14%, 15% and 6%, respectively. In select questionnaires, subsets of the study showed that UC-II significantly improved the quality of life, such as reducing pain ascending stairs, pain at night while in bed, pain climbing up and down stairs and difficulty walking on a flat surface, compared to glucosamine plus chondroitin.⁵

Animal studies in dogs demonstrate significant efficacy levels (improvement in walking) versus baseline using the highly objective Ground Force Plate method. Ground force plate analysis is determined by measuring the amount of weight the dog is bearing on a given limb and the amount of force applied by the limb onto the plate. This analysis determined that UC-II significantly increased both parameters, suggesting a significant increase in joint comfort and mobility.⁶ Previous research findings showed that UC-II significantly reduced overall pain and pain after limb manipulation in osteoarthritic dogs.⁷ In another study, osteoarthritic horses receiving UC-II showed an increase in mobility, flexibility of joints and physical activity due to decreased pain associated with arthritis. The placebo group showed no changes in arthritic conditions.⁸

Unique Mechanism of Action

Daily wear and tear of the joints leads to release of proinflammatory cytokines and upregulation of collagenases and aggrecanases by chondrocytes, ultimately leading to the breakdown of joint cartilage and the extracellular matrix. Pain and stiffness soon follow. In healthy subjects, chondrocytes release anti-inflammatory cytokines as well as synthesize type II collagen to help repair the joints. UC-II helps with the repair part of this cycle.

- Active epitopes in UC-II interact with Peyer's patches (lymphoid tissue) in the small intestine resulting in the release of a second class of collagen-specific, regulatory T cells that migrate to joint areas and modulate the ongoing local inflammatory response.
- These collagen-specific regulatory T cells also slow the production of inflammatory cytokines.
- Through the action of these collagen-specific T regulatory cells, the secretion of collagenase enzymes by macrophages that break down the collagen in the joint is vastly slowed.
- As the destructive cycle subsides, the imbalance of cartilage turnover appears to shift in favor of normal cartilage rebuilding.



Joint Health

UC-II supplies a patented form of undenatured type II collagen for joint health support. It is an FDA-notified and published new dietary ingredient (NDI). UC-II is derived from everyday food that is well tolerated by humans as well as animals, with no reported side effects. UC-II is sourced and manufactured in the United States at a GMP-certified facility. A comprehensive safety profile on UC-II has been established demonstrating a wide margin of safety for human consumption based on an array of toxicological studies.⁹ The Burdock Group, an independent leading toxicology group, reviewed UC-II safety research in a thorough, critical evaluation. The expert panel of toxicologists concluded that UC-II is safe for human consumption and is generally recognized as safe (GRAS).¹⁰

We experience “joint health” when we are easily able to move, run, jump, and enjoy the full range of motion our bodies were built to explore. A safe food-based approach is ideal for helping us to remain active and vibrant through our lives. Research in healthy subjects demonstrate benefits for sports nutrition. UC-II can fill that role now that it is available as a nutraceutical ingredient that can be a part of your product range.

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