



## Its Potential Therapeutic Role in Joint Health and Function

- **Statement of goal**

To examine the elemental structure of BioCell Collagen II™ (hydrolyzed type II collagen from young chicken sternum), and to examine the material's therapeutic potential as a dietary ingredient in the treatment of osteoarthritis and other connective tissue health concerns.

- **Statement of objectives**

To obtain a general understanding of osteoarthritis, its causes, its impact on an individual's health and its economic impact.

To gain a general understanding of healthy joint function and structure and to compare these to a joint affected by osteoarthritis.

To gain an understanding of Type II Collagen, Proteoglycans, Glycosaminoglycans and the role they play in maintaining healthy joint tissue and function.

To understand the current nutritional treatments for osteoarthritis and other connective tissue disorders.

To examine the unique elemental make-up of BioCell Collagen II™ (hydrolyzed type II collagen from chicken sternum)

To examine the potential therapeutic benefits of of BioCell Collagen II™ (hydrolyzed type II collagen from chicken sternum)

To gain an understanding of the market opportunities for the use of of BioCell Collagen II™ (hydrolyzed type II collagen from chicken sternum)

\*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, cure, treat, or prevent any disease.

\*For Educational Purposes Only



## Introduction

Osteoarthritis is the most common disease of the articular joints. Also known as degenerative joint disease, it is most often characterized by degradation of articular cartilage, loss of joint function, inflammation and pain. Considered a major musculoskeletal disease it may seriously limit an individual's productivity, self-reliance and ultimately, quality of life. It has been estimated that approximately 80% of the American population will suffer from osteoarthritis by the time they reach the age of 65 (Brandt KD, 2000). In addition, 30% of all doctors' visits are made by individuals who suffer from this disease (Brandt KD, 2000). The financial impact of osteoarthritis, including medical costs and lost wages was projected to be \$95 billion for the year 2000.

Osteoarthritis primarily affects the weight-bearing joints including knees, hips, spine and, in some instances, hands and feet. Many factors may contribute to the onset and progression of osteoarthritis including aging, genetics, weight, trauma and metabolic abnormalities.

Traditional therapies for osteoarthritis include prescription drugs such as Paracetamol, with doses as high as 4000 mg/day. If they do not work well for the patient, NSAIDs, acetaminophen and different analgesics may be used orally and topically. Because of gastrointestinal distress, NSAIDs are recommended at the lowest possible dose and for as short a time as possible. Surgery is sometimes an option. In general, there are limitations with traditional, conventional medical treatment for osteoarthritis partially because of the side effects from drugs and the fact that they do not alter the progression of the disease.

The limitations associated with traditional therapies have been a driving force in the search for new alternative therapies that might help alter the progression of this disease. The dietary supplement industry has been at the forefront of this search. Current dietary ingredients with clinical support and great consumer satisfaction include glucosamine and chondroitin. Continuing consumer demand along with a better understanding of the disease has led to the development of powerful new dietary ingredients that may more effectively nourish and strengthen the articular cartilage, thereby enhancing the quality of life for those suffering from osteoarthritis.

## Joint Anatomy

To understand how nutritional therapies might offset or delay the progression of osteoarthritis, it is important to understand the function, structure and

elements of healthy joints and to compare these to a joint affected by the disease. (see figure 1)

**Function.** Joints are the joining points where two moving bones meet. Their purpose is to protect the bone ends from wearing away and to provide shock absorption from movements such as walking, running and other repetitive movements.

**Structure.** Joints are made up of Articular Cartilage, Joint Capsule, Synovial Fluid, Synovium, Muscles, Tendons and Ligaments.

- Articular Cartilage is a protective gel-like tissue that covers the ends of bones in movable joints. It is a complex material consisting of both solid and fluid components. The cells primarily responsible for the production and maintenance of articular cartilage are called "Chondrocyte Cells". These chondrocyte cells produce Collagen (specifically type II collagen) and Proteoglycans, which along with water make up the intercellular matrix. Researchers refer to this as the "cartilage matrix". Together Chondrocytes, Collagen, Proteoglycans and Water provide articular cartilage with outstanding shock absorbing capabilities and permit repetitive motion without breakdown of underlying bone. When articular cartilage is healthy it is firm, smooth, resilient and perfectly able to perform its designated task of providing protection to and frictionless movement between two meeting bones. However when cartilage becomes unhealthy it may become thin, rough or torn. All of which may increase pain and decrease range of motion. Articular cartilage is the primary tissue affected in connective tissue disorders such as osteoarthritis or degenerative joint disease.

- The joint capsule is a strong membrane sac that provides protection and support for the bones and other joint components. It is surrounded by ligaments, tendons and muscles for added strength and support.

- Synovial fluid is an ultra-filtered, blood plasma consisting of Hyaluronic Acid (glycosaminoglycan) and glycoproteins. It reduces friction and provides lubrication to the joint. Hyaluronic acid is primarily responsible for the lubricating and shock-absorbing capabilities of synovial fluid. In addition, synovial fluid carries nutrients to the cartilage cells (chondrocytes) and transports waste products away from the cartilage. It is important to note that articular cartilage has very poor blood supply and that nearly all the nutrients required to support the health of articular cartilage come from the synovial fluid. A reduction of synovial fluid can therefore lead to increased friction and poor

nutrient supply which may ultimately lead to degeneration of cartilage.

- The synovium or synovial membrane is a thin, weak membrane inside the joint capsule. The synovium acts to control the environment within the joint. It does this in two ways. First, it acts as a membrane to determine what can pass into the joint space and what stays outside; second, the cells within the synovium produce substances such as hyaluronan (hyaluronic acid) which as noted above, is a major component of joint or synovial fluid.

- Muscles, ligaments and tendons work synergistically to keep the bones and joints stable and aligned, allowing them to bend and move.

Many factors may contribute to promoting healthy joint structure and function with one of the most important factors being nutrition. Connective tissue such as articular cartilage is in a constant state of turnover, meaning that damaged or older connective tissue cells are being removed and then replaced by new healthy cells. To perform this task the body requires a constant supply of nutritional raw materials that it can utilize to help maintain tissue health and integrity. In the case of degenerative joint disease or repetitive impact activities such as running this cellular turnover can be greatly accelerated which in turn places an increased demand on the nutritional raw materials the body requires for tissue repair and maintenance.

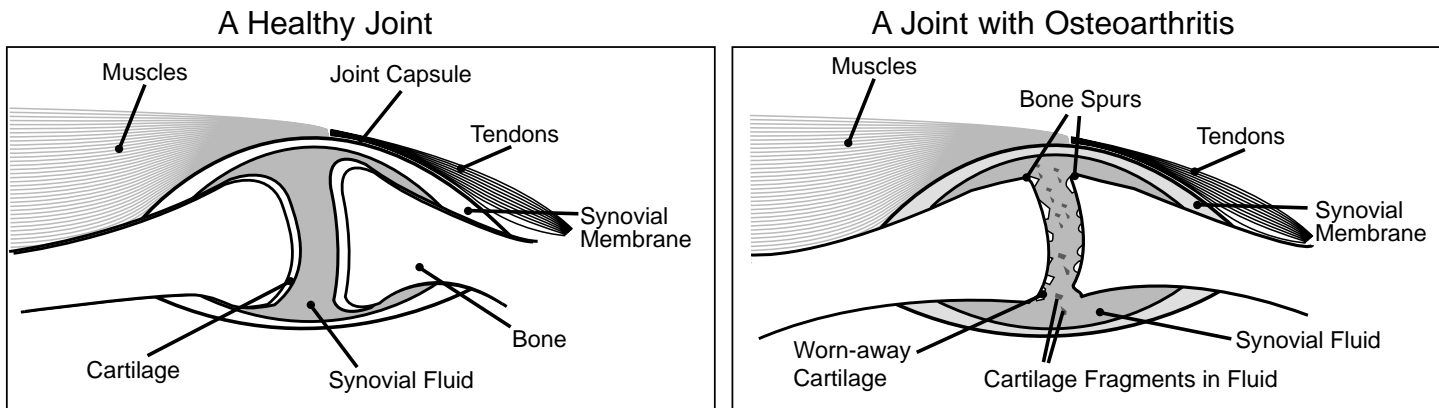
When the balance between cellular breakdown and synthesis does not occur we will see an overall degeneration of the connective tissue. To prevent this degeneration or at the very least slow its progression, it is important to supply the body with optimal levels of nutritional raw materials, or as many health experts refer to them, "chondroprotective nutrients".

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Figure 1



### The Cartilage Matrix – A Closer Look At Its Role In Joint Health

As noted earlier a major symptom of osteoarthritis is degradation or breakdown of articular cartilage. It is important to fully understand the cartilage matrix, how the body produces it, and how the body is able to repair or delay damage to this matrix when properly nourished. By having a clear understanding of the structures involved in cartilage production and maintenance we may also better understand how to support the body with essential nutritional raw materials (chondroprotective dietary ingredients) that may prove more effective or further compliment the primary ingredients being marketed today.

Healthy articular cartilage is composed of Chondrocytes (cartilage cells), which make up approximately 5% of the tissue. The remaining 95% is a gel-like extracellular matrix consisting of Collagen, specifically Type II Collagen, Proteoglycans and Water. Together these structures are referred to as the cartilage matrix. Embedded within the cartilage matrix are glycosaminoglycans such as Chondroitin Sulfate and Hyaluronic Acid. When healthy, these structures and their essential components enable articular cartilage to efficiently distribute load and permit repetitive motion without damage to the bone. Special attention should be paid to maintaining its health and integrity due to the fact that the largest percentage of articular cartilage is the cartilage matrix.

• **Chondrocytes** are the cells that actually produce type II collagen and proteoglycans, the solid components of the extracellular matrix. The extracellular matrix in turn provides the chondrocytes with an environment that is conducive to their health in the face of high mechanical stress. In other words, chondrocytes are responsible for the overall health, regeneration and maintenance of cartilage tissue.

Like all other tissue cells, chondrocytes require a constant supply of nutritional elements and raw materials to produce the structures that compose articular cartilage (type II collagen, proteoglycans) and maintain the cartilage's health and integrity. But unlike other cells, chondrocytes have little if any nutrient support from the blood. The primary way in which nutrients are delivered is via the synovial fluid. This method of nutrient delivery is not nearly as effective as direct blood flow. It is therefore critical that the body is supplied with high concentrations of nutritional raw materials that the chondrocytes can then use to maintain cartilage health and integrity. A breakdown in the flow of nutrients necessary for collagen and proteoglycan synthesis can greatly impair tissue regeneration.

• **Collagen** is the primary structural protein making up the connective tissues of the body including cartilage, bones, tendons, ligaments and skin. The word collagen comes from the Greek word meaning "glue producing". Depending on your information source we have identified between 12 -19 different types of collagen within the body. In each type their main function is to supply structural support to and connectivity between cells. The primary collagen found in articular cartilage is Type II Collagen.

As with all proteins, collagen is made up of unique amino acid chains. There are 20 different amino acids that are used throughout the body to help build specialized protein structures. Ten of these amino acids are termed "essential", meaning the body cannot synthesize them. They can only be obtained from the protein-rich foods we eat. The remaining ten can be obtained from food sources or synthesized by the body providing it has the necessary raw materials. By combining different numbers of amino acids or by altering their sequence, the body is able to make unique proteins that perform highly specialized functions. What makes collagen proteins

truly unique as compared to other proteins is that they contain two amino acids not found in other proteins. These amino acids are Hydroxyproline and Hydroxylysine. Without proper levels of each amino acid or the raw materials for amino acid synthesis the body's ability to build and repair essential protein structures such as collagen will be greatly compromised which can lead to a breakdown in the connective tissue.

• **Type II Collagen** makes up approximately 90% of the collagen present in articular cartilage. As mentioned above one area that separates collagen proteins from other proteins is the fact that hydroxyproline and hydroxylysine are essential components of their amino acid structure. What further differentiates Collagen Type II from other collagen proteins is that type II collagen has higher levels of hydroxylysine. The ability of the chondrocytes to produce type II collagen is primarily dependent upon having the right amino acids (raw materials) available in the diet to build the protein chain.

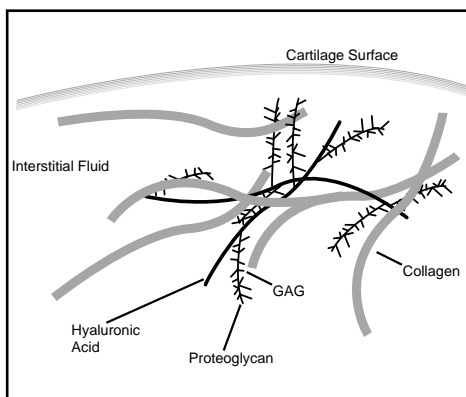
Type II collagen as found in articular cartilage is in the form of thin fibrils in a loose mesh. These thin collagen fibrils provide the tensile strength and closely interact with proteoglycans and glycosaminoglycans to hold the gel-like material that is produced when proteoglycans attract water. This combination of structures with their specialized functions is what provides articular cartilage with its strength, moistness, lubrication and resiliency.

• **Proteoglycans** are intertwined with the type II collagen fibrils described above. They consist of a protein core attached to long chains of sugar based molecules known as glycosaminoglycans. The major glycosaminoglycans are Hyaluronic Acid, Chondroitin Sulfate, and Keratan Sulfate.

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Proteoglycans and glycosaminoglycans are not specific to the cartilage matrix. They can be found in synovial fluid, ligaments, mucus, skin, blood vessel walls, heart valves and in the eye. Proteoglycans look something like a bottlebrush. The protein core is the main bristle and the glycosaminoglycans are attached to this core and extend away from it (see figure2). The glycosaminoglycans are negatively charged which cause them to repel each other but enables them to attract a large amount of water. As stated earlier articular cartilage is approximately 70% water. When many proteoglycans join together within the cartilage matrix they form proteoglycan aggregates.

Figure 2



Type II Collagen

The resulting cartilage that is formed by the intertwining of type II collagen and proteoglycans is very porous and looks much like a sponge which in a sense it is. When weight is applied to a joint, water is forced out of the sponge-like cartilage and into the joint space. When the pressure is eased, the proteoglycan structures pull water back into the matrix. They absorb as much water as the type II collagen fibrils will allow. This action offers several important benefits including cushioning, resiliency, joint lubrication and movement of nutrients into the cartilage matrix where chondrocytes can pick up the raw materials they need to produce the matrix and removal of waste products from the matrix.

Within the cartilage matrix there is a delicate balance between type II collagen and proteoglycans. One where the proteoglycans attract and retain the water required for shock absorption and lubrication and the type II collagen provides the tensile strength that ensures not too much water is retained. When this balance is shifted such as sometimes happens when glycosaminoglycans are not being synthesized by the chondrocytes as fast as they are being destroyed, we see a greater amount of water filling the space the proteoglycans once occupied in the cellular matrix. When this takes place the cartilage becomes soft and watery (chondromalacia). When in this condition normal pounding and friction from repeated movement can more easily

damage cartilage, which then leads to an even greater demand for the chondrocytes to synthesize more proteoglycans. This again shows the importance of supplying the body with the nutritional raw materials required for the health and maintenance of articular cartilage.

In review we can see that articular cartilage is a complex mix of several structures which are synthesized by specialized cells known as chondrocytes. As with all tissues, the structures that make up articular cartilage are in a constant state of turnover and require a steady supply of raw materials for tissue repair or regeneration. It has also been noted that the health of articular cartilage may be affected by many factors including aging, genetics, weight, trauma and metabolic abnormalities. Anyone of these conditions can put extra stress on cartilage tissue breakdown, which in turn puts a greater demand on nutritional raw materials for repair or maintenance. When this increased demand is not met with an increase supply of nutritional raw material we may see an increase in joint pain and or a decrease in range of motion. Each of these could be warning signs of cartilage degeneration. The ultimate result is a decline in quality of life.

### Current use of Nutraceuticals in the Management of Osteoarthritis

We earlier referred to nutritional elements that facilitate cartilage tissue repair and maintenance as being "Chondroprotective nutrients". These chondroprotective nutrients help stimulate chondrocyte synthesis of collagen type II and proteoglycans. They may also stimulate production of glycosaminoglycans such as hyaluronic acid. The net result is an inhibition of cartilage degradation. The most common chondroprotective nutrients currently being sold as dietary supplements are Glucosamine and Chondroitin.

**Glucosamine** is an amino sugar manufactured in the body and has also been studied to support joint health. It is a precursor of glycosaminoglycans and proteoglycans. It is a key compound in the synthesis of hyaluronic acid and chondroitin sulfate. It is found throughout the body in various tissues, but it is most abundant within the cartilage. Glucosamine sulfate as a supplement is readily absorbed in the body. Research has shown that radioactive labeled glucosamine administered to animals was visible in cartilage within 4 hours. Once absorbed cartilage chondrocytes take it up for utilization. The research demonstrates it uses glucosamine for regeneration or repair of cartilage and actual synthesis of glycosaminoglycans. One human study (Drovanti, 1980) with subjects administered 1.5 grams of glucosamine sulfate daily over a 30-day period. There was a significant 70%

improvement in symptoms (reduced pain, tenderness, swelling; increased range of motion). The placebo only had about half with improvements.

**Chondroitin sulfate** has been shown in the United States and other countries to have a significant effect on joint function, reducing pain and improving joint mobility. It is the most abundant glycosaminoglycan found in articular cartilage. It has been shown in research that chondroitin sulfate is significantly reduced with age (Yamada, 1999). Specifically chondroitin-6-sulfate was reduced with age and in advanced and the terminal stage of osteoarthritis.

A meta-analysis was performed which analyzed 7 double-blind studies (Leeb B) showing it's effectiveness. By providing nourishment to the body, it has profound effects on its ability to regenerate cartilage.

Both nutrients are believed to be beneficial to Osteoarthritis, with the ability to promote the health of cartilage. With degenerating arthritic disease, cartilage continues to degenerate, but when its own fundamental materials are provided it reverses. Chondroitin and glucosamine taken orally serve as building blocks to help support regeneration of cartilage and improve joint mobility.

Although isolated chondroprotective nutrients such as glucosamine and chondroitin have proven to be effective dietary ingredients supporting cartilage health they are still somewhat narrow in their applications. Nutritional product formulators have known this all along and have created multinutrient formulas with most containing a glucosamine and chondroitin blend. Their goal is to create a finished product that supports cartilage health on many fronts.

Even with the success of glucosamine and chondroitin the search has continued for natural materials that are more efficacious or at the very least complement these materials so that together they provide even greater chondroprotective benefits. This continued search lead to the discovery of **BioCell Collagen II™**. BioCell Collagen II™ represents a new generation of natural dietary ingredients whose diverse elemental makeup provides the body with key reconstructive materials that work synergistically to support optimal joint health and integrity.

**"Within the cartilage matrix there is a delicate balance between type II collagen and proteoglycans."**

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**BioCell Collagen II™ ...Its Potential Therapeutic Nutritional Role**

The structure and function of the elements making up healthy articular cartilage are to say the least quite complex. Maintaining optimal health within the articular cartilage is a delicate balance between tissue breakdown and tissue synthesis. If the body is not provided all the raw materials needed to maintain this balance we may only achieve partial benefits.

BioCell Collagen II™ and its elemental structure may address this need for nutritional balance far better than any known dietary ingredient targeting joint health. BioCell Collagen II™'s primary nutritional potential is to provide the body with a "super concentrated food source" that will more effectively support connective tissue health and maintenance. It may specifically support the anabolic process of the body as it pertains to conditions such as osteoarthritis, degenerative joint disease, joint defects and cartilage injuries. Unlike other isolated elements which are more narrow in their application (ie. chondroitin, glucosamine, MSM etc.) BioCell Collagen II™ naturally supplies a full-spectrum of chondroprotective elements each with diverse methods of action that support different structures of the cartilage matrix simultaneously.

BioCell Collagen II™ is derived from 100% pure chicken sternum cartilage of young chickens. It is carefully manufactured through a patented process to contain high concentrations of Hydrolyzed Collagen Type II Protein (60-65%) and low molecular weight GAG's (Glycosaminoglycans), such as Chondroitin Sulfate (min 20%), Hyaluronic Acid (min 10%), and other proteoglycans that readily absorb through the GI Tract to allow superior bioavailability.

As a dietary food source BioCell Collagen II™ offers great biological value for articular cartilage synthesis by supplying the body with a concentrated source of reconstructive materials that match the structure to be built. A close look at the elements that makeup BioCell Collagen II™ shows that each on their own offers great potential for nutritional support but the benefits from their synergistic yet diverse actions should be far superior.

• **Type II Collagen** as mentioned earlier is approximately 90% of the collagen present in articular cartilage. BioCell Collagen II™ is an extremely rich dietary source of the primary amino acids that make up the type II collagen molecule. As concentrated source of these amino acids, BioCell Collagen II™ may more effectively support type II collagen synthesis within articular cartilage by assuring that the right amino acid structures are available when needed. It should be noted that most joint products being marketed today overlook

support for type II collagen synthesis. By doing so they may be creating products that are not providing full nutritional benefits for optimal joint health. (see figure 3)

Figure 3

<b>AMINO ACID PROFILE (gms/100 gm powder)</b>			
*arginine	4.42	alanine	4.51
*histidine	2.05	aspartic	5.29
*isoleucine	1.90	cystine	0.46
*leucine	4.20	glutamic	8.75
*lysine	3.54	glycine	8.93
*methionine	1.38	hydroxyproline	3.90
*phenylalanine	2.14	proline	5.25
*threonine	2.60	serine	2.45
*tryptophan	0.37	tyrosine	1.16
*essential amino acids		valine	2.43
*may naturally vary			

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• **Chondroitin** is the most abundant glycosaminoglycan found in articular cartilage. We previously discussed the efficacy of this material when taken orally. It has several methods of action that have proven to be beneficial in helping to maintain articular health. As part of BioCell Collagen II™'s elemental makeup it naturally contains a minimum 20% chondroitin that has been molecularly optimized for maximum bioavailability.

• **Hyaluronic acid** or hyaluronan has been mentioned throughout this paper as an important constituent of healthy articular cartilage and synovial fluid. Its structure is the simplest of all glycosaminoglycans and forms the backbone of proteoglycans. Hyaluronic acid is found in connective tissue and manufactured in the synovial membrane. As a major component of synovial fluid and articular cartilage it acts as a lubricant within the joints and protects the cartilage matrix from harmful compounds such as bacteria or toxins passing through it by diffusion. As a vital component of synovial fluid it is also essential for proper nutrient delivery. Hyaluronic acid irregularities have been associated with connective tissue diseases like osteoarthritis. It is presently being studied for its attributes. The molecular weight of the hyaluronic acid occurring naturally in BioCell Collagen II™ has been reduced to allow maximum absorption.

It is evident that BioCell Collagen II™ is a new generation of therapeutic agents that may more effectively support optimal joint health. Its unique elemental profile provides the body with a concentrated source of reconstructive materials that match the structure to be built... namely the structures that make up the cartilage matrix. As described above these elements offer different methods of action whose synergism may prove more effective than current dietary ingredients, which are more limited in their applications.

BioCell Collagen II™ has been available as a dietary supplement from a select few marketing partners since 1997. Since then thousands of people have used it and continue to use it as a natural dietary aid in the treatment of connective tissue disorders such as osteoarthritis. Reports from these individuals as well as the doctors who recommend it to their patients are directly in line with the expected results, which are a relief of pain, increased range of motion and greater quality of life.

Because of its medical potential and positive consumer feedback BioCell Collagen II™ is presently being studied in two double blind, placebo controlled human studies. Various hydrolyzed collagen studies have already been performed showing that they reduce inflammation and support joint health. BioCell Collagen II™ goes

beyond the materials used in these studies by providing a wider and more targeted array of nutritional support elements. The research suggests that pharmaceutical grade collagen hydrolysate (PCH) in large doses reduces joint pain in individuals with osteoarthritis of the knee or hip. Oral supplementation of hydrolyzed collagen has also been shown to increase blood levels of hydroxyproline. Hydroxyproline is a vital amino acid of connective tissue. In addition, for safety purposes there has been a long history of use of collagen products in pharmaceuticals and foods.

## BioCell Collagen II™ Offers Tremendous Market Opportunity

There is no doubt that one of the bright shining stars of a slumping nutritional industry is the sale of natural products targeting joint health. Active sports consumers and the ever-growing populations of those turning 50 have embraced the need for preventive maintenance when it comes to the health of their joints. Their response has helped drive double digit sales growth for products such as glucosamine and chondroitin.

• **BioCell Collagen II™** fits perfectly into this category and perhaps provides the category with an added spark. It was the quest to find more efficacious ingredients to serve this growing consumer group that led to the discovery of BioCell Collagen II™. As in the past today's consumer is still drawn to products that are "new, better, or improved". In this sense BioCell Collagen II™ has all the elements needed to grab consumer attention and drive sales even higher.

• **BioCell Collagen II™** is a chondroprotective nutrient that first and foremost has the potential to stand on its own merit. Feedback from our marketing partners as well as growing evidence of consumer satisfaction reinforces this fact. BioCell Collagen II's™ chondroprotective benefits are expected to be further reinforced when the results of two studies are released later this year.

• **BioCell Collagen II™** is also a perfect ingredient to serve as the centerpiece of new novel multi-ingredient formulas targeting joint health. It can also be used to add even greater potential benefits to existing products that are narrower in their applications. Finally, the addition of BioCell Collagen II™ will also help companies differentiate their products.

Overall the primary reason to include BioCell Collagen II™ in your line of natural products is to better serve the needs of today's consumers by offering products that more fully support the body's efforts to maintain joint health and integrity, thereby enhancing a person's quality of life.

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## In Summary

We have taken a close look at joint anatomy, its complex structures, metabolic actions and nutritional materials needed for the body to maintain a steady balance between tissue breakdown and tissue synthesis. Nutritional and medical scientists travel this same path each day in an effort to gain a better understanding of the human body and by doing so find new, more effective ways to help us maintain optimal health and therefore a better quality of life.

It was this very path that led researchers to investigate the potential health benefits of glucosamine and chondroitin and it is the same path that led to the discovery of BioCell Collagen II™.

Researchers quickly realized that the elements naturally contained in BioCell Collagen II™ closely match the raw materials needed by the body to effectively support synthesis of collagen type II, proteoglycans and synovial fluid. They had found a material with the potential to provide nutritional support to different structures of the cartilage matrix simultaneously. In essence they had found a product whose sum benefits could far outweigh the individual benefits of each element.

One of the primary goals of nutritional supplementation is to more effectively support the body's metabolic processes and supply the necessary raw materials that maintain cell structure and function. Based on this definition BioCell Collagen II™ with its complex make-up and diverse methods of action holds tremendous therapeutic potential to support the health and maintenance of the body's connective tissue particularly articular cartilage.

BioCell Technologies' BioCell Collagen II™ is a powerful nutritional ingredient now available for use in dietary supplements. For a price quote, or more information about BioCell Collagen II™. Contact Terry Howell, Director of Sales and Marketing at 1-949-476-3786 or visit our website at [www.biocelltechnology.com](http://www.biocelltechnology.com)

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BioCell Collagen II™ is a trademark of BioCell Technology LLC. BioCell Technology LLC holds the exclusive rights to market Chicken Sternum Collagen Type II under United States Patent # 6,025,327 for the use of Chicken Sternum Collagen Type II for the treatment of connective tissue disorders, osteoarthritis, degenerative joint disease, joint defects, cartilage injuries and vascular disease. Additional patents are pending, including the manufacturing rights of Chicken Sternum Collagen Type II for human and pet consumption.

# BioCell Collagen II™

## A New Dimension In Joint Health

**Question:** What do healthy joints and BioCell Collagen II™ have in common?


**Answer:** Type II Collagen, Chondroitin Sulfate, Hyaluronic Acid, Glucosamine and other Proteoglycans.

**BioCell Collagen II™** is a "Super Nutrient" which provides crucial support for healthy joints unmatched by other products. While other products offer merely one-dimensional support, BioCell Collagen II™ provides a comprehensive matrix of powerful reconstructive materials.

**BioCell Collagen II™** is derived from 100% pure chicken sternum, the richest source of type II collagen and hydrolyzed for maximum absorption. Independent analysis shows that BioCell Collagen II™ contains Type II Collagen (60-65%), Chondroitin Sulfate (20% min.), Hyaluronic Acid (10% min.) and Glucosamine. In other words BioCell Collagen II™ provides the same key elements which are vital to healthy joint structure and function. It is the **ONLY** hydrolyzed chicken type II collagen product to offer this unique profile.

A recent human clinical study showed that 89.9% of the subjects received pain relief at some level within forty-five days of taking BioCell Collagen II™.

Patented BioCell Collagen II™ will add a new dimension to your joint care products and a new dimension to your sales.

 is a trademark of BioCell Technology, LLC and is protected by U.S. Patent No. 6,025,327 (Other U.S. and foreign patents pending)



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