A stunning report on the importance of collagen!

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Collagen is a family of highly characteristic fibrous proteins found in all multi-cellular animals which are the most abundant proteins found in mammals, constituting 25 per cent of the total protein mass. The characteristic feature of a typical protein molecule is its long, stiff, triple-stranded helical structure in which three collagen polypeptide chains (called α [alpha] chains) are wound around each other forming a rope-like super helix. Collagen is extremely rich in the amino acids Proline and Glycine.

To date, 25 distinct collagen α chains have been identified and each is encoded by a different gene. Combinations of these genes are expressed in different tissues. In principle, more than 10,000 types of triple-stranded collagen molecules could be assembled in the body from various combinations of the 25 but only 15 types of collagen molecules have been identified.

The main type of collagen in connective tissues is Type I, II, III, V, and IX. Type I is the principle collagen of skin and bone and, by far, the most abundant in the body (representing 90 per cent of body collagen). Type II is found in the cartilage. Type III is found in skin, blood vessels and internal organs. Type V is found in bone, skin, tendons, ligaments, and cornea. Types IV and VIII are network-forming collagens which polymerize to form the sheet-like network basal lammae and anchoring fibril beneath stratified squamous epithelia (epithelium – coherent cell sheets formed from one or more layers of cells covering an external surface or lining a cavity).

The tissues of the body are not made solely of cells. A substantial part of the tissue volume is extracellular space that is filled with an intricate network of macromolecules that constitute the extracellular matrix.

The matrix is composed of a variety of versatile proteins and polysaccharides that are secreted locally and assembled into an organized network in close association with the cells that produce them.

In connective tissue, the matrix is generally more plentiful than the cells it surrounds and it determines the tissues physical properties. Variations in the amounts of the different types of matrix macromolecules give rise to an amazing diversity of forms. For example, the matrix can become calcified to become the rock-hard structures of our teeth and bones, or it can form the transparent matrix of our cornea, or it can adapt the rope-like helix organization that give tendons their enormous tensile strength. At the interface of the epithelium and connective tissue, the matrix forms a basal lamina, a tough but thin mat that plays a vital roll in controlling cell behavior.

Until very recently, the extracellular matrix was thought to be relatively inactive scaffolding to stabilize the more physical structure of the tissues much like the concrete foundation of a house. Recent research has proven that the matrix plays a very complex

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Collagen compounds diminish as we age

and very active role in regulating the behavior of the cells that contact it – i.e. influencing development, migration, proliferation, shape, and function. From the new information, we have learned that the matrix and connective tissue are message carriers and part of the body's internal communication system similar to the inter-office memo.

The macromolecules that constitute the extra-cellular matrix are produced by the cells in the matrix. In most connective tissue, the matrix molecules are secreted by cells called fibroblasts. In some more specialized connective tissue, such as cartilage and bone, they are secreted by specific cells of the fibroblast family called chondroblasts (cartilage) and osteblasts (bone). The two main classes of macromolecules that make up the extra-cellular matrix (communication matrix) are polysaccharide chains of the class called glycoaminoglycans (GAGs) which are found linked to proteins in the form of proteoglycans, and fibrous proteins of two functional types: mainly structural (i.e. collagen) and adhesive (i.e. laminin and fibronectin).

The members of both classes come in a variety of shapes and sizes. GAG and proteoglycan molecules in connective tissue form a moisture rich gel-like ground substance in which the fibrous proteins are embedded. The polysaccharide gel resists compressive forces on the matrix and the collagen fibers improve tensile strength. The polysaccharide gel allow rapid diffusion on nutrients, metabolites, and hormones between the blood and tissue cells. The collagen fibers both strengthen and organize the matrix and the rubber-like elastin fibers give resilience.

GAGs are defined as mucopolysaccharides with long, linear, highly charged molecules composed of a pair of repeating sugars, one of which is always bound to an amino sugar. Mainly found covalently linked to a protein core in the extra-cellular matrix, proteoglycans – i.e. chondroitan sulfate, hyaluronic acid (hyaluronan), heparin, heparin sulfate, and keratan sulfate.

So, what does all of this indicate? Early detection of degenerative diseases can be diagnosed by examination of the extra-cellular matrix. The inability of the body to sustain revitalization of the extra-cellular matrix is the beginning of all degenerative disease. As we age, function of the fibroblast family of cells to produce collagen compounds diminishes, which then reduces the gel-like substances of the extra-cellular matrix that protects cells and tissues from the compression of life and exercise. This deterioration also limits the transportation of essential nutrients and the screening of invasive and toxic materials into the tissue.

The prolific work of Dr. John Prudden, M.D., F.A.C.S., from the 1950's and into the 1990's, proved that bovine collagen supplementation had a beneficial and healing effect on the extra-cellular matrix that resulted in positive benefits to patients with a wide variety of conditions from psoriasis, wound healing, and side effects of steroidal medications to lymphagiosarcoma (cancer), elephantitis (filarial parasite infestation), arthritis, rheumatism, and skin ulcers.

Dr. Prudden passed on to our heavenly father two years ago an uncelebrated champion and visionary scientist and doctor whose work went unconfirmed and unnoticed by his peers. Today, at last, the courageous pioneering research of Dr. Prudden is validated and recognized. In modern research of just the last two years, new drug therapy is being compared directly to the effectiveness of bovine collagen supplementation. In many articles, drugs are being compared to collagen supplementation — regarded as equal in effect, except for SIDE EFFECTS! One must take less of the drugs than collagen but

Collagen supplementation of three grams a day is advisable

So far I have discussed the extra cellular matrix of the connective tissue of the human body. We learned that a family of cells, known as fibroblasts, secrete a matrix of macromolecules — i.e. polysaccharide chains of glycoaminoglycans (GAGs) and proteoglycans.

The GAGs and proteoglycan molecules form a gel-like substance that helps the body resist compressive forces and allows rapid diffusion of nutrients, hormones, and metabolites between blood and tissue. In addition, the extra-cellular matrix can expand and contract which can inhibit and prevent admission of toxins, poisons, and some viruses and bacteria.

In a recent article in the Journal of Applied Nutrition, Mathias Rath, M.D., discussed the extracellular matrix of the vascular wall. The article promotes the hypothesis that atherosclerosis is a cellular micronutrient deficiency. (Atherosclerosis is a common form of arteriosclerosis in which fatty substances form a deposit of plaque on the inner lining of arterial walls.)

In the Journal of Applied Nutrition, Mathias Rath M.D. explains that mechanically stressed organs such as the heart, skin, and vascular walls, activate a compensating mechanism that provides lipoproteins which "patch" the defect in an attempt to enhance and support structural stability, thus beginning the formation of atherosclerotic plague. Dr. Rath's research strongly supports the hypothesis that atherosclerosis is a cellular micronutrient deficiency disorder.

The natural healing process of the blood vessels, heart and skin, is collagen synthesis and remodeling of the extracellular matrix. The significant contribution of Dr. Rath's research is that an abundance of the amino acid proline and lysine, from collagen, act as a Teflon-like layer around the lipoprotein plaque particles and detach them from their anchor sites in the vascular wall and initiate the reversal of plaque deposits. Further, collagen supplementation, when coupled with Vitamin C, stimulates the natural repair process to rebuild and reinforce the vascular wall.

In Spain, Portugal and Italy, glucosamine sulfate has been the treatment of choice since the early 1980s. Glucosamine is required for the synthesis of GAGs. The synthesis of glucosamine, coming from glucose and glutamine in the body, tends to be slowed and diminished in later life. Long-chain GAGs, such as chondroitan sulfate, have inhibitory actions and processes against enzymes that cause degenerative joint diseases. Repair of the extra-cellular matrix, which is destroyed in arthritis, needs collagen supplementation coupled with glucosamine sulfate for reversal. In a study by R. Luke, Ph.D., it was found that 95 per cent of all patients treated with bovine collagen and glucosamine sulfate had reversal of arthritis compared to 72 per cent in patients taking non-steroidal anti-inflammatory drugs.

Osteoarthritis is the most common form of arthritis affecting more than 40 million Americans. It is characterized by joint degeneration, loss of cartilage, alterations of subchondrial bone and damage to the extracellular matrix. There is a 35 per cent incidence of weakness in the knees as early as age 30. Its incidence increases dramatically with age affecting 80 per cent of all person over the age of 50. Non-steroidal anti-inflammatory drugs are the common medical treatment but these medications have adverse side-effects in the gastrointestinal tract and actually accelerate cartilage destruction and aggravate osteoarthritic conditions.

Collagen supplementation important!

Elimination of genus Solanaceae (the night shade family which includes tomato, potato, egg plant, pepper, and tobacco) is suggested as the alkaloids present in these foods inhibit normal collagen repair.

Oral and injectable forms of proteoglycans, GAGs, and bovine collagen have proven a significant improvement over non-steroidal and steroidal anti-inflammatory drugs. Vitamin C, glucosamine sulfate, chondroitan sulfate, and collagen are naturally occurring substances found in joint structures and have been proven, in numerous studies, to stimulate cartilage regeneration.

A very large study found low Vitamin C intake results in statistically higher risk of heart disease mortality and total mortality in a 10 year period due to lack of stimulation of collagen protection and maintenance of the extra-cellular matrix.

The extra-cellular matrix of tissues and organs is composed of collagen, elastin and ground substances composed of GAGs and non-collagen proteins such as fibropectin and lamin. Defects in synthesis of these compounds can result in macular corneal dystrophy. Proteoglycans are macromolecules, comprised of chains of GAGs covalently bonded to proteins, and are major components of the basement membrane of the intestinal foundation. This basement membrane plays a significant role in intestinal permeability and immunological function.

Intestinal GAGs are severally modified in chronic and inflammatory bowel diseases such as Crohn's Disease, colitis, diverticulitis, and leaky gut syndrome. The gut, more than any other organ, is constantly challenged by bacteria, viruses, and dietary antigens. The structure, function, and integrity of the gut wall and its preservation are directly proportional to the integrity and maintenance of the extra-cellular matrix, collagen synthesis, and GAG production.

Even in autoimmune disease, numerous recent articles report that mucopolysaccharides and amino acid supplementation from bovine collagen, which contains GAGs – including glucosamine and chondroitan sulfates, have been found to enhance T-Cell antibody response in vivo and in vitro.

As more recent and advanced research moves forward, one can only assume that bovine collage supplementation of three to 12 grams per day is an advisable and warranted regime to resist auto-immune system breakdown, degeneration and aging.

it's all about ingredients!

Collagen supplementation is **essential** to support the body

Collagen is a natural protein that provides our bodies with structural support. Twenty-five per cent of the dry protein weight of the human body is collagen — the fibrous, elastic, connective tissue in our bodies that holds us together. Seventy-five per cent of our skin is made up of collagen, providing texture, resiliency, and shape; and in total about 30 per cent of our body is collagen.

As you can see it's part of the natural make-up of our tendons, ligaments, joints, muscles, hair, skin, etc. Fibers of collagen are woven together like threads in fabric to form a framework into which new cells can grow. When the body needs to build any new cellular structure, as in the healing process, collagen and collagen fragments play a central role.

As we age, our body's production of collagen slows down. On the outside, we see our skin start to wrinkle and lose its youthful radiance. On the inside we experience this as the weakening of our skeletal structure due to the breakdown of connective tissue, including *muscle tissue*. Collagen supplementation is essential to support the body during these natural processes.

When our body's essential supply of collagen is low many areas are affected — causing weakness, fatigue and overall lack of performance. Taking a collagen supplement may help with much more than just fat and inch loss. Most people experience many welcome ***side-benefits*** which notifies them that the collagen supplementation is working – including improved sleep, increased energy, overall toning, rejuvenation and a greater overall sense of wellness. On your path to a more beautiful body, there will likely be many positive indicators that collagen supplementation is working ***on the inside***!

Remember — collagen supports **most** of your body's functions. Therefore **Calorad®** nice results could show up in any number of areas – expect a lot and you may get it.

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When looking for signs that collagen is working, ask yourself:

- Am I sleeping better?
- Do I have more energy?
- Do I have fewer cravings?
- Has my skin's appearance improved?
- Are my fingernails stronger?
- Has my hair gained more luster and strength?

E s s e n t i a l l y Y o u r s