

Collagen Supplementation: An Overview

A lot of information is coming at us these days about collagen supplementation: Knox gelatin; shark cartilage; chondroitin sulfate; glucosamine sulfate; bovine cartilage; bromelain; and hydrolysat. What are all these things, and why are we suddenly hearing so much about them from our patients, from magazines, and in health food stores?

The answer is results. The lack of collagen, the need for collagen, the many systems of the body that are affected by its deficiency, and finally the remarkable changes that take place when such needs are met: all these are being recognized by nondrug oriented people. For the drug crowd, the failures and dangers of standard arthritis "medicine" - the pain pills - are forcing people to look elsewhere.

What is collagen? A triple helix polypeptide molecule, collagen is a protein in our bodies, in fact, the most abundant one we have, making up about 65 percent of our total protein. Proteins are made of amino acids, such as glycine, proline, and hydroxyproline, which are amino acids that exist in collagen in varying proportions depending upon the source.

Where is collagen found? Everywhere. It is the prime component of muscle; bones; joints; ligament; skin; cartilage; hair; all of the organs; the heart; the arteries; even the erythrocytes. But as we age, production goes down, and any of these systems can be affected.

Why does collagen production decrease? Hormonal changes; drugs; alcohol; processed food; white sugar; radiation (especially sunlight); fluoridated water; stress; trauma: the usual culprits.

What happens as collagen production decreases? Muscles sag. The bones lose density. The joints and ligaments become weaker and less elastic. Cartilage becomes thinner and weaker at the joints it is supposed to cushion. Hair loses its wave, curl or thickness. Organs may sag toward the floor (prolapse), and may malfunction. The heart weakens and enlarges. The arteries weaken and are less able to resist plaque formation. They are also more likely to develop a break in one of their three layers (aneurysm). The skin becomes thinner and it wrinkles. (Ever notice that kids never lick their fingers for friction when thumbing through the pages of a book: only adults do? Collagen breakdown. Ever notice that plastic surgeons often own large houses overlooking the ocean? Collagen breakdown.)

Each one of these areas obviously deserves an entire article with respect to the effects of decreased collagen as the body ages. But for now, we'll just mention a few of the most obvious, like fat/muscle ratio. Let's say a man of 40 weighs the same as he did when he was 20. More fat or less fat, proportionately? You guessed it. What happened? His muscles lost collagen and got smaller, but at the same time he stored a lot of fat, so his weight stayed the same. Since muscle weighs three times as much as fat, you can imagine how fat/muscle ratio tells a more accurate story than the scales tell.

So that's the briefest of introductions to the collagen loss problem and the widespread effects in so many systems of the body. Now let's look individually at some of the supplements that claim to address the issue of collagen rebuilding. Some of these products have been around for years,

though not in general use.

Knox Gelatin

Knox gelatin is derived from animal collagen. Dissolved in water, heated, and then cooled, it forms a semisolid form we've all seen in Jello, mousse, and other treats. In this heating and cooling process, the hydrogen bonds of the collagen are first broken, then reform in a looser configuration when the gelatin is cooled. As a supplement, Knox gelatin is a powder which when mixed with water goes back to the gelatin state.

The claim is that Knox gelatin is good for joint rebuilding. Once in the body, however, we now have animal collagen, and here is the central dilemma encountered with most collagen products: the body cannot just take in another animal's collagen and simply apply it for its own needs. Why? First of all, it's digested. Normal digestion breaks down protein into amino acids, which are then absorbed into the bloodstream. This must happen, because collagen is a protein, and any foreign protein in the body is attacked as an antigen. That's called your immune system. So for the collagen found in supplements to be utilized by the body, it must first be broken down by the digestive system, then absorbed through the intestine into the blood, and then reassembled into your collagen at the proper site.

All this is very complicated and inefficient, since it takes many metabolic steps to do all the breaking down and building up, using up a great deal of the body's reserve enzymes, minerals, and co factors to do all the work. Guess where the minerals reserves are stored? The bones and ligaments, i.e., joints. Very often, the strain on the body of going through this entire process does not justify the supposed upside of new collagen formation. Keeping this whole process in mind is central to assessing the possible benefits of any collagen supplement.

Shark Cartilage

Shark cartilage was designed as a supplement within the past few years by William Lane. He promotes it as a holistic therapy for treatment of cancer, and many of the Mexican cancer clinics use shark cartilage. I attended a lecture about four years ago at the Cancer Control Society's annual convention in Pasadena, in which Lane extolled the virtues of this expensive product. The new word is angiogenesis. New words are not always red flags when it comes to a new product, but they are sometimes.

Angiogenesis means new blood vessels. Lane's theory of cancer is that tumors are growths which require new capillary systems to form to nourish them. Shark cartilage supposedly prevents these new blood vessels from forming, thus starving the tumor. The two hot books that are out are called *Sharks Don't Get Cancer* and *Sharks Still Don't Get Cancer*, both of which titles are true, but then neither does any other animal in nature, except man.

Mainstream oncology does not really deal with or describe angiogenesis as a phenomenon that occurs with cancer. Of course, with the abysmal track record of mainstream oncology in treating cancer during the past 50 years, that doesn't necessarily mean angiogenesis doesn't happen. I'm just saying it's a theory. The main question I have with shark cartilage is exactly the same one I described above under Knox gelatin. The body can't use shark cartilage, or any protein, per se, it must be broken down and reassembled into your own cartilage.

Then there's the oxygen factor. Nobel prize winner Otto Warberg proved in the 1940s that cancer had an inverse relationship with the presence of oxygen. The less oxygenation to tissues, the more the cancer was promoted. This is why cancer loves sugar, and is accelerated by the intake of white

sugar. The incomplete digestion of refined carbohydrates (fermentation) is anaerobic. Oxygen leaves. That's what those bubbles are in a bootlegger's still: oxygen leaving.

To prevent the surrounding normal cells from becoming cancerous, they need oxygen, and they also need to have cell wastes constantly removed and cleared. Only one thing can accomplish this: blood flow. I don't know that I would do anything to potentially interfere with unrestricted blood flow to normal tissues. The entire angiogenesis theory sidesteps the question. New blood vessels would bring oxygenated blood, and cancer cannot thrive in the presence of oxygen. So why inhibit angiogenesis, even if it exists? Perhaps this accounts for the actual low success rate of shark cartilage, much of which may be due to simply distracting the patient from mainstream protocols of chemotherapy, radiation, and surgery, which have even lower success rates.

Chondroitin Sulfate

Chondroitin sulfate is a product that can be found on the shelves of most health food stores. (That in itself obviously does not guarantee safety or efficacy. Look at all the high fructose or refined protein powders on the same shelves!) The claim is made that chondroitin is a component of cartilage and can be a building block for joints and ligaments. This is good marketing, and is only half true. Looking a little deeper, we find that the molecular weight of chondroitin sulfate is 55,000 daltons. Our best absorption size through our intestinal mucosa is around 800 1000 daltons! This puts absorption at less than 13 percent, which makes chondroitin sulfate a very expensive fiber source with minimal effect.

Another problem with chondroitin sulfate is the source. To show a profit, manufacturers often don't put much of an ingredient into a supplement. Unfortunately, they are not required by law to list the percentage of the ingredients. Couple this with the fact that the source may be a chemical copy (synthetic form) of the original substance rather than the ingredient itself, and you can see why you have to be careful. Chondroitin sulfate is generally the result of good marketing rather than of good holistic engineering. Money can be much better spent, in my opinion.

Glucosamine Sulfate

Glucosamine sulfate is a protein supplement derived from the chitin of shellfish. Chitin is the hard material that makes up the shells. The theory is that in pure form, glucosamine sulfate will rebuild joints because it is a component of the shellfish's shells, as well as a component of your cartilage. An Italian researcher, Rovati, has been the world authority in the area of glucosamine sulfate for the past 30 years. The main problem is stability: isolated glucosamine sulfate naturally tends to degrade into formless mush after about 30 days.

In Italy during the 1970s, Dr. Rovati patented a process to stabilize glucosamine sulfate, which is still used today. There are many companies which do not use Rovati's method and sell the cheaper, unstabilized form, which may be worthless by the time it gets into your system. Fillers may be used to hide the decomposition of the active ingredient, so percent composition is also an issue in evaluating a brand of glucosamine sulfate. In addition, absorbability into the bloodstream is critical after the supplement has gone through the digestion process. If all these variables are optimized, however, glucosamine sulfate can actually deliver what it promises, acting as a building material for new cartilage formation. The implications and success for arthritis cases are obvious.

Bovine Cartilage

Bovine cartilage is a new source of collagen supplementation getting some attention these days both as a collagen replacement, and also as an inhibitor of angiogenesis, thereby competing with

shark cartilage, especially since it is cheaper. The issues are the same as above: source; percent composition; digestion; and absorbability. The problems are the same as for Knox gelatin: it must be broken down, then re-assembled.

Bromelain

Bromelain is not really a collagen supplement at all. Bromelain is a proteolytic (protein splitting) enzyme derived from pineapple. It is thought to function as a natural antiinflammatory by hydrolyzing foreign proteins within a joint that are triggering the inflammatory process. You can see the proteolytic action of bromelain yourself. Pour some fresh squeezed pineapple juice on a gelatin dessert, and watch the juice dissolve its way through. That is the enzyme working on the collagen bonds. Gelatin will not form in the presence of fresh pineapple, which explains why that flavor is generally absent from the list of available Jellos.

The problem which is still being researched with respect to bromelain is that cartilage, ligaments, and discs are also protein, and as an enzyme, bromelain may have some catabolic action upon those structures (just like the gelatin) which obviously would be counterproductive. This is exactly what happened in the case of chymopapain injections for herniated discs, a technique that came and went in the 1980s. Chymopapain was a papyrus extract which was injected into the herniated disc area, as it had a proteolytic effect on the extruded nuclear material from the disc. Chymopapain use was soon discontinued because doctors discovered that it was further dissolving the normal part of the disc and promoting chronic inflammation, as well as causing allergic reactions. Chymopapain was a much stronger agent than bromelain, but more study needs to be done in this area before the long term effects of bromelain can be known with confidence, in my opinion.

Hydrolysate

Hydrolysate is a Canadian product that is getting very popular these days in North America. It is the only one of the collagen supplements that was originally designed as a weight loss product. Hydrolysate has been used on animals in Canada for more than a decade, notably chickens. Fatty liver syndrome was a widespread condition that was having a deleterious effect on egg production. Hydrolysate solved that problem in a matter of days. I figured that chickens don't have Blue Cross, MediCal, HMOs, lawyers, or the 30-day rule. The placebo effect didn't really enter into it, either. Farmers can't afford to use products that don't work. They don't have the time or the money, so animal use immediately impressed me.

Hydrolysate is the only one of the collagen supplements available today that does not go through the digestive system, since it is absorbed directly through the stomach. This makes hydrolysate quite different from shark or bovine cartilage: there is no breakdown. Hydrolysate is not itself collagen, though it is derived from bovine cartilage. It is made of nonessential amino acids and dipeptides already in usable form that are absorbed directly into the bloodstream, with no wasting of time or energy by the digestive process. These amino acids are the building blocks of collagen. Taken on an empty stomach, as hydrolysate works to build lean muscle and provide for the other collagen deficiencies, the only available energy is stored fat.

Originally marketed as a weight loss product because of its consistent success reversing the fat/muscle ratio, it soon became obvious that hydrolysate had other effects. Think of it: Where is collagen? Where do we lose it as we age? What problems does this cause? Refer back to the list at the beginning of this article.

Gradually, it dawned on people that maybe this was more than a weight loss product, because it

was having effects on many of the above body systems with real consistency and repeatability, especially with arthritis and chronic fatigue syndrome.

Let's go back to weight loss for a minute. Americans are eight pounds heavier on average today than they were 10 years ago. Thirty-seven percent of the population is obese: more than 35 lbs. overweight.

What are people doing now? Look at the dangerous drugs they are taking: Fenfluramine Phentermine, Redux, and now Xenical. Did you read about the 24 fen phen women the Mayo clinic found in August 1997 who had major heart valve deformities, some of whom had the usually fatal primary pulmonary hypertension? Johns Hopkins then found out that fen phen often destroys the brain cells that produce serotonin, resulting in permanent brain damage. Sure, that's cause for a class action suit, but these peoples' lives are destroyed; they're not going to be okay. And what about the thousands of unreported or subclinical cases, or the "normal" side effects of tachycardia, insomnia, and anxiety out of the millions of patients currently taking fen phen? All this, just to lose weight?

Up to the day before fen phen was taken off the market, what did the FDA say? According to Dr. Michael Friedman of the FDA, "The agency is not saying it is inappropriate to use fen phen."

Patients are also experimenting with all kinds of worthless and dangerous nonprescription remedies like refined protein powders and high fructose corn syrup based "proteins," or the old reliable ma huang and other thermogenics. For many of them, their weight worries them much more than their health problems. Ask your patients, would you rather be thin or healthy?

Collagen supplementation is a boom area. I hope that this short presentation has provided the basis for further investigation on your own.

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