The synthesis of collagen, for which vitamin C is essential, proceeds in the body as one of its major manufacturing enterprises. A person who is dying of scurvy stops making this substance, and his body falls apart -- his joints fail, because he can no longer keep the cartilage and tendons strong, his blood vessels break open, his gums ulcerate and his teeth fall out, his immune system deteriorates, and he dies.

Collagen is a protein, one of the thousands of different kinds of proteins in the human body. Most proteins occur in only small amounts: the various enzymes, for example, are so powerful in their ability to cause specific chemical reactions to take place rapidly that only a gram or two or even a few milligrams may be needed in the body. There are a few exceptions. There is a great amount of hemoglobin in red blood cells. There is even more collagen in the skin, bones, teeth, blood vessels, eye, heart, and, in fact, essentially all parts of the body. Collagen as strong white fibers, stronger than steel wire of the same weight, and as yellow elastic networks (called elastin), usually together with macropolysaccharides, constitutes the connective tissue that holds our bodies together.

Like other proteins, collagen consists of polypeptide chains; the long chains of this fibrous molecule contain about one thousand amino-acid residues, about sixteen thousand atoms. It differs from almost all other proteins in being substantially composed of but two amino acids, glycine and hydroxyproline. Collagen is a kind of supermolecule, however, in its three-dimensional architecture. The polypeptide chains of the two amino acids, alternating with one another and punctuated by the presence of certain other amino acids, are coiled in a left-handed helix. Three of these helical strands are twisted around on another, like strands of a rope, in a right handed superhelix, to compose the complete molecule.

Understandably, the synthesis of this structure proceeds in steps. While it has been known for half a century (these words written in 1985) that vitamin C is essential to the manufacture of collagen, the process is only now yielding to inquiry. It appears that vitamin C is involved at every step.

First, a three dimensional stranded structure is assembled, with the amino acids glycine and proline as its principal components. This is not yet collagen but its precursor, procollagen. A recent study shows that vitamin C must have an important role in its synthesis. Prolonged exposure of cultures of human connective-tissue cells to ascorbate induced an eight-fold increase in the synthesis of collagen with no increase in the rate of synthesis of other proteins (Murad et al., 1981). Since the production of procollagen must precede the production of collagen, vitamin C must have a role in this step -- the formation of the polypeptide chains of procollagen -- along with its better understood role in the conversion of procollagen to collagen.
The conversion involves a reaction that substitutes a hydroxyl group, OH, for a hydrogen atom, H, in the proline residues at certain points in the polypeptide chains, converting those residues to hydroxyproline. This hydroxylation reaction secures the chains in the triple helix of collagen. The hydroxylation, next, of the residues of the amino acid lysine, transforming them to hydroxylysine, is then needed to permit the cross-linking of the triple helices into the fibers and networks of the tissues.

These hydroxylation reactions are catalyzed by two different enzymes: prolyl-4-hydroxylase and lysyl-hydroxylase. Vitamin C also serves with them in inducing these reactions. It has recently been shown by Myllyla and his colleagues that, in this service, one molecule of vitamin C is destroyed for each H replaced by OH [Myllyla et al., "Ascorbate is Consumed Stoichiometrically in the Uncoupled Reactions Catalyzed by Prolyl-4-Hydroxylase and Lysyl Hydroxylase. Journal of Biological Chemistry 259:5403-5405. 1984]

We have come upon the two big reasons why we require for good health so much larger amounts of vitamin C than are present in the plants we use as food. First, there is the bodies continuing need for the synthesis of large amounts of collagen for growth and for replacement of the collagen degraded by daily wear and tear. Second, vitamin C, in the critical reactions that assemble collagen in the tissues, does not serve merely as a catalyst but is destroyed."

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**Roger J. Williams** NUTRITION AGAINST DISEASE 1971) Pages 85-86

Vitamin C is essential for the building of collagen, the most abundant protein built in our bodies and the major component of connective tissue.[Wolbach, S. B., and Howe, P. R. ](ntercellular substance in experimental scorbetus" Arch. Path., 1:1, 1926] This connective tissue has structural and supportive functions which are indispensable to heart tissues, to blood vessels, --in fact, to all tissues. Collagen is not only the most abundant protein our bodies, it also occurs in larger amounts than all other proteins put together. It cannot be built without vitamin C. No heart or blood vessel or other organ could possibly perform its functions without collagen. No heart or blood vessel can be maintained in healthy condition without vitamin C.

 Victims of prison camps who have suffered from vitamin C deficiency have been found to have wide-spread fatty deposits (atherosclerosis) in their arteries. It is quite possible that vitamin C deficiency is directly implicated; it is unlikely that such deposits could have been due to too much fat or cholesterol in diet.

 Strong evidence has recently been present that individual needs for vitamin C vary widely, and that some individuals have much higher needs than has hitherto been supposed. While the functioning of vitamin C, except for its role in building collagen, is obscure, it is quite possible that many hearts and blood vessels would be better protected if an abundant environmental supply of this vitamin were available in the circulating fluids that bathe the tissue cells.
Understanding How Collagen Functions And How It Benefits You

Who would want wrinkles on their faces, dry and sagging skin, and joint aches? I don't, do you? If only you could run after time, it's as plain as the nose on my face that you would race against it just to have that feeling of youthfulness and strength you once had. But, it's never too late. These signs of aging can be prevented by slowing down their development. It's so easy! Take that ridiculous thought of racing against time off of your mind. Just the thought of it makes me feel more aged! All you need to do is understand why these things occur. Its collagen or the lack of it that is responsible for the deterioration of your skin.

Collagen functions as scaffolding for our body. It is the fibrous protein constituent of skin, cartilage, bones and other connective tissue. An appropriate and enough collagen supply in our body are extremely required, however it is no easy to maintain and achieve. Unfortunately, it is established that our body loses collagen at a rate of 1.5% per annum, starting at the age of 25. Collagen functions as a chondroprotective agent, which means that it protects cartilage and synovial fluid against degeneration.

The depletion of collagen in our skin leads to the formation of wrinkles and the occurrence of other signs of aging. If this happens, collagen function simply defeats its purpose. Another collagen function is that it can reduce oxidative damage to joints, hence, stimulate major decrease in joint pain, and swelling.

How Collagen Works

Previously collagen could not be produced in a form that could pass directly through the intestine wall and into the blood-stream intact and the only way was by injection. The problem with collagen injections is that they are only effective locally around the site of the injection, just plumping up the skin, and are very expensive.

Now that collagen has been produced in a form that can pass directly into the blood-stream intact, a whole new anti-ageing system has become available to everyone.

Once we pass our late 20's our body's have less collagen than they could use and a slow decline starts, but by ingesting Hydrolysat Collagen into the blood-stream, we are changing that situation.

Suprisingly, the presence of the collagen that you have ingested also stimulates the body's own collagen production.
What Happens

During the first few hours of sleep we go into what is called the Alpha Sleep phase of the brain's sleep cycle. During this cycle the brain's pituitary gland (a vital part of the endocrine system) releases Human Growth Hormone into the blood-stream and we go into the **rejuvenate, repair & replace mode** (the **collagen** being the **essential part of protein synthesis**).

Having both HGH and Collagen available, the body can synthesize all the protein it needs, not only to do the "essential to staying alive" repair & renewal work, but also less essential repair & renewal like **re-building the skin, strengthening ligaments, cartilage and bone, normalizing the immune system**.

In other words, the body begins to try and do all of the things that took place when we were a **young** and growing person.

Collagen to Fight Ageing

Collagen is a **powerful long-term anti-ageing protein**. It improves the skin's elasticity and suppleness, **reducing lines and wrinkles**. Taken in capsule form, collagen produces a firmer, more even toned skin and helps to achieve a **glowing radiant & more youthful complexion**.

**Without enough collagen** only life maintaining repairs can take place. **Less essential repairs are not done**. As we become older even essential repairs have to be neglected. **This is the disease we call ageing**.

Your skin should feel smoother over the first few weeks, gradually becoming firmer. The lines & wrinkles in the eye area will begin to diminish and the lip border area start to fill out.

**Without enough collagen your skin & body is old, whatever your age!** No Anti-Ageing system can be effective without an adequate supply of body collagen.

Your body does not get collagen from food, it has to make it. By **ingesting** collagen (not digesting as food), your body lifts its own collagen production to that of a younger person.
Weight Loss & Reducing Body Fat

Collagen, taken orally, can help the body metabolise fat, it therefore has a roll to play in both weight management and the production of lean body mass in both sports and body-building.

Taking collagen capsules causes the body to burn fat.

Collagen is used in protein synthesis with the body's energy source, fat, to produce the necessary proteins that the body needs to repair muscles, ligaments, tendons etc.

Taking collagen orally, you can stimulate your body's own collagen production.

Almost all the body's renewal and repair takes place during the first two hours of sleep when the body produces Human Growth Hormone.

The overall effect of the increased fat metabolisation due to the increased renewal & repair activity is a decrease in body fat.

Anti-Inflammatory, Pain Relief, Joint Health

Collagen has been shown to reduce damage to joints and stimulate significant reductions in joint pain, tenderness and swelling.

A Harvard Medical School study on the effects of orally administered collagen for reducing inflammation and relieving pain (Dr C Searling, Fresco CA.) proved conclusively that almost 90% of those taking part had remarkable results - resulting in a changed life-style for many.

Collagen can reduce oxidative damage to joints and stimulate reductions in joint-pain, tenderness and swelling.

Collagen naturally stabilizes the body's immune system and helps neutralize the production of abnormal molecular structures known to be a major cause of joint misery and stiffness, especially in rheumatoid arthritis.

Collagen naturally consists of 15% glucosamine and 15% chondroitin sulphate - two substances renowned for their beneficial anti-inflammatory properties.

It functions as a chondro-protective agent and protects cartilage and synovial fluid against deterioration.

Collagen can bring real relief from pain by directly combating ageing tissue and arthritis by aiding normal repair of ligaments, tendons joints and bones while improving the connective tissue of the skin.