

# Collagen

*The Glue That Holds Us Together...  
and How To Keep it 'Sticky'!*



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## ***An introduction to Collagen***

### ***So what exactly is Collagen?***

Most of us have heard of it, often associating it with the latest faddy beauty treatments reported in the media. For many of us it will set alarm bells ringing as we think of injections and the oft reported potential for terrible side effects.

In this book we will discuss what collagen actually is. We'll also take a look at some of the problems many of us will experience as our own collagen levels naturally decrease with age and most importantly - the good news - how it is possible to re-build these declining levels both safely and inexpensively.

Put simply, collagen (from the Greek word 'kolla' meaning glue producer), refers to the group of proteins that occur naturally in mammals, particularly in the flesh and connective tissues. In fact it is the main component of connective tissue and actually makes up to 25-35% of our total body protein content (there are an estimated 100,000 types of proteins).

It is predominantly found in fibrous tissues such as fascia, ligaments, tendons and skin. However, it is also found in abundance in our cartilage, bones, cornea's, intervertebral discs, our gut and our blood vessels. Without it we would quite literally fall apart! Indeed the Greeks were right; it is the glue that holds us together.

### ***The effects of declining Collagen levels***

As we age our levels of collagen naturally

begin to decrease at the rate of between 1-1.5% per year. For the majority of us this starts somewhere around the age of 25.

Although our bodies continue to reproduce collagen throughout our life time, as we get older, it breaks down faster than we can replace it. This reduction in collagen levels can create a number of problems. These can be divided into two sections: ***cosmetic and internal health.***

#### ***Cosmetic effects of reduced Collagen levels***

- Appearance of aging skin, including fine lines, wrinkles and sagging skin
- Cellulite
- Grey hair and hair loss

#### ***Internal health problems related to reduced Collagen levels***

- Arthritis
- Joint pain
- High blood pressure
- Bone loss
- Arteriosclerosis (hardening of the arteries)

By taking high quality supplements or using a high quality collagen cream we now know we are able to promote the synthesis of collagen within our bodies. This enables us to restore aged collagen to its earlier healthy state.

In turn this can improve the visible appearance of our skin and improve our bones and blood cells; in short we can potentially counteract the effects of aging.

There are many products that claim to be high

quality collagen, but we have found only three on the market that we feel comfortable enough with to provide links to the time of writing this book. In the upcoming pages we will discuss the above issues in greater depth and show how taking an advanced collagen supplement or using collagen cream can be beneficial in so many ways.

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## ***The science of Collagen***

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### ***The characteristics of Collagen***

Collagen is one of the long, fibrous structural proteins whose functions are quite different from those of globular proteins such as enzymes. Tough bundles of collagen called collagen fibres are a major component of the extracellular matrix that supports most tissues and gives cells structure from the outside. However, collagen is also found inside certain cells. Collagen has great tensile strength, and is the main component of fascia, cartilage, ligaments, tendons, bone and skin.

Along with soft keratin, it is responsible for the strength of our skin and elasticity. As it degrades it leads to wrinkles that accompany aging. It strengthens blood vessels and plays a role in tissue development. It is also present in the cornea and lens of the eye in crystalline form.

### ***Types of Collagen***

As we know, collagen occurs in many places throughout the body. However, over 90% of the collagen in the body is of Type I. Although 28 types of collagen have been identified and described, the five most common types are:

- > **Collagen Type I:** Skin, tendon, organs, vascular ligature, bone (main component of the organic part of bone).
- > **Collagen Type II:** Cartilage (main component of cartilage).
- > **Collagen Type III:** Reticulate (main component of reticular fibres), mostly Found alongside Type I.
- > **Collagen IV:** Forms bases of cell basement membrane.
- > **Collagen V:** Cell surfaces, hair & placenta.

### ***Synthesis of Collagen***

Collagen has an unusual amino acid composition and sequence:

- Glycine (Gly) is found at almost every third residue
- Proline (Pro) makes up about 17% of collagen
- Collagen contains two uncommon derivative amino acids not directly inserted during translation, both of which require vitamin C as a co-factor.
- Hydroxyproline (Hyp), derived from proline.
- Hydroxylysine (Hyl), derived from lysine (Lys). Depending on the type of collagen, varying numbers of hydroxylysines are glycosylated.

It is worth noting than Cortisol stimulates degradation of skin collagen into amino acids. This is covered in more depth when we examine how stress hormones & dietary stress can run down our collagen stores rapidly.

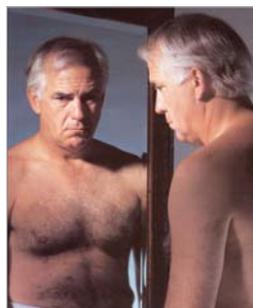
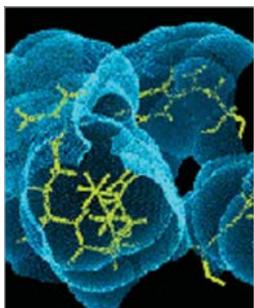
### ***Not all Collagen supplements / creams are the same***

It is often said: you are what you eat / drink. Technically this is not correct and should read: you are what you digest from the foods and drink that you ingest. Therefore it is important that you choose an advanced collagen supplement or cream that has been designed to be absorbed efficiently.

Too many supplements these days find their way on to the internet aiming to attract the purchaser simply by price alone.

There are three disadvantages with this approach: the first is that simply having a product that says it is collagen is not sufficient: it needs to contain the correct type of collagen and all the other elements that help the body process it.

Another issue is that spot checks need to be made on the manufacture to ensure that each capsule / jar actually contains the ingredients stated. Apart from the obvious fact that an unscrupulous manufacture can under-supply the most expensive ingredients, the very



process used in mixing and preparing the products need to be such that all ingredients are spread evenly throughout the batch.

The third is only using the highest grade materials in the products and in an environment of ultra strict cleanliness at every stage of manufacture.

We therefore have only provided links to the products that we could find which pass these standards. If you find other products that you feel are of sufficient quality and design, please email us with the details so that we may consider adding them to future updates of this book.

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## ***The importance of vitamin C & Collagen***

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Vitamin C is a water-soluble vitamin, meaning that your body doesn't store it. We have to get what we need either from supplements or from food, including citrus fruits, broccoli and tomatoes.

We need vitamin C for the growth and repair of tissues in all parts of our body. It helps the body make collagen, an important protein used to make skin, cartilage, tendons, ligaments and blood vessels.

Low levels of vitamin C have been associated with a number of conditions, including high blood pressure and atherosclerosis; the build-up plaque in blood vessels that can lead to heart attack and stroke.

We cannot ignore just how important it is to

have enough vitamin C in our diets. Without it we cannot make collagen. A study shows that vitamin C must have an important role in the synthesis of collagen. It was found that prolonged exposure of cultures of human connective tissue cells to ascorbate (vitamin C) induced an eight-fold increase in the synthesis of collagen. However, there was no increase in the rate of synthesis of other proteins.

***However not all vitamin C is the same:*** The standard vitamin C used in most nutritional supplements and creams is ascorbic acid, however as the name suggests, it is acidic. As we age our body has difficulty handling the increased acid load that we have placed upon it over the years and begins to breakdown our bones and protein stores to handle this acidity.

That is why it is common to see people on a typical Western diet shrinking as they age and their muscles shrinking too. It is important not to tax the system further hence why a technical approach is preferred.

Due to this fact we look for sources of vitamin C that are alkaline in nature - meaning that they are buffered with alkaline minerals to form calcium or magnesium ascorbate.

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## ***What else helps Collagen production in addition to Vitamin C?***

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> ***Manganese:*** Manganese is a mineral that plays a role in collagen production. It is essential for the proper function of prolydase, an enzyme that supplies the necessary amino acids for collagen production in your skin. Therefore,



manganese has an important role in proper wound healing. This mineral can be found in supplements or dietary sources including pineapples, almonds, pecans, peanuts, brown rice, oatmeal, whole-wheat bread, pinto beans, spinach and sweet potatoes.

> **Zinc:** Zinc is a vital mineral necessary for a healthy immune system and wound healing. It is also essential for the formation of protein and collagen in your body. Zinc intake can be increased by taking supplements or good dietary sources of this mineral include beef, beans, black strap molasses, egg yolks, fish, lamb, poultry, pork, milk, oysters, pumpkin seeds, sesame seeds and whole grains.

> **Lysine:** An amino acid (protein)

> **Digestive Enzymes:** When we eat any food, the body breaks it down into smaller particles that can be transported efficiently via the blood into the cells. Protein is broken down into its component amino acids and then re-assembled back into collagen “on site”.

The initial breakdown requires hydrochloric acid in the stomach and protein digestive enzymes. Our supply of these protein digesting enzymes (protease) declines with age and we can often assimilate amino acids more efficiently when they are taken with the digestive enzymes contained in the same supplement on an empty stomach.

It follows that when we look for collagen supplements available, we look for those that have buffered their vitamin C and also contain lysine, digestive enzymes, manganese & zinc.

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## ***How Cortisol can destroy our Collagen stores and what we can do to reduce this***

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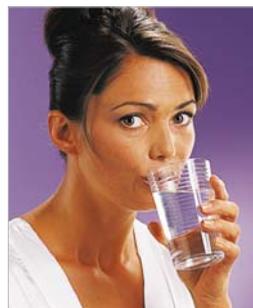
As well as looking at supplementing collagen, we should also look at lifestyle issues that reduce collagen significantly. To understand this we need to appreciate that part of our survival mechanism is the ability to rapidly raise blood sugar levels quickly when the body is stressed or when blood sugar falls too low.

The stress response raises cortisol levels which rapidly breakdown protein sources in the body (including collagen) as a temporary “fuel” source. However, most people are unaware that common dietary habits can induce a cortisol release, thereby sharply lowering collagen levels.

For example caffeine from tea, coffee and caffeine drinks can raise cortisol levels. Switching to naturally caffeine free replacements like Red Bush Tea would be beneficial. Similarly herbal teas are beneficial in this respect.

It is known that cortisol levels are at their highest first thing in the morning. This is due to the fact that the period of time between dinner and breakfast is usually such that blood sugar levels fall significantly, which triggers the cortisol release.

By dividing your desired daily calorie intake so that you eat smaller meals every four to five hours - eating your last meal late in the evening reduces such cortisol spikes.



The actual composition of the meal can have a similar positive or negative effect on cortisol levels. For example, if proteins, complex carbohydrates and fats are eaten at each meal, the release of blood sugar is even throughout the day.

If, however, sugary foods or refined carbohydrates are eaten at a meal, they initially cause a rapid rise in blood sugar levels. The body reduces this (stores it as fat) by releasing insulin, after a short period of time the body then requires a cortisol release to rapidly restore the blood sugar balance.

Most of us know that sugary food, drinks and refined carbohydrates cause fat gain, but are unaware of cortisol's role in this process. If you have been accumulating fat around the tummy, it may be an indicator that too much cortisol is regularly being released.

Alcohol can also have the same effect as sugar due to its high glycaemic value. Beer is the worst culprit as evidenced by the traditional "beer belly", yet white wine and other alcoholic beverages can also cause cortisol spikes. Above you have read that vitamin C is important in new collagen formation, yet the diuretic effect of tea, coffee and alcohol flushes vitamins from the body.

### ***Exercise***

Many people use exercise as a means of controlling their weight. However, there are three areas within exercise that can deplete collagen by spiking cortisol: The first is that you must eat an hour or so before exercising and again shortly afterwards to stop the body raising cortisol levels.

Similarly you should exercise no longer than 60-90 minutes without rest/eating or blood sugar levels will fall too sharply, bringing about an insulin spike. The same is true of straining to lift weights that are too heavy for you. It is also important to drink plenty of water before, during and after your workouts as dehydration can also cause a stress response.

### ***Hormonal Effects***

Cortisol lowers testosterone and growth hormone and causes muscle weakness by lowering insulin levels. With weaker muscles, it is difficult to exercise to a level whereby fat is being burnt during rest periods. Similarly injury and illness is more common when cortisol levels are too high: Injury, as tendons and ligaments are weakened via reduced collagen. Illness due to suppression of the immune system that cortisol invokes.

Many people have trouble controlling their weight as they age, yet the above control of cortisol naturally brings about fat reduction too. Once testosterone and growth hormone are no longer being lowered by excessive cortisol release, they rapidly produce a leaner more muscular body that has more energy.

### ***Relaxation***

Stress is the worst culprit in spiking cortisol levels. However, stress has become a common part of modern lifestyles. Simple relaxation, meditation and yoga can calm the mind and lower cortisol production.

Just setting aside ten minutes morning, lunch time and evening when you sit and simply observe your breathing can have a very positive effect too.



Deliberately counting the breath is a rapid way to send a signal to the brain that the stress is over and cortisol production may stop. You do this by breathing in for a count of 6 - 8. Holding the breath for a count of 6-8, then breathing out for a count of 6-8.

After breathing out hold for a count of 6-8 before breathing in again and completing another cycle. Do not strain and adjust the counts so that you find a comfortable number (that is usually between 6-8 ).

After 10 cycles of counting your breath in this manner, simply observe the pattern of breath that you have when you simply observe.

One thing that you may become aware of is that the breathing slows down significantly the longer you simply observe it.

As you do this, direct your attention to each part of your body in turn from the tips of your toes to the top of your head, mentally telling each part to relax.

However, move your thoughts to the present tense by thinking: my toes are completely relaxed, my feet are completely relaxed, my ankles are completely relaxed. You may find that certain muscles twitch or move on their own or that an area will feel like it needs to move to become more comfortable.

That is fine, just remember all the time that there is nothing to force, rush or do: simply observe your breathing and mentally go around the body, part by part relaxing each part down.

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## ***How you can help rebuild cartilage and free your body from arthritic pain with Collagen supplements***

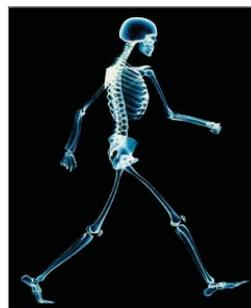
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Sadly all too many of us live with the daily pain that is arthritis or rheumatism. For the majority it is a debilitating condition that affects just about every aspect of our lives. Typically we turn to over the counter or prescription medication to help aid the pain and make living with this condition a little more tolerable.

### ***What is cartilage?***

Cartilage is the tough, but flexible connective tissue found in numerous areas within the bodies of humans and other animals. Like most of our connective tissue, collagen is the vital ingredient. It includes the joints between bones; the elbow, the knee, the ankle and also the rib cage, the ear, the nose, the bronchial tubes and the intervertebral discs. Whilst it is not as hard and rigid as bone, it is stiffer and not as flexible as muscle.

Cartilage is composed of specialised cells called chondroblasts that produce a large amount of extracellular matrix composed of Type II collagen (except fibrocartilage which also contains Type I collagen) fibres, abundant ground substance rich in proteoglycan, and elastin fibres. Chondroblasts that get caught in the matrix are called chondrocytes. They lie in spaces called lacunae with up to eight chondrocytes per lacuna. Cartilage is classified in three types, elastic cartilage, hyaline cartilage and fibrocartilage, which differ in the relative amounts of these three main components.



However, unlike other connective tissues, cartilage does not contain blood vessels. Because of this, it heals very slowly. The chondrocytes are supplied by diffusion, helped by the pumping action generated by compression of the articular cartilage or flexion of the elastic cartilage. Therefore, compared to other connective tissues, cartilage grows and repairs more slowly.

### ***So what does this mean to the individual?***

> **Osteoarthritis:** The cartilage covering bones becomes thinner and is eventually completely worn out, resulting in a "bone against bone" joint, reduced motion, and pain.

Osteoarthritis affects the joints exposed to high stress and is therefore considered the result of "wear and tear" rather than a true disease. If you consider that at the age of 30 the collagen level in our cartilage is around 98%, by the time we reach 50 this has plummeted to 37%. It is clear to see just how vital collagen is to our joint health.

> **Rheumatoid arthritis:** This is a chronic, systemic inflammatory disorder that may affect many tissues & organs, but principally attacks flexible (synovial) joints. The process involves an inflammatory response of the capsule around the joints secondary to swelling of synovial cells, excess synovial fluid, and the development of fibrous tissue in the synovium.

The disease process often leads to the destruction of articular cartilage and ankylosis (fusion) of the joints. Rheumatoid arthritis can also produce diffuse inflammation in the lungs, membrane around the heart, the

membranes of the lungs and white of the eye and also nodular lesions, most common in subcutaneous tissue. About 1% of the world's population is afflicted by rheumatoid arthritis, women three times more often than men. Onset is most frequent between the ages of 40 and 50.

### ***What can you do?***

Taking collagen supplements can provide a protective layer for your joints. A daily dose can enable the collagen reserves to rejuvenate, so that after a week the pain will typically reduce noticeably. Within 3 months of taking the collagen supplement on a daily basis the cartilage can often be 100% rebuilt.

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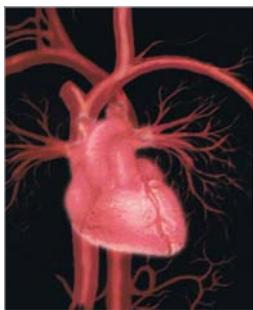
## ***How Collagen can help repair damage to your tendons and ligaments***

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Our tendons and ligaments are made up of collagen rich, super strong connective tissue. The role of the tendon is to connect muscle to bone. These tough, yet flexible, bands of fibrous tissue attach to the skeletal muscles that move our bones.

Ligaments are similar to tendons, but they connect bone to bone and help to stabilise our joints. They are composed mostly of long, stringy collagen fibres that create short bands of tough fibrous connective tissue.

As aging commences our collagen levels begin to peter out. The collagen levels in the tendons of 30 years old would be 95%, move on 20 years and this level has shrunk to 47%. It's easy to see why problems such as tendonitis become such an issue as we age.



Symptoms can vary from aches or pains and local stiffness, to a burning that surrounds the whole joint around the inflamed tendon. Swelling may appear along with heat and redness, but not in all cases. With tendonitis, the pain is usually worse during and after activity, and the tendon and joint area can become stiffer the following day as muscles tighten from the movement of the tendon.

Typically the treatment of tendon injuries is quite conservative. The use of non-steroidal anti-inflammatory drugs, rest and gradual return to exercise is a common therapy. Collagen supplements however, can aid with this recovery by naturally strengthening the tendons and ligaments, helping them heal faster and making them stronger for the future.

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### ***How Collagen supplements can help your heart, arteries, blood, veins and circulation***

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As discussed in our introduction we know that our collagen levels naturally begin to decline as we age, starting from the age of around 25 to 30.

In someone of 30 we would expect collagen levels in their heart to be in the region of 87%. By the time they reach the age of 50 that will have dropped to around 39%.

#### ***So what effect will this have on your heart?***

The short answer to this question is potential heart disease and heart failure. Collagen fibres are the most abundant components of the extracellular matrix in arteries and

myocardium (heart muscle). Disturbances in the collagen turnover have been linked to inflammatory diseases including cardiovascular pathological syndromes. In arteries, collagen synthesis and degradation are associated with the progression of atherosclerotic disease.

#### ***Can Collagen supplements help?***

Our bodies contain a huge amount of arteries and blood vessels (over 60,000 miles!) By taking the correct collagen supplements we have found we are able to rejuvenate the blood tissues, vessels and arteries throughout the body. By taking a daily collagen supplement you will start to feel the benefits in a matter of weeks. Your pulse rate can often normalise itself in a couple of weeks. Circulation improves rapidly, with swelling problems often disappearing within a week or two.

For those suffering from swollen legs, oedema (fluid under the skin), and varicose veins benefits may be seen in the first few weeks.

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### ***Use Collagen supplements to control fluctuating cholesterol levels and help fight against atherosclerotic disease***

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Cholesterol is an organic chemical substance classified as a waxy steroid of fat. It's an essential component of mammal cell membranes. In addition to its importance within cells, it is a key component in the hormonal systems of the body for the manufacture of bile acids, steroid hormones, and vitamin D.



Although cholesterol is vital and necessary for human health, high levels of cholesterol in the blood have been linked to damage to arteries and cardiovascular disease.

Atherosclerosis (also known as atherosclerotic vascular disease or ASVD) is a condition in which an artery wall thickens as a result of the accumulation of fatty materials such as cholesterol. It is commonly referred to as a hardening or furring of the arteries. It is caused by the formation of multiple plaques within the arteries.

These complications of advanced atherosclerosis are chronic, slowly progressive and cumulative. Most commonly, soft plaque suddenly ruptures, causing the formation of a thrombus that will rapidly slow or cease blood flow, leading to death of the tissues fed by the artery in approximately 5 minutes. This catastrophic event is called an infarction.

One of the most common recognised scenarios is called coronary thrombosis of a coronary artery, causing myocardial infarction (a heart attack). The same process in an artery to the brain is commonly called stroke. Another common scenario in very advanced disease is claudication (limping) from insufficient blood supply to the legs.

### ***Collagen and the Liver***

It is equally important to look after the health of your liver. Excess cholesterol is excreted by the liver via the bile into the digestive tract. Typically about 50% of the excreted cholesterol is re-absorbed by the small bowel back into the bloodstream.

By taking collagen supplements the liver can feel less congested. Collagen supplements can regenerate collagen and thus improve the condition of the arteries.

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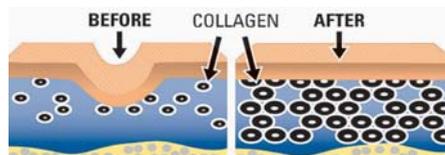
## ***Improve your skin tone, wrinkles, hair and nails with Collagen supplements and cream***

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### ***Our skin, Collagen and sun damage***

The dermis is the middle layer of skin between the epidermis (top layer), and the skin's deepest adipose (fatty) tissue. The dermis layer is the densest layer of our skin, containing the body's thickest mesh of collagen protein fibres. This is the layer with the greatest responsibility for the skin's health, proper functioning and appearance and it is where sun damage has the most significant effect.

With age comes a decline in the quality and quantity of collagen in the skin; its production slows and eventually ceases altogether. At age 30 it is estimated our collagen levels are at 98%, at age 50 this has dropped to a staggering 47%. As collagen is most abundant in the dermis, this is the layer most affected and sun exposure dramatically speeds up this process. Ultraviolet radiation penetrates the skin's surface to the dermis layer causing collagen to weaken and break down at a significantly higher and faster rate than natural aging





alone. The ultraviolet rays cause abnormality in the collagen fibres, which in turn create malfunctions in the skin cells. Basically our collagen cells become unable to regenerate themselves, and the skin becomes ever more vulnerable to sun damage.

Collagen in the dermis layer keeps the skin tight, healthy and youthful. When this layer's collagen declines, the skin becomes thinner and weaker, revealing the signs of age. Sun damage can make this happen long before it's due, a process called premature aging.

As the skin begins to thin because of collagen decline, fine lines and wrinkles become visible, increasing in depth and quantity as collagen loss continues. The skin also loses its suppleness as the lack of collagen affects its ability to retain moisture. Also, since the dermis' collagen protects the fatty tissue responsible for keeping the skin from sagging, its decline eventually causes the skin to sag.

### ***How can Collagen cream and supplements help?***

Every year the amount spent on expensive, and often painful, collagen treatments multiplies, as both men and women alike try to preserve their youthful appearance. By taking an advanced collagen supplement or using an advanced collagen cream it may be possible to achieve the same results at a fraction of the cost. It will help heal the skin within a week. Wrinkles and age spots may disappear within a few months. Your complexion should start feel fuller and wrinkles often fade as connective tissue is filled and plumped out with collagen.

### ***Nails & Hair***

Our nails and hair consist of keratinized cells, basically layers of dead cells with small quantities of fat and moisture. At the age of 30 the collagen levels in our hair would be at about 68%, fast forward twenty years and this will have dropped to about 23%. Taking collagen supplements may serve to build strength and encourage growth in both hair and nails.

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### ***Help reduce acne, psoriasis and rosacea with Collagen supplements and cream***

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> **Acne:** It probably comes as no surprise that acne is indicative of unhealthy skin. Acne can be caused by various factors. A build-up of bacteria can cause your skin to break out with pimples, zits, and various other blemishes. The over production of oil and the irregular shedding of dead skin cells can also cause acne. And to add insult to injury, these outbreaks can cause permanent scars on the skin.

> **Psoriasis:** Psoriasis is a disease of the auto-immune system which presents itself on the skin. Symptoms mainly appear in the form of what is known as plaque - raised red lesions covered in what is referred to as 'scale' - dead skin cells, which are whiteish in colour.

Flare ups often occur following skin injury or other illness, with acne and psoriasis often causing simultaneous discomfort.

> **Rosacea:** Rosacea has acne-like appearance, is a chronic, inflammatory skin condition with signs and symptoms that include:



- Tendency to blush or flush easily
- Persistent facial redness
- Small visible blood vessels
- Bumps and pus-filled pimples on the face (inflammatory papules and pustules)
- Facial discomfort—burning or stinging sensation, tightness, dryness or itch
- Burning, itching, or watery eyes and/or swollen eyelids
- Thickening skin on the nose, cheeks and/or forehead

Many people find it extremely beneficial to use an advanced collagen cream to help deal with and reduce the appearance of these skin conditions. Collagen creams and supplements can start to heal the skin within a matter of just weeks.

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### ***How Collagen supplements can help you shift that stubborn, extra weight***

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For many of us, as we get older, that extra bit of persistent weight that just won't shift, is an all too familiar problem. As previously discussed collagen is a natural protein. It can actually aid in naturally detoxifying the body by ridding it of excess fat, toxins and sugars.

By taking a regular dose of collagen you can actively detox your body and begin to rebuild and tone muscle. A body that is more lean is naturally more efficient in burning calories. Collagen supplements can help rejuvenate your internal organs and therefore lead to an improved elimination of waste. Relief from constipation and bloating can be felt within a matter of a week or two.

Imagine being able to lose that dreaded 'pouch' with the aid of advanced collagen supplements. Many people find that within just 21 days they have lost between 5-10lbs. Not only that, skin will feel firmer and have increased elasticity too.

More importantly if you following the dietary guide above on how to lower cortisol levels to protect your collagen greater weight loss can be seen. Cortisol makes us crave sweet and fat soaked foods. Lowering cortisol stops this crazing immediately.

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### ***How to reduce cellulite and stretch marks with Collagen supplements and cream***

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#### ***What Is Cellulite?***

The adipose (fatty) tissue immediately below the surface of your skin rests on top of a firm layer of collagen connective tissue.

Before cellulite shows up, the outer surface of the skin is smooth and supple (no bumps and no ridges). The skin is smooth because the surface of the fatty tissue just below the skin is also smooth. This fatty layer remains smooth and supple as long as the fat cells remain strong, healthy and flexible.

The dimply, bumpy texture we call cellulite begins to occur when the structure of the fat cells begin to weaken. When the cell walls weaken, the cells begin to "sag" and this "sagging" is what accounts for the "orange peel" look of cellulite. The weaker the cells become the worse the sagging and the worse



the cellulite. Taking a collagen supplement or using a collagen cream can significantly improve the appearance of cellulite.

### ***Stretch marks***

Research has shown that the formation of stretch marks begins with a breakdown and stretching of collagen located beneath the top layer of skin. Collagen makes up about 75 percent of healthy skin so when collagen fibres get damaged or production of collagen decrease, major differences in your skin's health are noticeable.

One of the most obvious is the formation of stretch marks. When a person gains weight or loses weight quickly, the natural order of collagen fibres is disrupted. The fibres become stretched, and we see what we refer to as stretch marks.

In addition to maintaining the healthy collagen levels you have, you also want to promote new collagen synthesis, especially if you are developing or already have stretch marks. Make sure you are getting your recommended daily allowance of Vitamin C. Vitamin C plays a major part in collagen synthesis and is also a powerful antioxidant. Using an advanced collagen cream can help with the appearance of stretch marks.

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### ***Use Collagen supplements to improve memory and concentration levels***

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Another all too common sign of aging is memory loss and poor concentration. Memory loss is a symptom of the gradual deterioration of brain cells, but it can be improved with



proper nutrition and supplements. Collagen is one of these supplements. By taking collagen supplements your concentration, memory and headaches can be improved quite quickly.

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### ***Firm up your chest, leg and arm muscles and improve stamina and endurance levels***

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Another area increasing worldwide demand for collagen is the field of sports nutrition. Collagen supplements can quickly boost lean muscle gain, decrease recovery time, rebuild damaged joints without the need for surgery and improve cardiovascular performance. Lungs become stronger with collagen; your ability to breathe easier can improve in the first week or two. Your muscle tone will be more defined particularly when you follow the notes on cortisol reduction above.

Increased muscle size and strength, cannot happen without first putting the muscle under additional load. However unless the connective tissue increases in strength damage / injury can occur easily. It follows that increasing collagen levels can help strengthen connective tissue so that the increased load can be tolerated.

Similarly muscles cannot function efficiently without sufficient blood supply. As the heart contracts, a wave of blood flow is passed around the arterial system by the arteries first expanding (stretching open) and then the recoil as they pull back together, passing blood further along the system. All aspects of the arterial system can improve with sufficient collagen.

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## **Summary**

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Aging is not simply a matter of how many years that you have lived since you were born. Part of aging is down to the lifestyle and eating habits that we adopt through either the culture or family that we were born into. Clearly genetics has a major role to play too, but with sufficient knowledge of what nutritional areas are lacking in our diet we may enter old age with a level of fitness and flexibility of someone many years our junior.

Collagen is simply a specific combination of amino acids (protein) that is often difficult to obtain through a regular diet. Having those ingredients supplemented with the elements required to absorb them efficiently, simply provides your body with the building blocks that it requires to set about repairing years of damage caused by their deficiency.

The intelligence of the body is such that it will “tag” such nutrients and send them to the areas that it assigns the greatest priority to first. That is why different people report such dramatic improvements in so many different areas and the speed of recover can vary from person to person.

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## **Recommendation**

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There are a multitude of collagen supplements available. In my opinion many do not provide value for money in terms of their efficacy. One that has much research and testing behind it to validate its collagen production & deposition is:

- **Colla-Regen** : see [www.colla-regen.com](http://www.colla-regen.com)
- **To Order Colla-Regen call:** 0871 704 8686

Two others that have almost as much evidence of efficacy are:

- **Nu-Col** : see [www.nu-col.com](http://www.nu-col.com)
- **PremierCol** : see [www.collagen-store.com](http://www.collagen-store.com)

## Glossary

- **Adipose** - loose connective tissue composed of adipocytes (fat cells). It is technically composed of roughly only 80% fat; fat in its solitary state exists in the liver and muscles. Its main role is to store energy in the form of lipids, although it also cushions and insulates the body.
- **Amino acids** - key elements of an amino acid are carbon, hydrogen, oxygen, and nitrogen. Amino acids serve as the building blocks of proteins.
- **Ankylosis/Anchylolysis** - is a stiffness of a joint due to abnormal adhesion and rigidity of the bones of the joint, which may be the result of injury or disease. The rigidity may be complete or partial and may be due to inflammation of the tendinous or muscular structures outside the joint or of the tissues of the joint itself.
- **Articular cartilage** - refers to the hyaline cartilage on the articular surfaces of bones.
- **Atherosclerosis/atherosclerotic disease** - (also known as atherosclerotic vascular disease or ASVD) is a condition in which an artery wall thickens as a result of the accumulation of fatty materials such as cholesterol. It is a syndrome affecting arterial blood vessels, a chronic inflammatory response in the walls of arteries, caused largely by the accumulation of microphage white blood cells and promoted by low-density lipoproteins (plasma proteins that carry cholesterol and triglycerides) without adequate removal of fats and cholesterol from the macrophages by functional high density lipoproteins (HDL). It is commonly referred to as a hardening or furring of the arteries. It is caused by the formation of multiple plaques within the arteries.
- **Buffered vitamin C** - magnesium or calcium is bound to the vitamin c with makes it alkaline rather than acidic. The taste is slightly metallic rather than sharp.
- **Chondroblast** - is a cell which originates from a mesenchymal stem cell (loose connective tissue) and forms chondrocytes, commonly known as cartilage cells. Chondroblasts that become embedded in the matrix are called chondrocytes. They lie in the space or lacunae present in the groups of two or more. The groups are formed by division of a single parent cell.
- **Chondrocytes** - the only cells found in cartilage. They produce and maintain the cartilaginous matrix, which consists mainly of collagen.
- **Complex carbohydrates** - when you eat complex carbohydrates, they get converted to glycogen and either used immediately for energy, providing a steady dose of blood sugar, or they are stored in the muscles and liver for energy at a later time. These include whole grains, fruit, vegetables, beans, pulses, low fat yogurt and skimmed milk.
- **Cornea** - is the transparent front part of the eye that covers the iris, pupil, and anterior chamber.
- **Cortisol** - a stress hormone that breaks down protein & fats to rapidly raise blood sugar level.
- **Dermis** - a layer of skin between the epidermis and subcutaneous tissues that consists of connective tissue and protects the body from stress and strain.
- **Elastic cartilage/Yellow cartilage** - is a type of cartilage present in the outer ear, larynx, and epiglottis. It contains elastic fibre networks and collagen fibres. The principal protein is elastin.
- **Elastin fibres/elastic fibres/yellow fibres** - bundles of proteins (elastin) found in extracellular matrix of connective tissue and produced by fibroblasts and smooth muscle cells in arteries. These fibres can stretch up to 1.5 times their length, and snap back to their original length when relaxed. Elastic tissue is classified as "connective tissue proper". Elastin fibres are found in the skin, lungs, arteries, veins, connective tissue proper, elastic cartilage, periodontal ligament, fetal tissue and other structures.
- **Enzymes** - are biological molecules that increase the rates of chemical reactions.
- **Epidermis** - is the outermost layers of cells in the skin.
- **Extracellular matrix** - is the extracellular part of animal tissue that typically provides structural support to the animal cells in addition to performing various other important functions. The extracellular matrix is the defining feature of connective tissue in animals.
- **Fascia** - is a layer of fibrous tissue. A fascia is a structure of connective tissue that surrounds muscles, groups of muscles, blood vessels, and nerves, binding some structures together, while permitting others to slide smoothly over each other. Like ligaments and tendons, fasciae are dense regular connective tissues, containing closely packed bundles of collagen fibres oriented in a wavy pattern parallel to the direction of pull. Fasciae are consequently flexible structures able to resist great unidirectional tension forces until the wavy pattern of fibres has been straightened out by the pulling force. These collagen fibres are produced by the fibroblasts located within the fascia.

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- **Fibrocartilage** - White fibrocartilage consists of a mixture of white fibrous tissue and cartilaginous tissue in various proportions. It owes its flexibility and toughness to the former of these constituents, and its elasticity to the latter. It is the only type of cartilage that contains type I collagen in addition to the normal type II. Fibrocartilage is found in the pubic symphysis, the annulus fibrosus of intervertebral discs, meniscus, and the TMJ. During labour, relaxing loosens the pubic symphysis to aid in delivery, but this can lead to later joint problems.
- **High glycaemic value** - a high glycaemic index food causes a more rapid rise in blood glucose levels. This includes white bread, most white rice, processed breakfast cereals, white potatoes etc.
- **Hyaline cartilage** - (aka "Gristle") is a type of cartilage found on many joint surfaces. It is pearly bluish in colour with firm consistency and considerable collagen. It contains no nerves or blood vessels, and its structure is relatively simple. Hyaline cartilage is covered externally by a fibrous membrane, called the perichondrium, except at the articular ends of bones and also where it is found directly under the skin, i.e. ears and nose. This membrane contains vessels that provide the cartilage with nutrition. Hyaline cartilage also contains chondrocytes which are cartilage cells that produce the matrix. Hyaline cartilage matrix is mostly made up of type II collagen and Chondroitin sulphate, both of which are also found in elastic cartilage.
- **Intervertebral discs** (or intervertebral fibrocartilage) - these lie between adjacent vertebrae in the spine. Each disc forms a cartilaginous joint to allow slight movement of the vertebrae, and acts as a ligament to hold vertebrae together.
- **Keratinized** - keratin refers to a family of fibrous structural proteins. Keratin is the key of structural material making up the outer layer of human skin. It is also the key structural component of hair and nails.
- **Lacuna** - a small space containing an osteocyte in bone or chondrocyte in cartilage.
- **Ligaments** - the fibrous tissue that connects bones to other bones.
- **Myocardium** - is the Cardiac muscle (heart muscle) and is a type of involuntary striated muscle found in the walls and histological foundation of the heart, specifically the myocardium. Coordinated contractions of cardiac muscle cells in the heart propel blood out of the atria and ventricles to the blood vessels of the left/body/systemic and right/lungs/pulmonary circulatory systems. This complex of actions makes up the systole of the heart Cardiac muscle cells, like all tissues in the body rely on an ample blood supply to deliver oxygen and nutrients and to remove waste products such as carbon dioxide. The coronary arteries fulfil this function.
- **Oedema/Edema** - is an abnormal accumulation of fluid beneath the skin or in one or more cavities of the body that produces swelling (formerly known as dropsy or hydropsy).
- **Proteoglycans** - proteins that are heavily glycosylated.
- **Red Bush Tea** - is a herbal tea popular among health-conscious consumers, due to its high level of antioxidants, its lack of caffeine, and its low tannin levels compared to fully oxidised black tea or un-oxidised green tea leaves. It is also thought to aid nervous tension, allergies and digestive problems.
- **Refined carbohydrates** - are generally considered unhealthy carbohydrates. These complex carbs have had the fibre stripped away so they act as simple carbohydrates do in the body; they are digested rapidly, which causes a spike in blood sugar, followed by a crash. They are essentially empty calories. They include sweeteners, white flour, sweetened fruit fillings, biscuits, cookies, crisps etc.
- **Reticular fibres** - a type of fibre in connective tissue composed of type III collagen. Reticular fibres cross-link to form a fine meshwork (reticulin). This meshwork acts as a supporting net in soft tissues such as liver, bone marrow, and the tissues and organs of the lymphatic system.
- **Synovial joint** - is the most common and most movable type of joint in the body of a mammal. As with most other joints, synovial joints achieve movement at the point of contact of the articulating bones. Structural and functional differences distinguish synovial joints from cartilaginous joints and fibrous joints. The main structural differences between synovial and fibrous joints are the existence of capsules surrounding articulating surfaces of a synovial joint and the presence of lubricating synovial fluid within those capsules (synovial cavities).
- **Tendons** - A tough band of fibrous connective tissue that connects muscle to bone. Similar to ligaments and fasciae in that they are all made of collagen.

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**18. *Collagen: The Glue That Holds Us Together...and How To Keep it 'Sticky'!***