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Amazing Collagen Peptides

How Bioactive Collagen Peptides
can improve your Quality of Life

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Introductions

Dear readers,

Regardless of age, everyone wants to be strong, agile and healthy, and maintain a good appearance for as long as possible.

In this book, you will discover why collagen peptides are so important for our bodies, and the many things these natural proteins can do.

No matter if it concerns flexible, powerful tendons and ligaments, pain-free joints, skin beauty, strong bones, or whether you desire a firmer, more defined body or a more rapid build-up of muscle mass; whether you are an athlete and want to stay as injury-free as possible, or you wish to ensure you stay mobile into your later years; whether you want to counter age-related muscle reduction, or if you are about to have surgery and want to encourage rapid wound healing – you will find an abundance of information and suggestions in this book.

Above all, you will learn more about what collagen peptides are, how they work in the body, and the results of the numerous scientific research studies conducted in this area.

Now, we wish you an enlightening journey of exploration into the world of collagen peptides.

And, if you have any unanswered questions once you have finished reading, be sure to get in touch with us. We will be more than happy to help you.

Yours,

Dr. Stefan Siebrecht

Dr. Stephan Hausmanns

Dr.med. Hans-Christoph Kneféli



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On the topic of dietary supplements in general, and collagen peptides in particular, many questions tend to arise. Our experts provide answers to the most common questions at the end of each chapter.



1 Healthy and Attractive for a Lifetime

Life expectancy in industrialized nations is increasing year by year. Statistically speaking, a 65-year-old man still has 17 years ahead of him; a woman of the same age still has 22 years. As a common saying goes: “Everyone wants to grow old, but no one wants to be old.” One of the biggest fears relating to old age is the loss of mobility, often times resulting in loss of independence.

In addition to living longer, we want to live longer in good health, and with a high quality of life. No question, at some point, most of us will have to live with certain signs of aging. However, when they occur and how strongly they really affect us is something that can be influenced.

We can create the essential conditions to healthy living so that health disorders and restrictions strike as late as possible, and possibly in milder form. As a result, we can increase our life expectancy while also increasing our quality of life with greater activity and mobility. The foundation for this is already established at a young age. Healthy living requires a balanced diet, regular exercise, adequate sleep, stress management, and above all, avoiding behaviors that make you ill. In addition, a sufficient supply of the necessary micronutrients is also important [19]. What is more, those already “advanced” in age can also actively support their body.

What does “aging” actually mean?

When we are young, the metabolism runs at full speed and all the body cells are constantly renewing themselves. The nutrient uptake works flawlessly, and the body’s own production of important substances also helps to ensure the body gets everything it needs. We are bursting with strength and youthfulness. But our body is programmed for mortality. As we grow older, many processes in the body change: The entire metabolism slows down and the uptake and processing of nutrients decline. Certain body tissues are no longer reproduced at the required levels.

Cartilage tissue wears out, bones become more porous, blood vessels calcify and stiffen. The blood flow decreases, and as a result neither the tissue nor the brain is optimally provided for. The skin loses its ability to store moisture. These aging processes cannot be halted or reversed. They can, however, be positively influenced by physical activity and a targeted diet or nutritional supplement.

Who benefits from nutritional supplements and when?

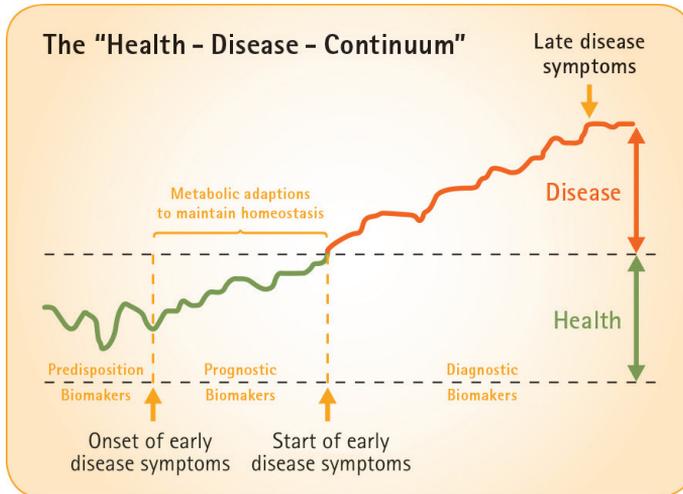
The question is often asked: “Who really needs nutritional supplements and when should we start taking them?” Unfortunately, there is no “one-size-fits-all” answer. The physical aging process in people already begins in their mid-twenties [17]. As we are all different and have disparate preconditions, appropriate recommendations can only be given individually. There are nonetheless a number of guidelines. Anyone who is already suffering from certain ailments, has a genetic disposition for certain ailments, or leads a lifestyle that is highly likely to result in adverse consequences, should certainly consider targeted support for the organism from an early stage. If, for example, you actively engage in a sport that is heavy on your joints, you should make sure that the body has all the necessary components at its disposal to maintain or build up sufficient cartilage mass.

There are also some ailments that affect nutrient uptake via the intestine, regardless of one’s diet. Chronic diseases, permanent stress and other intense psychological strain can also slow down the uptake or synthesis of nutrients in the body. At the same time, many drugs have side effects which require a higher supply of certain proteins, minerals or vitamins.

Questions and Answers:

I am healthy – do I still need nutritional supplements?

Being healthy or ill is not an absolute condition. As a rule, chronic diseases develop gradually and lead to ailments at some point. Aging is not a disease, and yet it causes unwelcome restrictions for many people. This is what makes the question so tricky: At an early stage, when it would be quite easy to stop or slow down certain processes, we don't yet see the need for it. On the other hand, we consider many restrictions of age as a matter of "fate", unaware that we could significantly improve the quality of life in a natural way:

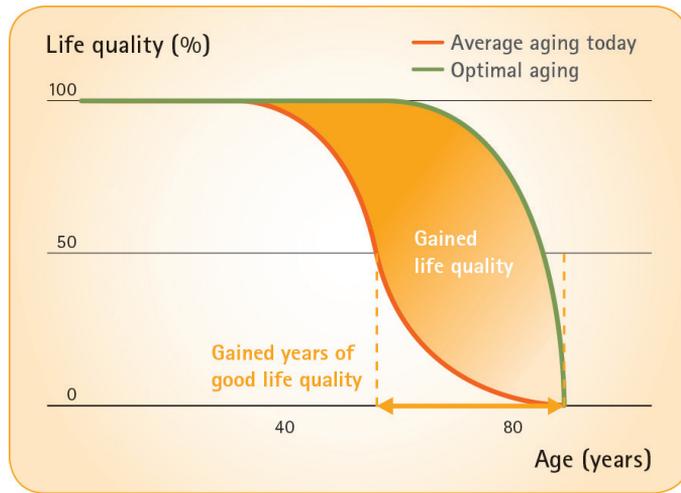


Health and diseases are consequences of slow and continuous processes (Lloyd Iva, 2009, *The Energetics of Health, a Naturopathic Assessment*, Elsevier).

I don't want to live for 100 years. Why should I take nutritional supplements?

Dietary supplements are not a matter of extending the life span – although many people wish they could. The goal is to significantly improve the quality of life for its entire duration with a suitable lifestyle and the corresponding food supplements, and to maintain our mobility and independence for as long as possible.

By instigating a positive change in the aging process, we gain more years with a higher quality of life.



There are so many different products – how am I supposed to know what’s best for my needs?

Every person’s body is different, people have divergent diets and lifestyles and a wide variety of genetic predispositions. The right kind of nutritional supplement for you in your current situation and phase of life is best determined with a well-trained nutrition consultant. As a rule, it is worthwhile to support the cardiovascular system, the skeleton, joints, muscles and – depending on the season and personal predisposition – the immune system. By doing this, you’ve already made a good start.

Why do many doctors not believe in nutritional supplements?

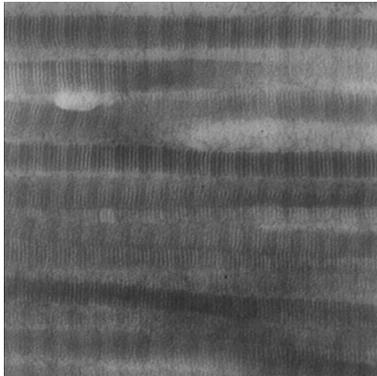
Like many pharmacists, physicians are trained in pharmaceuticals. Nutritional supplements are not drugs. They are freely available – and do not fall within most doctors’ expertise. In recent years, numerous studies have clearly confirmed the efficacy of certain nutrients.

2 Collagen – Building block of life

It is well known that the human body consists largely of water. Proteins are another major component. Whether referring to the heart, lungs, kidneys, liver, brain, skin, bones, and even most hormones and enzymes that are indispensable for metabolism – it is always the proteins that provide their structure and function.

It's not just the skin that consists largely of collagen. With a presence of approximately 30%, collagen is the most frequently found protein in the human body and therefore the most important component of human connective tissue. This extraordinary protein is also the central building block of the bones, joints, cartilages, tendons, ligaments, fasciae and many other tissues and structures.

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The structure of collagen
(scanning electron microscope).

Collagen provides a structure for the body and its many organs, and keeps them “together” in the truest sense of the word. It is present nearly everywhere in the body, forming and connecting moving parts, like the bones, and in turn, the muscles, tendons, and ligaments with the bones. Collagen also provides the structure and tension in the tissue and fasciae surrounding the tissue. Together with water, it erects barriers that divide the body into its various compartments, thus ensuring their function.

Collagen has enormous tensile strength: stronger than a steel cable of the same thickness [22]. That is why collagen can withstand tremendous loads. Just like a rope or a thread, it can be “spun” into fibers, which then enclose our muscles as fasciae, or form the second skin layer, the dermis. The skin is particularly important: It is used in the construction of a protective outer coating from the outside world, shielding us from harmful influences and from drying out. The intestinal wall is the inner counterpart to the outer skin. It protects us on the inside, but allows nutrients and other important food constituents to pass through, and be absorbed by, the body.

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Even the veins and arteries, or the blood-brain barrier that surrounds our brain, would not exist without collagen. Collagen is therefore an essential component of all these tissues and lends them functionality and stability [11].

Our body: Permanent renewal

Our body can produce collagen on its own. Strictly speaking, proteins are constantly being synthesized and degraded in the body. Approximately 400 grams (14 oz.) of degraded proteins are replaced by new protein every day – in young and healthy bodies, mind you [25]. However, over the years, when our metabolic processes slow down, endogenous (the body’s own) production shrinks by about 1.5% per year [27]. Simply put, that is just the normal aging process, but it has far-reaching consequences.

Collagen dry matter and types in various tissues [11]

Bones ~ 90% of the organic matrix of bone; 25% collagen of the entire bone mass

Skin ~ 75% collagen

Joint cartilage ~ 70% collagen

Ligaments ~ 70% collagen

Tendons ~ 85% collagen

Fasciae ~ 70% collagen

Muscle tissue ~ 6% collagen

Other tissue such as:

Gastrointestinal tract,
periodontium
(tooth holding apparatus)

Eyes, ears, nose

Blood vessels, lungs

Blood-brain barrier



Basically, everything “white” consists largely of collagen

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The Types of Collagen

28 different types of collagen are currently known. The human body mainly consists of collagen types I, II and III.

Type I collagen: Accounts for about 90% of the body’s total collagen content, mainly in the connective tissue of the skin, bones and tendons

Type II collagen: Joint cartilage

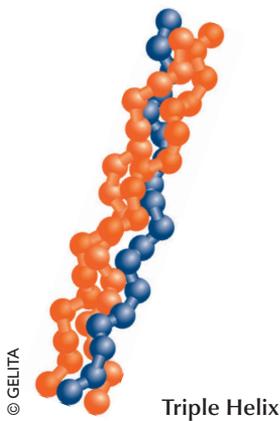
Type III collagen: Skin and muscles



As people age, the ratio of the different types of collagen in the tissue, particularly in the skin, changes [7]. In newborns, for example, the ratio between type I and type III collagen is still almost balanced. Over the years, this ratio changes more and more in favor of type I collagen, and the concentration of type III collagen decreases significantly. Overall, the amount of all collagen fibers declines considerably in mature skin causing it to become thin and wrinkled.

A brief excursion into the world of chemistry

To understand why collagen is so strong yet flexible at the same time, one needs to look at its molecular structure. Natural collagen consists of chains of about 1000 amino acids each. Glycine, the smallest amino acid, appears at about every third point of this chain. The glycine-proline-hydroxyproline sequence occurs particularly frequently. Three chains of these amino acids wind around each other like a spiral to form a stable and mobile structure, a so-called triple helix. This is about 300 nanometers long and has a diameter of around 1.5 nanometers – roughly 100,000 times thinner than a human hair. Yet, it is this above-mentioned combination of amino acids that ensures tight helix winding and the particularly densely packed structure. This is what makes collagen so stable. The different types of collagen vary in the sequence of the amino acids and in the cross-linking.



3 How do collagen peptides get to the right place?

During the past years, collagen peptides have progressively gained a reputation for their ability to positively influence human collagen metabolism. They are now available as dietary supplements, but how can we imagine their effect – we swallow a few grams and they brilliantly land in the right place? It is not as simple as that. Here is an admittedly highly simplified explanation:

In principle, our body is busy day and night performing renovation work. It keeps itself young by breaking down old tissue, while at the same time building new tissue to replace the old. With advanced age, this process slows down, but it never ceases.

When our body breaks down collagen, these long chains are disassembled, by enzymes, into small “snippets” for removal. This sends a signal to the body: “Attention! – Bits of degraded collagen are floating around here – we have to start rebuilding!” A young and healthy body reacts promptly to build the required quantity.

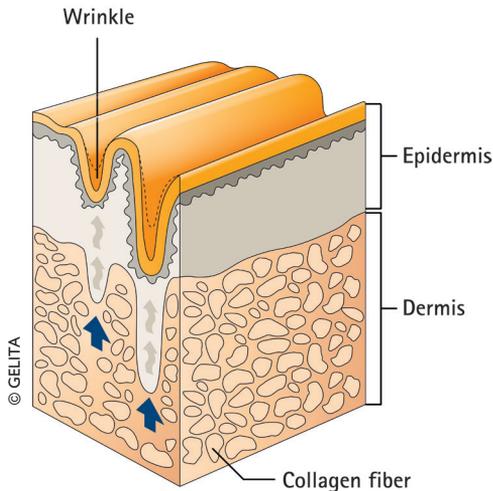
When the metabolism becomes weary as time goes by, these signals are no longer sufficient for the body, which has become somewhat sluggish. When we consume collagen peptides as a dietary supplement, we ingest just these collagen snippets – but in larger amounts. Our bodies are rapidly digesting and absorbing collagen, mainly in form of the smallest units – single amino acids, but also partially in intact form as collagen peptides (= collagen snippets). These collagen snippets reach the blood stream and distribute throughout the body. Now, the cells in our body, which are responsible for connective tissue / collagen metabolism, notice that there is an imbalance. It is like an alarm, “Attention! There are loads of collagen particles swimming about here – now we really have to get to work and make even more collagen!” As the collagen supplements provide the amino acids (=building blocks for collagen synthesis at the same time), they support the body twofold.



Bioavailability

Collagen peptides can be so well absorbed by the body because they are water-soluble, and – unlike other proteins – have a very simple peptide structure, that is very easy for the body to work with. They are “broken down”, with an enzymatic treatment, and can therefore be absorbed more quickly and extensively than undenatured collagen.

In this way, collagen peptides stimulate our body’s own collagen production. The whole connective tissue metabolism comes to life. Taking the skin as an example, it can be shown that other important components of skin structure, such as elastin and proteoglycans, are also produced in greater quantities. The dermis, the second layer of skin, is, so to speak, completely overhauled. At the same time, the degradation of the skin is slowed. In total, more collagen is being built up than broken down, and it is exactly this effect that many users – mostly women – describe as a more attractive, firmer, radiant complexion. The balance also shifts in other tissue types such as cartilage or bone: increased formation, slower degradation.



Skin formation and increased collagen formation.

This also explains why dietary supplements cannot produce visible or tangible results overnight. Joint cartilage cannot be rebuilt in a flash, nor can skin wrinkles instantly disappear. Our body needs time to adapt to these processes. It is important to note one thing – collagen peptides do not only affect the symptoms, but also address the causes of the problems directly.

Not all collagen peptides are the same

If we look back at the beginning of this chapter, we read that there are different types of collagen that occur frequently in the widest variety of tissue types. If our body degrades these different collagen types, then varying “snippets” are produced. However, this also means that the cells that form cartilage tissue, for example, react to different snippets than those which are responsible for the formation of skin or bone, for instance.

There are special cells in our body that are responsible for collagen formation:

- ↘ Chondrocytes: Collagen formation in joint cartilage
- ↘ Fibroblasts: Formation and degradation of collagen in the skin, ligaments, and tendons
- ↘ Osteoblasts and Osteoclasts: Formation and degradation of collagen in bones



Science has invested a lot of time researching these differences, and came up with a method of cutting the snippets out of the long chain of amino acids “to size” in precisely the right way. How this works exactly is explained later in more detail.

What you should be aware of as a consumer: There are various dietary supplements that provide collagen peptides optimized for different purposes. So, if you want a product specifically for your joints, you should

choose a composition of collagen peptides, specifically optimized for that condition, as opposed to a different product designed for firmer skin or stronger muscles. In the appendix you will find a list of collagen peptide products with scientifically proven effects, which have been formulated for specific purposes.

How much protein does the body need?

As is often the case, there is no universal answer to this question. The amount of protein you need depends on many factors: Your age and weight are just as important as the type and frequency of your physical activity. And, of course, your general health status is also important. Here are a few examples:

- ✦ If you weigh 70 kilograms (1 kg = 2.20462 lb), you only need about 56 grams per day at a young age [6]. If you do up to three hours of sports or other physical activity every day, the requirement increases to as much as 77 grams per day. Healthy older people need about 70 grams without sports, but with sports, significantly more – up to 119 grams, depending on the intensity [4].
- ✦ Endurance athletes require a similar amount, and if you do weight training you need slightly more. Are you on a diet and consuming fewer calories? Then you need between 126 and 140 grams. With additional sports activity, *even* up to 175 grams. Anyone suffering or recovering from a serious ailment needs just as much. It is therefore high time to challenge an old prejudice: A high intake of proteins is by no means a topic only for bodybuilders and competitive athletes.
- ✦ Conversely, those with a protein deficiency usually eat too many carbohydrates and too much fat in their diets. It is not just the quantity, but also the quality of the proteins and the reason for the intake that are decisive.
- ✦ So, if you eat healthily and figure-consciously, you should aim to ingest at least 5, or even better, 10 grams of collagen peptides per day. This protein intake should be supplemented by other proteins such as milk, eggs, meat, fish, nuts, and soy or dairy products like cheese.

4 Collagen peptides – the special source of protein

As already described in previous chapters, nature based highly essential elements used in the construction of the human body on collagen. The same is also true for animals. The fact that the body's collagen-producing cells require collagen peptides as a signal to start their own collagen production, has previously been explained. Over time however, collagen production starts to lose its equilibrium. With increasing age, evermore collagen is broken down and less and less is formed, which is why the proteins (collagen snippets) that stimulate the body's own production process become increasingly important.

Simply put: We need proteins for a balanced diet, and there are special proteins with added benefits. Collagen peptides belong to the second category: They are indispensable for optimal stimulation of the cells.

Collagen peptides are pure protein, safe and allergen free, and they are easily and completely digested. They provide amino acids as protein building blocks, the composition of which corresponds exactly to natural collagen. This is why they are ideally suited to support the body's own collagenous tissue (see box in chapter 2).

Although natural collagen lacks tryptophan, an essential amino acid, this is not necessary in nature for the formation and function of the body's own collagen. For this reason, collagen peptides that are absorbed via the diet do not require this amino acid either. Collagen peptides are therefore ideally suited to stimulate the formation process of collagenous tissues in the body.

The long-term energy provider

However, collagen peptides should not be the only source of protein. The ideal diet combines, for example, a nutritional supplement with collagen peptides and a balanced mixture of other protein sources such as milk, meat or fish.

This ensures that all necessary amino acids are available to the body in sufficient quantities over the day. As a macronutrient, proteins also

contribute to the body's energy supply. Collagen peptides contain a high amount of the so-called "energy amino acids", proline and glycine, which are converted to glycogen and stored in the muscles as an energy supplier. Nevertheless, the transformation processes necessary for this require a lot of time, which is why proteins can also be termed "long-term energy providers".

Protein from milk, meat and soy: Not only benefits

There have been numerous discussions on the right sources of protein and many new insights over time. For many years, the consumption of great quantities of meat and milk was regarded as an absolute must for rapid muscle growth. However, the excessive consumption of proteins from these sources revealed a downside: A drastic increase in cardiovascular diseases such as arteriosclerosis, and numerous disorders that can be attributed to increased chronic inflammatory process (CIP). Such a diet does not only consist of ingesting pure protein, but a large number of other substances such as cholesterol and other animal fats, hormones, and lactose, too. Another important concern to consider is that more and more people are intolerant to dairy products.

With the trend toward plant-based proteins, many consumers are faced with a similar problem: Plant-based proteins are foreign substances to the body and can therefore trigger severe allergies, which is particularly common with soy products, but with numerous proteins from almonds or nuts as well. Evermore, people have intolerances to the popular protein drinks based on these substances.

Another important aspect: Many products made from vegetable proteins have a rather unpleasant aftertaste. Manufacturers conceal this with sugars or other sweeteners, as well as with a multitude of flavorings. Collagen peptides, on the other hand, are virtually neutral in taste and can be easily dissolved in powder form in beverages or muesli.

Collagen peptides are free of purines, lactose and gluten and contain no allergens. Although they have a satiating effect, they do not cause a feeling of fullness or bloating.

5 How collagen peptides are produced

Collagen and collagen peptides are produced from collagen-rich ingredients, mostly from skin and bones from pigs and cattle, and partly also from fish. However, since fish contain relatively little collagen, fish-based collagen products are very expensive. In addition, fish collagen from coldwater fish is somewhat different in structure to that obtained from “warm-blooded” animals.

These fresh, natural raw materials are produced as by-products of meat production, and are therefore also subject to the extremely strict guidelines and tight controls of food production.

At the beginning of the production process the collagen is extracted. The natural collagen is dissolved very gently in warm water in a state-of-the-art, rigorously controlled process. This takes place in closed systems under the strictest hygiene conditions. The purity is also impressive: Cutting-edge filtration and analysis methods ensure the highest quality. Incidentally, quality already begins with the selection of the raw materials.

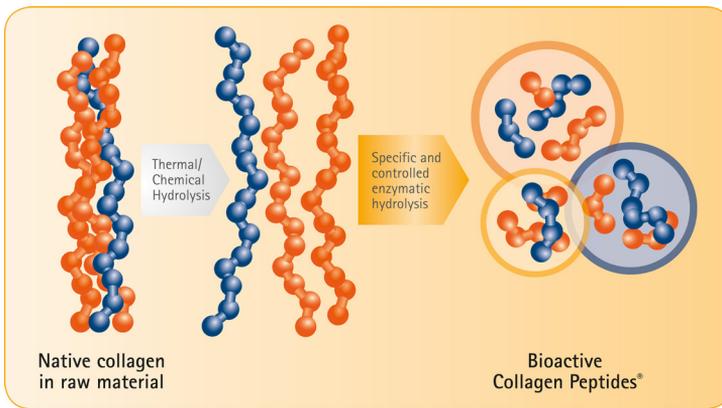
The manufacturers only buy from certified companies, which they regularly check themselves. Strict adherence to the cold chain ensures that only absolutely fresh goods are supplied. They are then processed immediately or deep-frozen in special warehouses.

After extraction, collagen still consists of very long amino acid chains. In the next step, the collagen is hydrolyzed with the help of enzymes. As if they had been cut with natural scissors, the long chains are broken down and divided into shorter sections so that they can be optimally utilized by the body.

Now that the process is complete, these peptides have the optimized length to support bones, joints, muscles or skin. Although this all sounds very simple, there is a highly modern and complex process behind it.



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Surprisingly, apart from water, only agents found in most households are used for this process. Since no other synthetic components or solvents are used in this process, the collagen peptides produced are completely natural foodstuffs.

Closely related yet very different: Gelatine and collagen peptides

Gelatine is also made out of collagen. The difference to collagen peptides is that the collagen snippets are much bigger, and consist of longer amino acid chains than the collagen peptides. Gelatine consists of long amino acid chains, which are absorbed more slowly by the body and, above all, do not have the same stimulatory effect as the shorter collagen peptides.

Gelatine is not specifically manufactured for its physiological benefits, but for providing texture to foods. In combination with water, gelatine forms a gel which is a desirable ingredient in gummy bears or jello. Collagen peptides, on the other hand, dissolve completely in water and do not form a gel. They are produced specifically for the optimum effect e.g. on skin or joints. This is why gelatine is an excellent and natural food ingredient while collagen peptides are ideal nutritional supplements.



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Gelatine gels – collagen peptides dissolve completely.

6 Amino acid chains – the optimal length and composition

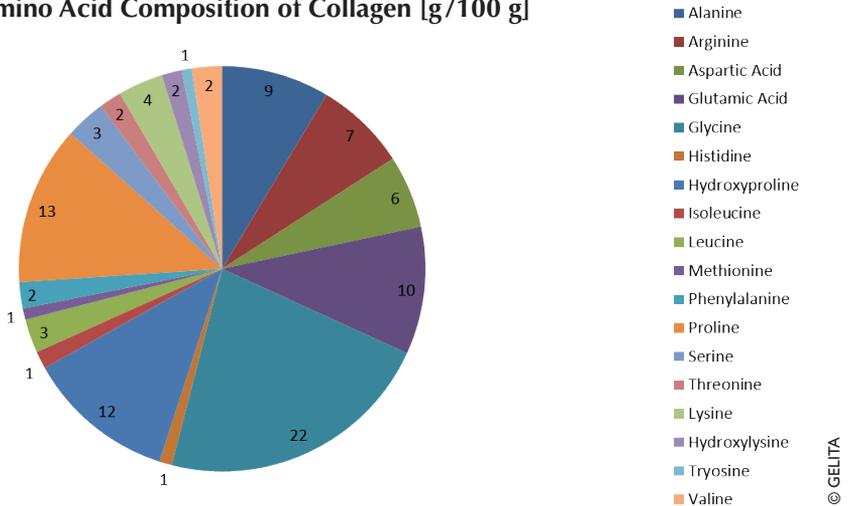
The average chain length in the production of collagen peptides depends on the production process, how the big collagen molecules are ‘cut’ into small peptide pieces. As explained above, different chain lengths are each ideal for particular health objectives, and to stimulate specific cells in our body involved in connective tissue metabolism. The length of the collagen peptides is typically between 5 and 100 chain links with a corresponding molecular weight of between 500 and 10,000 daltons. And, did you just do the math? Exactly, one amino acid weighs about 100 daltons. A dalton, by the way, corresponds to 1.66053×10^{-24} gram. However, collagen peptides with a molecular weight of between 2000 and 5000 daltons, which corresponds to around 20 to 50 chain links, have the highest bioactivity. And, this length needs to be tweaked even more finely if you want to make collagen peptides that are targeted specifically at cartilage growth, firmer skin or stronger bones. These collagen peptides can be absorbed and used excellently by our body [10].

The amino acids in our body

A great variety of amino acids are present in the human body, and – with the exception of tryptophan – they are all contained in collagen peptides. Our human body contains 20 amino acids that can form proteins. These are protein-forming or proteogenic amino acids and are divided into three groups:

The essential amino acids include isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, histidine and valine. These cannot be synthesized by the body itself. Conversely, arginine, glycine, proline, tyrosine, cysteine and glutamine are considered as conditionally essential amino acids. The body can synthesize them in principle, but in certain situations (or conditions, hence “conditionally”) they have to be ingested with food.

Amino Acid Composition of Collagen [g/100 g]



In this case, the body requires so many of these amino acids that it simply cannot meet the demand through self-production. These conditions may include, for example, intense exercise, stress, recovering from injuries or aging. The body synthesizes five amino acids itself. These non-essential amino acids include alanine, asparagine, aspartic acid, glutamic acid and serine.

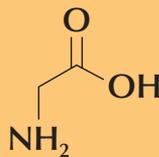
Watch out for protein quality

If you deal with the subject of proteins in greater detail, you will often come across the term “protein quality”. This simply covers the questions: “What quantities of essential amino acids are present in food proteins?” and “How important are these for the body?” In this respect, it is a fact that all amino acids the body cannot synthesize itself, must be absorbed via the diet. This does not mean however, that these essential amino acids are more important for the body than the others. The body needs all 20 amino acids in a certain proportion to develop healthily and to stay healthy. Studies have shown that the composition for an adult should be as follows: Essential amino acids should account for 19% of protein, and non-essential or conditional amino acids should account for 81% of protein [6].

A varied diet is important. Those who eat in accordance with the so-called nutritional pyramid absorb a highly diverse range of proteins and thus ensure a healthy mix of amino acids. It is also this diversity that provides all the important vitamins, because a lemon is not a good source of vitamin E, and a pepper contains hardly any vitamin B12.

Introducing: The amino acid glycine

At this point we would like to highlight a very special amino acid: Glycine, which is the smallest in the family – and extremely important. Most proteins do not contain much glycine. In collagen, however, it is abundant, usually about 25%. It has a special property: It is soluble in both fat and water, can overcome the blood-brain barrier, and also performs important functions in the brain. It supports our memory capacity, has a positive effect on sleep quality, and helps to regulate the sleep-wake cycle. In addition, it plays a role in the formation of a serotonin precursor. This so-called “happiness hormone” brightens our mood and helps us unwind after stressful days. If you have good serotonin levels, you are satiated more quickly and for longer and less prone to depression. A diet rich in glycine is therefore beneficial in many respects. To achieve an intake of 2.5 grams of glycine, you only have to consume 10 grams of collagen peptides per day.



Glycine



Questions and Answers:

Do collagen peptides contain ALL amino acids that are important for me?

In principle, a nutritional supplement with collagen peptides supplies the body with all of the necessary amino acids to increase the body's own collagen metabolism. With the exception of tryptophan, collagen peptides contain all essential amino acids, but the body's own collagen does not produce tryptophan either. So, if you want to provide support for your bones, fasciae, joints or skin, supplements containing collagen peptides comprise all of the necessary amino acids – in exactly the right amount. For this reason, it is advisable to combine different sources of protein in your diet along with consuming collagen peptides as a dietary supplement.

I don't like protein drinks – do collagen peptides taste the same?

Collagen peptides have a mild flavor of their own, however, this is nothing like the taste of conventional protein powders and peptides. Collagen peptides have a relatively high proportion of the slightly sweet-tasting amino acid glycine – in comparison, most people find they taste pleasant. Because of their neutral taste and their excellent solubility and dissolution properties, many customers take collagen peptides in powder form without flavoring and stir them into their breakfast cereal, drinks, sauces, soups, yogurt – the options are endless because collagen peptides neither change the taste nor the consistency.

Is it possible to take in too much protein?

On the basis of current knowledge, this is virtually impossible for healthy people because proteins supply energy, and have a strong satiating effect which sets in quickly. By way of comparison, we can easily ingest 500 grams of carbohydrates, but we could hardly consume the same amount of protein. The intake of one gram of pure protein daily per kilo of body weight would not generally be considered problematic in the long run. However, if you have an impaired renal function, you should make sure to drink plenty of water because a significant increase in protein intake can lead to increased water loss.

7 Impaired collagen formation – the consequences

Serious health problems and functional disorders can occur if collagen formation in the body slows down – not only as a result of age, but also as a result of illness. Ecchymosis (bruising) and internal bleeding can result, the collagenous structures of tendons and ligaments can be destroyed, and serious damage to the blood vessels can occur.

There are multiple causes for impaired collagen formation: Anybody who is constantly on a diet and neglects to provide the body with sufficient energy in the form of carbohydrates or stresses the body on an ongoing basis, can suffer from excessive protein deprivation. Another major factor is chronic inflammation. It accelerates the degradation of proteins because the corresponding enzymes are overactive. Vitamin C plays a crucial role in the collagen formation. One of the most important stabilizing components of collagen protein is the amino acid, hydroxyproline. If there is insufficient vitamin C available in the body, hydroxyproline cannot be incorporated adequately. The body also requires sufficient “building blocks” for collagen formation. Vitamins B6, C, and D, as well as calcium are also required in sufficient quantities for these complex processes.



Tips for healthy collagen formation

- ✎ Consume adequate carbohydrates and proteins – energy suppliers
- ✎ Ensure important amino acids are available
- ✎ Ingest sufficient vitamins B6, C, D, and calcium
- ✎ Combat inflammation with omega-3 fatty acids – they contain anti-inflammatory micronutrients
- ✎ Exercise regularly – it is important for healthy collagen formation, however, excessive training without sufficient regeneration is likely to lead to a reduction.

Questions and Answers:

Where can I find suitable products containing collagen peptides?

High-quality collagen supplements are available through a variety of sales channels. In the Appendix, you will find an overview of collagen peptides and their corresponding recommended daily dosages for different areas such as joints, muscle building or skin. These recommendations, for specific collagen peptides, are confirmed by scientific studies. To help you select a suitable product from the wide selection available, you can refer to this chart. Here you can have a look, whether the daily dose of a product contains sufficient quantities of the collagen peptides to meet your daily requirements or whether the product contains specific collagen peptides required for your individual needs.

What is the difference between collagen and collagen peptides?

Collagen molecules themselves are very large, which is why the body has difficulty absorbing and using them. Collagen peptides are obtained from collagen. Collagen peptides are smaller cut collagen molecules (so to speak), so our body, in turn, is able to make very good use of them. Therefore, one speaks of their excellent “bioavailability”.

Do collagen peptides have side effects?

Collagen peptides have zero side effects. Under the European Union’s food legislation, collagen peptides are considered as foodstuffs, and may be processed without restriction in any product. Today’s standards in manufacturing and storage are correspondingly high, so collagen peptides are considered as completely safe.

I’m a vegetarian. Is there anything similar of plant origin?

There are indeed a multitude of plant-based proteins, for example, soy or hemp. However, they cannot replace collagen peptides as nutritional supplements. The explanation is quite simple – our body itself is not of plant origin. In purely biological terms, we are also “animals” – the collagen peptides of warm-blooded animals correspond to our body’s own collagen building blocks in their molecular structure. Our body recognizes them as

quasi naturally-produced proteins and can easily absorb and utilize them. Do you remember that our body takes the small collagen peptides as a signal to produce collagen of its own? This doesn't work with other proteins. Another difference – in contrast to, for example, soy protein – collagen protein does not cause any allergies.

Can I take collagen peptides as a diabetic?

Absolutely! In particular for diabetics, who have to keep their blood glucose levels under control, collagen peptides and proteins in general, are an ideal energy source. They are largely independent of the insulin and glucose metabolism and therefore, they scarcely affect the insulin level – in marked contrast to carbohydrates. Also, many diabetics suffer from poor wound healing. Collagen peptides have a positive effect in this case, because when the formation of collagenous structures in the skin is supported, this can also improve wound healing [15].

I'm always struggling with my weight. How many calories do collagen peptides have?

Like other proteins, collagen peptides have a caloric value of 4 kilocalories per gram. Fat, for example has 9 kilocalories per gram, and alcohol has no less than 7. So, if you take the recommended quantity of 2.5 grams of collagen peptides daily for your skin, that amounts to just 10 kilocalories. For muscle building and body toning, the recommended 15 grams totals up to 60 kilocalories. But, here comes the very good news: Collagen peptides can increase and prolong the feeling of being full and also counteract food cravings, which makes them ideal for weight management. They also promote muscle building – which involves the burning of calories! However, you do have to train a bit, though, because muscles don't grow by themselves.

Can I also simply take gelatine powder?

Yes, you can – Hildegard von Bingen used bone broth in medieval times to alleviate her patients' joint complaints. From a medical perspective, there are absolutely no objections against gelatine, because it is a tested, tried, and highly valuable foodstuff. However, if you wish to support your body

in a targeted manner – maybe you’re noticing the first signs of aging – special collagen peptides can help you achieve noticeable results because they are precisely tailored to target the body’s needs while being as free of allergens and as natural as gelatine.

Can I use collagen peptides in the same way as gelatine to prepare food?

You can certainly add collagen peptides in powder form to numerous warm and cold beverages and food dishes. However, they do not have the gelling effect of gelatine, because their amino acid chains are broken down into small parts. Therefore, for cake glazes and gelled desserts, good old-fashioned gelatine is required. Collagen peptides, however, are completely soluble. This means that, even in higher doses, they produce only slightly higher viscosity:

Is a collagen peptides overdose possible?

There is no maximum daily dose for collagen peptides. In this sense, there is no risk of overdose. Keep in mind this motto: “A lot helps, a lot doesn’t.” High-quality, optimized collagen peptides can be taken in lower doses than conventional collagen products or other proteins. In general, according to individual needs, the recommended daily dose of collagen peptides is between 2.5 and 20 grams. For instance, for a more attractive complexion, 2.5 grams per day is sufficient. But, muscle building requires slightly more – usually about 15 grams, daily. More will not harm you, but it will not help you any better or quicker, either.

I suffer from various food allergies. Do collagen peptides trigger allergies?

Collagen peptides are considered non-allergenic. Their structure is very similar to that of the body’s own natural collagen. For that reason, collagen peptides as well as gelatine itself are not regarded as a foreign substance that must be combated – even by a very sensitive immune system. This is why collagen medical sponges are used in surgical procedures. For example, the surgeon uses them in the body to stop bleeding then leaves them in place so that they can continue to regulate the blood flow,

even after the operation. The surgeon simply sutures the incision, and the sponges are simply absorbed and degraded in the body in the course of just a few weeks without any reactions occurring.

In what form can collagen peptides be consumed?

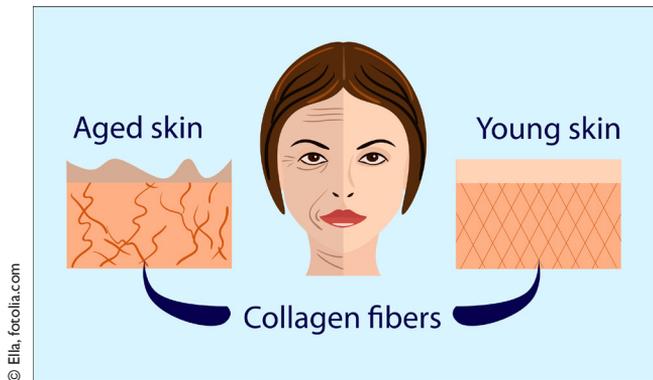
Whether for beverage or food, the forms in which collagen peptides can be consumed are vast. There are products available in powder form for stirring into breakfast cereals, shakes or yogurt – even your morning coffee! Consumers can also find bars and fruit gummies as well as several beauty and sports drinks.

Do children need collagen peptides, too?

Collagen peptides are not only important for the healthy formation of all kinds of connective tissue, they are above all an excellent source of protein and energy. Most children consume far too many carbohydrates and too few proteins. This not only increases the risk of obesity, but also of secondary diseases such as type II diabetes. Issues such as cravings for food, difficulty concentrating, restlessness and frequently fluctuating performance levels experienced by children and young adults, are often diet-related. Protein-rich meals keep energy levels high for longer. A child's body also benefits from a healthy formation and growth of the whole musculoskeletal system [21].

8 Beauty from within: Collagen peptides for skin, hair and nails

Nowhere in the body is aging more apparent than in the complexion. Firm, wrinkle-free skin is the privilege of youth. From our mid to late twenties, our collagenous connective tissue begins to recede and store less moisture. In our thirties, our first wrinkles often appear on the forehead or around the eyes. In our forties, these wrinkles get deeper, the nasolabial fold becomes more and more evident, and bags appear under the eyes – beginning with shadows. By the age of fifty, our facial contours begin to change – they lose their clarity, the cheeks sink, and the skin becomes thinner and softer – especially in the area of chin, neck and cleavage.



Slowing down the aging process

The cause of these changes has long been known: The collagenous structures in the lower skin layers, especially in the so-called dermis, degrade gradually; the skin loses its elasticity. This is all part of a completely natural aging process, which can never be stopped completely.

In a young, healthy body, collagen degradation also occurs, but is built up again to the same extent. At some point, however, this process gets out of balance, and skin aging begins. When exactly this becomes visible for the first time and how the aging process proceeds depends on very different factors. Our genes play a major role, of course, but how we have treated our body is also significant. Frequent and intense exposure to the sun, smoking, inadequate diet and exercise as well as anxiety and stress, particularly influence the appearance and health of our skin. What most people aren't aware of is that these factors also increase the activity of certain enzymes that break down proteins, and destroy the collagen along with it.

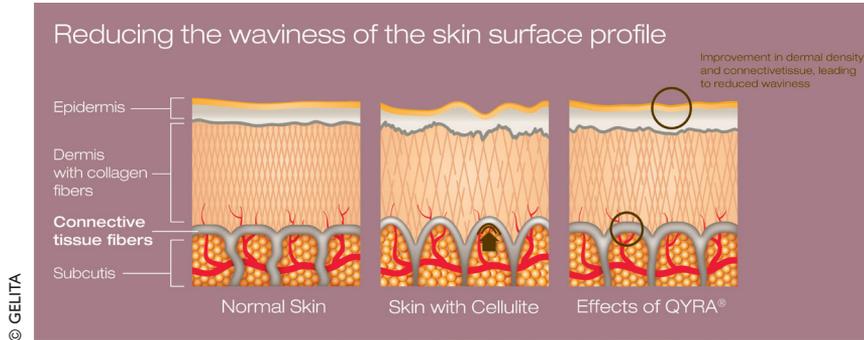
“Turn the clock back ten years”

Many women – and more and more men – wish to keep a youthful appearance for as long as possible. Typically, the goal is not to have the skin of teenager, but “turn the clock back ten years, and I'll be satisfied with my appearance”, is how most people would put it.

Collagen is one of the most important building blocks of the skin and accounts for about 80% of its dry weight. Therefore, collagen peptides can contribute greatly to keeping the skin healthy, taut and youthful. Products with collagen peptides have been part of the standard beauty program for many years in Japan where, traditionally, beauty care plays an even more important role than in this part of the world – and, for good reason as these products are healthy, natural and free of allergens.

If taken regularly, collagen peptides visibly reduce the depth of wrinkles, and the skin gains in moisture and tone. This effect cannot be achieved with any topical skin care. Because they reach only the outer layers of the skin, the effectiveness of even expensive facial creams is short-lived. However, if collagen peptides are consumed as dietary supplements in the form of powder or tablets, they support the construction of collagenous structures from within – not only deep within the skin of the face, but in the entire body – even in fingernails and hair. This, too, was thoroughly investigated in a scientific study which showed that over 80% of the participants were satisfied or very satisfied with the results. Even cellulite, loathed by many women, improved. The skin on the thighs

became noticeably firmer and the unwelcome dimples improved visibly in many cases [25]. Many more women than men suffer from so-called “orange skin” because female connective tissue has a completely different structure in order to be able to stretch during pregnancy. Strength is provided by a lattice structure.



There is another reason to provide the body with collagen peptides: Elderly people or diabetics often suffer from poorer wound healing. One of the reasons for this is that the body’s own collagen production declines. Bioactive collagen peptides can therefore contribute to faster wound healing. Surgeons and dentists therefore increasingly recommend treatment with collagen peptides before and after operations.

Attractive fingernails and strong hair

If the collagen formation in the body is stimulated, hair and fingernails grow faster and stronger. Even though they do not themselves consist of collagen, the blood vessels do, and they are responsible for supplying the hair roots and the nail-forming cells with nutrients. If this microcirculation is supported, the supply of blood and nutrients to the hair and nails improves, as does their vitality and appearance. If the essential building blocks are missing, nails



take longer to grow, longitudinal ridges or Beau's lines form, or the nails tend to crack and split. Collagen peptides support nail growth in the same way they support the skin and connective tissue.



How do specific collagen peptides reduce the depth of wrinkles?

Bioactive collagen peptides work in two ways. On one hand, they stimulate the activity of the fibroblasts. Fibroblast cells build all of the fibers and molecular components of the connective tissue, thus giving the skin structure and firmness. Activating the fibroblasts encourages the production of new collagen structures as well as hyaluronan. Hyaluronan can bind a great deal of water and is absolutely indispensable for taut-looking skin. This process takes some time, but after three to six weeks, the skin regains its natural tone and improves its moisture-storing capacity.

Furthermore, collagen peptides provide the skin with the necessary "building blocks." Their mode of action is extremely sophisticated – they perfectly resemble the fragments which form when skin collagen degrades. Our body "recognizes" the peptides as degradation products and boosts the body's own collagen synthesis. The result: Thanks to the considerably higher production of natural collagen, the skin can "repair" itself and replace what was lost through age and environmental influences.

<https://youtu.be/2vB7Maq8Nz0>



Specific collagen peptides for the skin

VERISOL® is an internationally known brand name for collagen peptides with an optimal composition for attractive skin. For VERISOL®, collagen peptides with exactly the right chain lengths for an optimal effect on the

skin are selected and combined. The effectiveness of VERISOL® collagen peptides has been scientifically proven. Therefore, when you are looking at collagen peptide products for hair, nails and skin, it is best to check whether they contain VERISOL® branded collagen peptides.

Questions and Answers:

I'm 60 and have numerous wrinkles, some of them deeper. What results can I expect?

No two people are the same. Most people report that, after about a month, their skin becomes firmer. And, after two to three months, their complexion generally improves and wrinkles become more shallow. Nobody will look like they did in their twenties, but we often hear comments like “My skin looks firmer” or “I have a more youthful appearance.”

Is it still worth taking in your mid-seventies?

Keeping the skin healthy is always worthwhile. As long as we live, our metabolism is active, and our cells are constantly being renewed. The processes just take a little longer as we age. The skin cells are among the most active and reproduce significantly faster than many other body cells. Collagen peptides affect not only the skin, but all connective tissue including cartilage, joints, ligaments and tendons; therefore, they become increasingly important for maintaining mobility as we age.

When should I start taking nutritional supplements?

Generally, there is no valid answer since every person's body is different. If your skin has already lost some of its elasticity and wrinkles have begun to appear, it is certainly not too late to start. As a rule, think “slowing down the aging process is always easier than reversing it.”

What is the right quantity of collagen peptides to take?

For high-quality collagen peptides exactly tailored to the skin's needs, 2.5 to 5 grams per day are sufficient – if you wish to support your joints or skin. For other purposes, a higher dose may be advisable. On page 81 of

this book you will find an overview of collagen peptides and their corresponding recommended daily dose.

Can I simply take a collagen peptide course of treatment from time to time?

In principle, an occasional three-month course of treatment is better than no support at all. Since the skin in particular renews itself very quickly, no long-term “storage” occurs. If you want lasting results, continuous administration is recommended.

How do I recognize products with high-quality collagen peptides?

You can simply check to see if the product contains VERISOL®. Or, consult the manufacturer, since the brand of collagen peptides is not listed on every product. VERISOL® collagen peptides are specifically tailored to the skin’s needs and you can rest assured that you have a high-quality product with optimal effectiveness in your hands. Because dosage is important, the daily dose of your product should provide 2.5 grams of collagen peptides.

I don’t like swallowing tablets, is there an alternative?

There are a variety of products containing pure VERISOL® collagen peptides: powder products, with or without flavoring, shots or beauty drinks as a functional beverage, even fruit gummies make daily intake easy and enjoyable.

9 Collagen Peptides support Weight Management

Proteins in general and collagen peptides, in particular, support weight management. We know all too well, that due to the stress of everyday life – barely any time for cooking and shopping – a conscious and healthy diet often falls by the wayside. We get a sudden craving, and because there is nothing better on hand, we grab a sugar-filled snack from the cabinet or the ice cream from the freezer. Blood sugar levels swiftly rise, and quickly fall back down again. This causes disturbances in concentration, and we become run down and tired. In addition, these wild fluctuations in glucose levels lead to an increase in weight, which increases the risk for obesity, type II diabetes, and other illnesses.

Collagen peptides are important for a balanced and healthy diet. They are easy to digest and are long-lasting energy providers. In combination with exercise and strength training, they also support the buildup of muscle mass, which in turn burns significantly more calories than fat. A protein-rich diet also lowers the risk of food cravings, which in turn supports consistent blood sugar levels and helps to maintain concentration and performance for a longer period of time.

How collagen peptides support weight management

- ↘ Fat reduction – muscle buildup means more calories burned even when resting
- ↘ Decreased appetite and fewer food cravings
- ↘ Longer lasting satiation – long-term energy supplier
- ↘ Improved fat burning



Studies demonstrate the effectiveness of Collagen Peptides

Collagen peptides have been proven to be effective in supporting weight management. Particularly impressive were the results of a study carried out in 1999. Three groups of women each consumed one liquid meal in place of their lunch – one group consumed mainly proteins, another consumed mostly carbohydrates, and the third consumed equal parts of both. In the evening, the women were allowed to eat as they liked. It was interesting to see that the group who consumed mostly carbohydrates for lunch went on to consume roughly 30% more calories than the group who consumed mainly proteins, and still 20% more than the group who consumed equal parts of both. This study demonstrates that collagen peptides, with their high satiation effect, provide ideal support to anybody wanting to lose weight or maintain their weight on a long-term basis.

In 2008, the University of Maastricht evaluated this hypothesis on the role of collagen for weight management once again. It was confirmed, that collagen and the milk protein alpha-lactalbumin have the potential to increase satiety and decrease the caloric intake compared to other protein sources like casein, soy and whey [28].

Twenty-four healthy men and women between 18–45 years received a breakfast including one of the mentioned protein sources with either 10% or 25% of the daily energy requirement. Three hours after breakfast, they were offered a lunch. Scientists observed the dietary behavior of the participants over three days. They determined the participants' energy intake and appetite profile, which included hunger, satiety, fullness and the desire to eat.

It was observed that collagen and alpha-lactalbumin have a ~40% higher saturation effect than casein, soy and whey. Those participants, who consumed a protein with a higher saturation effect, were less hungry and had a ~20% lower energy intake at lunch than those, who consumed proteins with a lower saturation effect.

People, who feel less hungry and therefore consume less, will achieve better results with their weight-loss diet than others. Consequently, these results allow the assumption, that collagen has the potential to play an important role in future weight management concepts [28].

Eat more – keep your weight stable

This sounds too good to be true, but it is! It is actually quite simple – muscle burns more energy than fatty tissue. So, if you build muscle mass, you can eat more without gaining weight. Incidentally, muscles don't only consume energy when we use them, these “combustion engines” continue to run even while we rest or sleep. So, if you love to eat without having to count calories, you should begin building muscle mass. This is particularly important for women because, again, their metabolism works a bit differently.



Women need muscles, too

Whenever we think of muscle building, we tend to imagine a bodybuilder heaving weights. However, as we have just seen, muscles consume calories. The mass of our muscles and how often we use them, plays a huge role in our metabolism and calorie consumption. Women tend to have a lower muscle mass relative to their total weight than men. So, for them to burn the same amount of calories, they must use their muscles more frequently and train more vigorously. Logical, right?

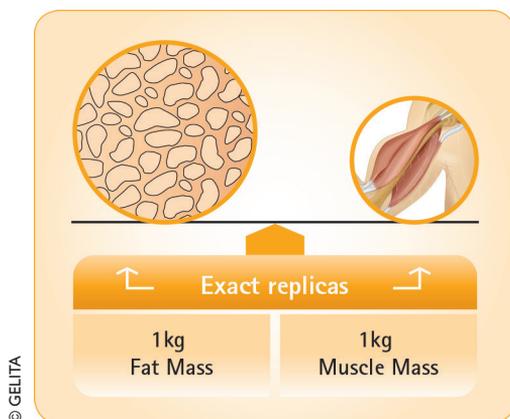
Another disadvantage – calories are converted into adipose tissue much more quickly in women than in men, and where does it tend to get stored? Around the waist and hips! This abdominal fat, however, is not found as a “spare tire” around the middle of the body center, but is also stored in the abdomen surrounding the organs. This visceral fat is actually less of a cosmetic concern than a health crisis because it is a factor that increases the risk for numerous diseases, including cancer.

Nevertheless, what typically bothers women is the visible fat. This is what they struggle with most frequently – even with the most diverse of diets, usually without long-term success.

Here is the good news, ladies! There is a way to escape the effects of aging, which include weight gain and muscle loss – build up muscle mass! You build up muscle mass with exercise and moderate strength training – and, with the support of collagen peptides!

10 Body toning or how to improve your figure

If you replace seven kilos of fatty tissue with seven kilos of muscle mass, you've already made a good start. But, typically, what do you do when you begin a diet? You starve yourself, which creates a domino effect. When you starve yourself, it affects your energy and your mood. Now, you are too tired to exercise. When you first begin to diet, the body sheds a lot of water, this explains why diets start off so successfully – but, after some time, not a lot happens. Then, the muscles feel the heat – instead of burning fat, the body begins to lose muscle mass. This is the opposite of what you want to happen. Because this reduces our calorie needs – and, once we have stopped the diet and begin to eat normally again – it does not take long for the scale to display an increase in weight.



Volume of the same amount of fat and muscles in comparison.

The better long-term solution: Change to a protein-rich diet on an ongoing basis and build up muscle mass. It might not show an immediate reduction in weight, since muscle mass is heavier than fat mass. However, compared to fat, muscles have considerably less volume for the same weight. You can be sure that your body will become tighter and noticeably firmer, and you can eat without feeling guilty.



Do you take birth control pills?

One study showed that women who take the birth control pill experienced 60% lower muscle development than women who were not taking birth control pills while both groups consumed the same amount of protein in their diet [18]. So, if you are using birth control pills, it would benefit you to consume additional proteins.

BODYBALANCE®

BODYBALANCE® collagen peptides are ideal for supporting your fitness goals. If you are looking for a protein product that helps you build up muscle and decrease body fat, ensure it contains the tested collagen peptides under the brand-name BODYBALANCE®.

11 Muscle building with collagen peptides

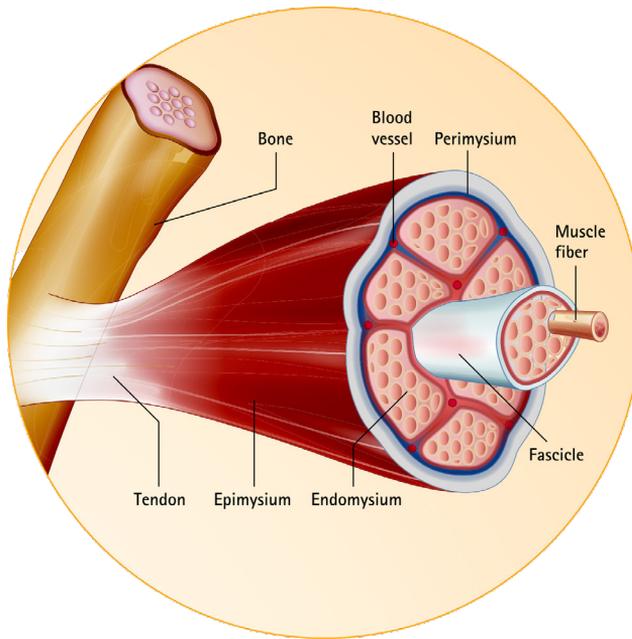
Proteins are essential for most bodybuilders, and many fitness aficionados also regularly consume protein products. In principle, a sufficient supply of proteins is important since they contain amino acids necessary for building muscle. Here, in particular, whey protein excels with a high proportion of essential amino acids. Those who have an interest in sports-related nutrition are sure to have knowledge BCAA (Branched Chain Amino Acids). These amino acids, particularly leucine, are known among experts for their effect on muscle building. New scientific studies, however, have clearly shown that collagen peptides also have this positive effect on muscle building. In the world of sports nutrition, this is significant because these findings dispel the decades-old belief that only whey proteins are effective for muscle building.

Collagen peptides: Effective and extremely well-tolerated

For a long time, the discussion about different types of proteins was limited to the composition of their amino acids. There are numerous proteins that are effective due to their bioactivity, and are by no means classified by their amino acid profile alone – the best examples are enzymes or hormones, like insulin.

Scientists have long known that proteins are absorbed in the form of more complex peptides, and have a bioactivity which extends far beyond that of the respective amino acids. In the fitness industry, only now is this information beginning to appear in relevant magazines and portals.

It has long been known and scientifically researched, that collagen peptides stimulate the cells that regenerate the collagen in the skin. However, a recent finding is, that this also works with muscle cells. This is significant, because every muscle is connected to the rest of the body by collagen-containing tendons, surrounded by collagen-containing fasciae, and divided into compartments by intermuscular collagen tissue and consequently, it is only logical that the effectiveness of collagen peptides in muscle building is also remarkable.



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A glimpse into research

Collagen and muscle protein are interwoven, to an extent. Therefore, it stands to reason that these proteins also influence one another. It can be assumed that this is precisely the reason collagen peptides have a comparatively strong effect on muscle development. To investigate this more closely, a number of studies were conducted. One study focused on people suffering from age-related muscle wasting. One group took 15 grams of collagen peptides daily and performed moderate strength training three times per week. The other group received placebo instead of the collagen peptides and only performed the strength training. The group that took 15 grams of collagen peptides daily experienced a significant increase in muscle growth compared to the group that received placebo. What was particularly interesting – the group that took collagen peptides, also saw a decrease in body fat mass, in a similar proportion. Two other studies (submitted for publication) were similarly structured, and also corroborated the positive effects of collagen peptides for the 35- to 65-year-old age group as well as for younger athletes.

It is considered an established fact that collagen peptides have a positive effect on the muscles and connective tissue. According to the latest research, the effects are multi-factorial. For example, research showed an increase in the mitochondrial density in the cells. The mitochondria are the so-called “power plants” of the cells that are responsible for converting food to energy. The more mitochondria there are, the higher the metabolic rate and energy consumption of the body – quite simply, more calories are consumed.

Whey protein and collagen protein – good partners

A comparison of the whey protein and collagen protein shows, that whey protein is rich in essential amino acids, and supports muscle development, particularly because of the amino acid leucine. Conversely, collagen protein contains many conditionally essential amino acids, which have a positive effect on muscle building and fat reduction as well as on the bones, joints, ligaments and tendons due to the stimulation of the collagenous tissue. However, collagen protein lacks the essential amino acid, tryptophan. Thus, both proteins complement each other to a certain extent.

Whey can be replaced effectively by other proteins such as casein or various plant proteins, but because the latter typically contain smaller amounts of essential amino acids, they must be consumed in correspondingly higher doses.

Collagen peptides, however, cannot easily be replaced by other proteins, because based on the current state of scientific knowledge, their stimulatory effect on the collagen-forming cells seems to be unique. Therefore, a combination of collagen and whey, for example, is ideal, particularly for athletes. Another option is to eat a balanced diet including different sources of protein, and adding collagen peptides as a targeted nutritional supplement.

12 Staying agile – why mobility is so important in old age

When we think of aging and mobility, we may think about unsteadiness while walking, difficulty sitting or standing, falls resulting in injury, or maybe even loss of independence requiring us to rely on others to help with everyday tasks. Retaining our mobility well into our senior years is a goal many of us have. We all like to imagine ourselves as active and happy seniors – filling our days with enjoyable, meaningful activities and conversations that enrich our lives. Maybe we picture ourselves exploring the world on the other side of seventy!



© istockphoto (Yuri-Arcurs)

Although these are worthy goals, there are other reasons to retain and promote our mobility. When we remain active, we not only enjoy a higher quality of life, but also a higher life expectancy. Those who exercise regularly – and we are not talking about competitive sports – also significantly reduce their general risk of illness and injury. In particular,

cardiovascular diseases, depression, diabetes, and even cancer or dementia occur more rarely, later, or with milder symptoms for those who remain active.

The vicious cycle of pain

The atrophy of the cartilaginous mass and the wear and tear of joints usually announce their arrival with an initial tweaking in the joints, which can start out as a minor nuisance and progress to more consistent, permanent pain. At first onset, we adopt a relieving posture in an attempt to avoid the pain. However, this leads to further problems and the exact opposite effect is achieved. At this point, many people make an appointment to see their doctor. Anti-inflammatory agents, injections and painkillers are the first measures and in the end surgery is often the only alternative.



Cartilage – the natural shock absorber

Cartilage is a very important constituent of our joints. It acts as a shock absorber – where two bones meet at the joint, allowing frictionless, smooth movement – while protecting the bones and joints. Since cartilage is not connected to the bloodstream, it receives its nutrients via a different system, the so-called “joint lubricant” – synovial fluid – acts like a lubricant film and supplies the sponge-like cartilage with nutrients. This works through movement and pressure. Therefore, to supply the cartilage adequately, exercise is absolutely essential.

Once we feel pain, we tend to avoid exercise, which, in turn creates a vicious cycle. When the musculoskeletal system is used less and less, degeneration proceeds ever more rapidly. Through the lack of exercise, the cartilaginous mass no longer receives adequate liquid, and with it, nutrients. It completely dries out, becomes brittle and wears down all the faster; the pain often becomes unbearable and makes exercise

impossible. The muscular system declines very quickly when used too little. The dreaded sarcopenia – age-related muscular atrophy – accelerates many times over. As a result, strength decreases on top of everything else.

Breaking the Vicious Cycle

- ↘ A change of lifestyle – eating healthier and getting more exercise – can regenerate, reactivate and renew parts of the musculo-skeletal system. And, exercise becomes fun again!
- ↘ Mobility and health: Use it or lose it.



There is a very direct and close relationship between health status and mobility. For this reason alone, it is essential to maintain our mobility for as long as possible. To do this does not require peak athletic performance. Regardless of age, everybody should ensure they get adequate exercise based on and determined by their health status. Fortunately, these findings have already taken root in medicine. In the past, strict rest was prescribed after operations or even heart attacks – it is now known this is counterproductive and not conducive to the healing process.

True to the motto “moderate but regular”, appropriate physical activity has a positive effect on a whole range of disorders, and also prevents the development of many illnesses. Whether for arthritis, osteoarthritis, cancer diseases, diabetes, hypertension and other cardiovascular disorders, muscle weakness as well as muscular atrophy or poor eyesight – exercise is a natural remedy without side effects. Exercise ensures good blood circulation – it even benefits the brain! Those who exercise experience better concentration and memory performance improvement, and the risk of dementia decreases. And last but not least, a reasonable amount of exercise also has a beneficial effect on the psyche.

Exercise

- Improves heart and lung function
- Regulates blood pressure
- Improves blood circulation
- Lowers cholesterol levels
- Strengthens the immune system
- Stimulates bone formation and increases bone density
- Improves flexibility of the joints
- Supports the digestive system
- Counteracts chronic inflammatory diseases
- Counteracts diabetes
- Reduces cancer risk
- Enhances sexual desire and performance
- Promotes cognitive skills
- Prevents the development and progress of Alzheimer's disease and dementia
- Acts against exhaustion and mental fatigue
- Increases stress resistance
- Supports the emotional balance
- Relieves depression
- Makes for peace of mind and better sleep

No more excuses!

One study, in which 400,000 people were observed for a period of eight years, showed impressive results. Just 15 minutes of daily exercise or training statistically increased life expectancy, by 3 years, and reduced the risk of illnesses such as heart disease (by 25%), diabetes (by 11%), arteriosclerosis (by 19%), cancer (by 10%) and strokes (by 12%) [32].

Questions and Answers:

I would like to exercise more, but with my excess weight and painful joints it is difficult. How can I go about it?

Important: Make sure to talk to your doctor before beginning any new exercise program. A few excellent low-impact exercises you could start with include cycling, swimming and walking. At the same time, take care of cartilage growth with collagen peptides. If you gradually lose weight doing so, your joints will be grateful (if you take care of cartilage growth with collagen peptides). If exercising is painful at first, your doctor might temporarily prescribe painkillers or anti-inflammatory drugs. However, these only alleviate the symptoms.

I'm a "pen-pusher" how will this affect my mobility in old age?

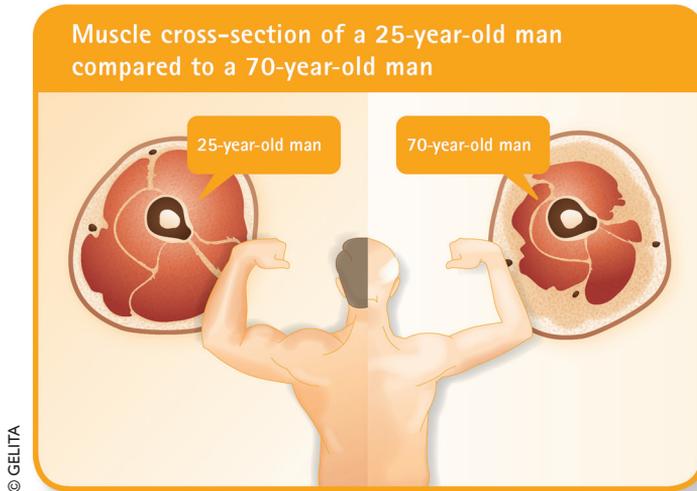
Those with a primarily sedentary occupation have a higher risk of degenerative diseases of the musculoskeletal system. Sometimes simple reminders like wearing a fitness bracelet with a step counter help us get up and about a bit more. If you can't compensate in your free time, then you should try to integrate exercise into your everyday life – take the stairs instead of the elevator, go for a walk over your lunch break, do squats or desk push-ups while waiting on hold. Whatever you do, don't wait until retirement age or until the first symptoms appear.

How can I contribute to remaining mobile and strong later in life?

Regular exercise not only supports the cardiovascular system, but also ensures that the joints are "greased" and supplied with nutrients. It is best to start with targeted and regular strength training – 10 minutes a day is adequate, and you don't even have to go to the gym.

13 Age-related muscle wasting: The dreaded sarcopenia

We can build up muscle mass with regular physical activity, but the passage of time wears mercilessly on our muscles. With advancing age, the dreaded sarcopenia sets in. If we do not take active measures to retain our muscle mass, we lose about one to two percent per year from about our 40th birthday! So, by the age of 80, we have already lost 40 to 60 percent of our muscle mass.



Typical muscle cross-section of a 25-year-old compared to a 70-year-old man.

The creeping threat

This age-related muscular atrophy creeps up on people and usually remains completely unnoticed because it is not accompanied by noticeable symptoms. No doubt, some activities become a little more difficult with age – the shopping bag no longer feels as light and climbing stairs is no longer as light-footed as in the past. But, most people accept this as a normal part of growing older. At a certain point, the term sarcopenia is used – approximately half of all 80-year-olds are affected [5]. The decline in muscle mass is accompanied by a loss of physical

strength, but entails much more – mobility is diminished, one loses one’s balance more easily, the risk of falls increases, and the loss of bone mass accelerates. But that’s not all, the glucose metabolism also changes, and the risk of diabetes rises. Most people are completely unaware that it’s possible to counteract sarcopenia with a targeted combination of muscle training and proteins.

Collagen peptides are particularly suitable for the elderly because they are a healthy energy source, ensure more consistent blood sugar levels and are well tolerated – they also support bones and joints.



Combating muscular atrophy with collagen peptides

One study showed, that the combination of collagen peptides and strength training can effectively counteract the dreaded sarcopenia. 53 male sarcopenia patients performed strength training under supervision for 12 weeks and ingested 15 grams of collagen peptides daily. The result: Significantly better muscle growth, improved muscle strength and greater fat reduction than in the group that only did the training [31].

14 A brief summary of the muscles

Muscle strength and mobility are inextricably linked. A healthy, powerful musculature is an indispensable prerequisite for overall flexibility of the body. But, only those who exercise their muscles regularly and sufficiently can retain it. Men, by nature, have more muscle mass than women. But, individual muscle mass is not only a question of gender, but also of general lifestyle and training. Basically, there are two different types of muscle fibers in our body – depending on what the muscle is used for, it contains different proportions of these muscle fibers.



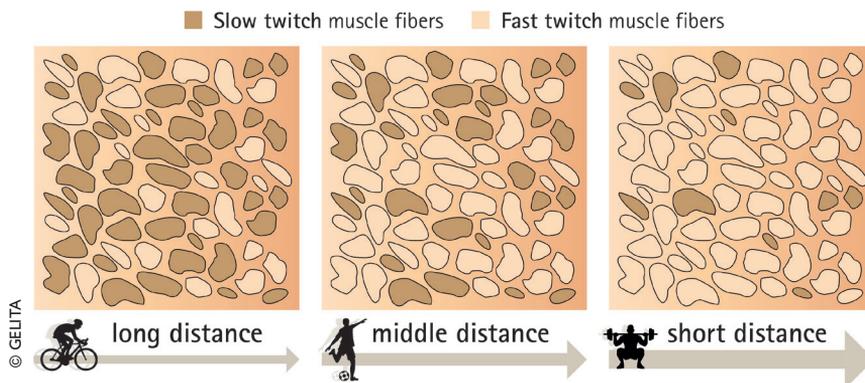
Slow-twitch: The marathon runner

The so-called “slow-twitch” muscle fibers are designed for prolonged strain. They contain a very high number of mitochondria, the so-called “power plants” of cells. These are responsible for supplying the muscle with energy. Because of their high myoglobin content, they are also called “red fibers”. Myoglobin is a protein that is important for the smooth transport of oxygen.

These muscle fibers are used for low-load long-lasting activities – during long hikes or long-distance runs. Moderate strain promotes general health excellence. An excessive strain, on the other hand, has a counterproductive effect in many respects.

Fast-twitch: The sprinter

The so-called “fast-twitch” muscle fibers are designed for short-term, intense loads. They have far fewer mitochondria than the slow-twitch fibers, and also have a lower myoglobin content. They are known as “white muscle fibers”. Their energy production works anaerobically – without oxygen. They are called into action for sprinting, weightlifting or strength training. They activate energy within an extremely short time, but they tire quickly and cannot sustain performance for long.



Less muscle, more fat

With over 650 muscles in the body, muscle mass accounts for a significant proportion of total body mass. Now, things get a little unpleasant for those who value a good figure – our muscles are the largest energy consumers in the body. If our muscles shrink, our bodies automatically need fewer calories. At this point, if we do not change our diet, we will store more fat. The insidious part is that the scale does not show a significant increase in weight because muscle mass is heavier than fatty tissue. However, a look in the mirror reveals the truth – our proportions change – we lose our figure, our tummy grows and our waist disappears. But, with a balanced diet, regular exercise including moderate strength training, and targeted nutritional supplements, we can reverse this process – at any time.

Fast-twitch: Fast decline in old age

It is mainly the muscles with a high “sprinter ratio” that we lose as we age. A Finnish study showed that women over the age of 80 no longer have the muscle mass required for short, intensive strain. However, it is in old age that it is particularly important to be able to mobilize muscle power at short notice – many falls would be less harmful for the elderly if they could be resisted with a short, powerful movement or rotation [33].

15 Connective tissue – what holds our body together

With respect to our general health, physical performance, and quality of life – connective tissue is, without a doubt, one of the parts of our body that we underestimate the most. Most of us know that healthy and powerful muscles depend on collagen protein. However, the fact that connective tissue also forms one of the body's largest collagenous structures is new to many people.

Therefore, collagen is a central component of connective and structural tissue, and found everywhere in the body. It gives bones, joints, tendons, ligaments, muscles, the skin and even the eyes strength and flexibility. If the collagenous structures are degraded by heavy stress – during sport, for example, or by the normal aging process – the function of all organs and tissues that depend on collagen are impaired. Ligaments and tendons become weaker, muscle mass decreases, and above all, the loss of highly important cartilage tissue at the joints can lead to painful symptoms.

Connective tissue includes the skin, ligaments, tendons, cartilage and joint cartilage, but also the fasciae and blood vessels.

Collagen is the main component of connective tissue. Collagenous protein has unique properties since it is extremely flexible and, at the same time, very strong and stable. The Achilles tendon, for example, is the strongest tendon in the body and can absorb stress of up to 1000 kg.





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The connective tissue literally holds our body together – providing it with structure and stability. Besides the muscle, nerve and epithelial tissue, connective tissue is one of the main tissue types in our body. It is virtually everywhere and takes care of the necessary tension of the tissue. Connective tissue includes ligaments and tendons, which connect the muscles with the bones, but also the fasciae. They contain a great deal of collagen, which is the reason for their extraordinary strength and elasticity. For many sports such as football or baseball connective tissue are the decisive factor, because they act like a bowstring or a catapult. They play an important role wherever a strong tension or force is required.

Cartilage and joint cartilage are also classified as connective tissue. They are natural shock absorbers and can be found wherever two bones meet. The cartilage tissue is one of the most critical components of our musculoskeletal system. If these shock absorbers are worn out, the bones rub painfully against each other. Because this topic is so important, we have devoted a separate chapter to it. For now, suffice it to say – regular exercise supplies the cartilage with joint lubrication, and supplies it with nutrients. If you take collagen peptides as nutritional supplements combined with regular exercise, the body will once again form cartilaginous

mass. However, this can only work where cartilage is still present. Once the cartilaginous mass has disappeared completely, you can only hope for a successful operation.

The connective tissue in the bones is also important – although we know how important calcium is for bone density, it is collagen that keeps this calcium in place in the bone. After all, about twenty percent total bone mass consists of collagen. Our blood vessels are also surrounded by a tissue containing many collagen fibers. Healthy and flexible blood vessels are tremendously important for a healthy cardiovascular function. Our skin is also connective tissue and occupies the largest area of our body. Of course, we all want beautiful-looking skin for a young and fresh appearance, but it also plays a decisive role in our health.

Extremely sensitive to pain

Connective tissue is extremely sensitive to pain because it has six times more pressure and pain receptors than our muscles and joints. Many people today complain of undefined pain. It is highly likely that the pain we perceive as discomfort in the muscles or joints, is in fact due to strained or damaged connective tissue. In many cases, regular and targeted training can keep the connective tissue intact so that no painful adhesions form [19].



When should you start looking after connective tissue?

Competitive athletes, menopausal women or people with a risk of osteoporosis are wise to take care of their connective tissue. The same applies to those who take cortisone, especially if they do so for an extended period of time. But, basically, the same principle applies to everyone – prevention and preservation of health is much easier than having to perform “reconstruction work” at an advanced stage. Things get especially

difficult when pain limits the ability to move – as movement is very important for healthy joints, muscles, tendons, ligaments and even bones. It is never too early, or too late, to incorporate a balanced diet and regular exercise into your lifestyle – of course, the younger, the better. Improve your results by combining a collagen peptide nutritional supplement with a balanced diet and regular exercise.



Dental implants, surgical procedures and bone fractures

Collagen peptides support the healing process after bone fractures. They also promote wound healing and prevent bedsores. For this reason they are useful as nutritional supplements before or after an operation or when confined to bed. Dentists report that dental implants assimilate faster with the jawbone structure and are more firmly fixed when patients consumed collagen peptides as nutritional supplements for up to three months prior to the procedure. One study found that collagen peptides seem to promote the activity of fibroblasts in the wound area. There, these collagen-building cells then assist in the healing of the wound [16].

Collagen peptides stimulate the production of collagen

A special characteristic of collagen peptides is that they activate the precise cells that are important for the new production of collagen and, with it, connective tissue in the body. At the same time, collagen peptides also stimulate the new formation of, for example, hyaluronan, which is important for supple joints. This is why collagen peptides make an important contribution to keeping connective tissue healthy and functional.

16 The fasciae: The underestimated sensory organ

The fasciae, an important part of the connective tissue, were underestimated for many years. The major role they play for the entire organism, has only recently been recognized. Today they are even said to act as a kind of extended sensory organ.

The fasciae consist mostly of collagen. They form a kind of white sheath around muscles and organs, but the individual muscle fibers and layers of skin are also intertwined by fasciae. They give the body structure, like a network. However, they are more than just a connecting link and a protective sheath – today we know that the fasciae are crammed full of receptors, and register every movement in the body.

Sticky fasciae cause pain

If the fasciae are not trained, for example, not regularly extended and stretched, they become immobile and may stick together. Then, they often cause nonspecific pain in the soft tissues, in the muscles, and also in the back. Today, it is even assumed that operations on the spine could be avoided with targeted fascia training. If the fasciae are rigid, the muscles tense up, resulting in induration (hardening), stiffness and pain. The significance and function of the fasciae are still being investigated, but one thing is becoming more and more evident – the fasciae play a significant role in a healthy musculoskeletal system.

Fascia training and collagen peptides

Targeted fascia training is important for a strong and healthy body. Collagen peptides supply the fasciae with important nutrients. In extreme cases, physiotherapists can help to loosen sticky fasciae. But, this can also be done at home as a preventive measure with special exercises or so-called “fascia rollers” or “foam rollers”.

17 Joint disorders:

Osteoarthritis and arthritis

When every step hurts and every movement is agony, the cause is often joint disease. This usually leads to a significant reduction in quality of life for those affected.

Let's briefly clarify the two terms because osteoarthritis and arthritis are often confused.

Osteoarthritis is the term used for degenerative joint disorders. In plain English, this means the symptoms of wear and tear and age-related cartilage degradation. It is deemed to be the most common joint disease. In Germany alone, an estimated 5 million men and women suffer from this condition. Although it can affect all joints in the body, it usually affects the ones subject to the most stress – hips, knees, feet and the spine.

Arthritis, on the other hand, is an inflammatory disease of the joints, and rheumatoid arthritis is its most common form. According to estimates, up to one million people in Germany suffer from it. This inflammatory disease should not be underestimated. Severe pain restricts mobility and severely reduces the quality of life of those affected. This inflammatory process is a systemic disease and can significantly increase the risk of many other illnesses.

Painkillers with side effects

Osteoarthritis and arthritis often go hand in hand. These painful joint disorders are frequently treated with anti-inflammatory agents, for example, in the form of cortisone or diclofenac. Many of these painkillers, some of them very strong, have serious side effects. Non-steroidal anti-inflammatory drugs can cause stomach ulcers, stomach bleeding, gastric perforation, or renal disease, especially when taken over a long period of time.

Soft-footed appearance

The progress of degenerative and inflammatory joint disorders is usually stealthy. Those affected by them usually don't feel any discomfort or constraints for a long time, even if the joints are already damaged and cartilage mass has already decreased. It is therefore advisable to take preventative steps and not wait until the first symptoms appear. Modern diagnostic methods allow us to determine at an early stage whether any degradation or inflammatory processes, such as arthritis, have already begun.

When is it too late?

It is never too late. Even if degenerative diseases of the musculoskeletal system are already causing pain and restriction, a change of lifestyle can decisively influence the course of the conditions. A balanced diet, low-impact movement, and in many cases – weight loss are important factors, and promote significant improvements in complaints. Collagen peptides can also provide effective and long-term support.

Don't just treat the symptoms

Even though medication may be necessary, it only treats the symptoms – not the causes of joint disease. Natural nutrients are a good alternative to, or a supplement in, these treatments. They are highly effective but at the same time gentle and palatable. The effect of collagen peptides on joint disorders such as osteoarthritis and arthritis has been scientifically proven. They can be taken on a long-term basis without causing harm.

Hyaluronan – the joint lubrication

Hyaluronan can absorb a lot of water and acts as a natural lubricant. This ensures that there is less friction on joint surfaces. Hyaluronan also plays an important role in providing the skin with moisture and flexibility. When the body is young, it produces a sufficient amount of hyaluronan, which in later years needs to be supplemented. The difficulty is that hyaluronan molecules are not easily absorbed by the body when taken in capsule or tablet form as the molecules are too large. Osteoarthritis patients, in particular, opt for injections. These are not only painful, but

Hildegard von Bingen – healing knowledge from the Middle Ages

Even Hildegard of Bingen, the famous abbess of the Benedictine monastery on the Rhine, knew of these healing properties. She treated patients suffering from joint pain with bone broth and beef that had been well-boiled. In the twelfth century, she could not have known what collagen was but she was convinced of its effect, and her success using it proved her correct. Boiling bovine bone for long periods of time made the proteins more beneficial to the human body. Research has provided the scientific basis for her experiences. Today, the therapeutic and preventative effects of collagen have been scientifically proven.

The Nutritional Therapy of Saint Hildegard of Bingen (1098–1179): “He who has stabbing pain in his limbs and joints as well as stomach and intestinal pain, should frequently eat plenty of well-cooked beef trotters, including fat and calluses. That soon gets rid of the pain.” [Paris, National Library, Cod. 6952]



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also have to be repeated regularly because hyaluronan degrades very quickly. The half-life of hyaluronic acid is only a few days, meaning, only half the original quantity remains after a few days and only a quarter remains after another few days. It is hardly detectable at all after a short period of time.



Risky injections

Another disadvantage of injecting hyaluronic acid directly into the cartilage is, that the risk of acute infection of the joints or cartilages increases considerably.

A safe and palatable alternative is the use of collagen peptides as a dietary supplement. They stimulate the activity of chondrocytes in a natural way from within, which are not only responsible for the body's

collagen production, but also form new hyaluronan. The effects on the skin can be noticed quickly, but a little more patience is required regarding the joints – an obvious improvement in symptoms is only possible after approximately two to three months. To remain permanently complaint-free, collagen peptides should be taken regularly because the body constantly regenerates its supply of collagen.

Nutrition and exercise

Naturally, a healthy, balanced diet and sufficient exercise are a prerequisite for healthy joints. Omega-3 fatty acids, which have an anti-inflammatory effect, are also important, especially where there is acute painful inflammation. Coenzyme Q10 and ubiquinol as well as pine bark extract also have a supporting effect since they inhibit collagen degradation. Vitamin C and silica, on the other hand, stimulate collagen formation and are therefore a good supplement to collagen peptides. In addition, anti-inflammatory plant extracts from rose hip or verbena can also be beneficial.



Green-lipped mussel, glycosuria and chondrites

Many products used for healthy joints contain glycosuria or green-lipped mussel extract, or else chondrites. These act on inflammations and are involved in the synthesis of hyaluronan. They are a good supplement for anyone suffering from an inflammatory disease of the joints. However, these substances are not an alternative to collagen peptides because they only treat the symptoms – not the causes of joint disease.

Questions and Answers:

If collagen peptides are good for my joints, can they also help my dog?

There are indeed numerous premium animal feed products that contain collagen peptides. The physical mechanisms in animals are basically the same as in humans. Dogs, livestock and even race horses benefit from a good supply of collagen peptides. They also help prevent joint issues in animals or can relieve the symptoms. Not only are dog owners pleased with their own smoother skin, their dogs too boast a healthier sheen.



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18 Osteoporosis – a creeping epidemic

In the past few years people have become increasingly aware of a very important issue – osteoporosis. The reality of the disease includes chronic pain, weakened bones and long-term disability. Despite a lot of publicity, many people still think that osteoporosis is only a problem for women. The fact is, although a higher percentage of women suffer from osteoporosis, men can be affected too.

What exactly is osteoporosis? If more bone is degraded than produced, the result is a continuous reduction of bone mass. Bone mineralization and the collagenous structures that provide density and firmness to bones are diminished.

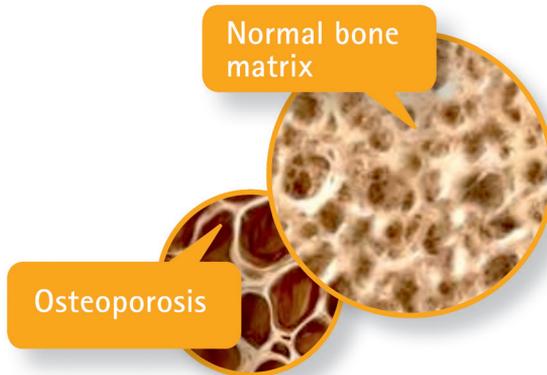
It is estimated that at least 25% to 35% of women over the age of 65 are affected by advanced osteoporosis. More than 40% over the age of 50 experience bone fractures caused by osteoporosis, which makes a hospital stay necessary in many cases. The worst-case scenario would be a loss of independence and the need for long-term care.

Watch out, ladies!

Statistics clearly indicate that women are much more frequently affected by degenerative diseases of the joints and bones. During menopause, the risk of osteoporosis increases significantly as a result of hormonal changes. Consuming collagen peptides supplements activates the formation of new collagen in the joints and bones and is therefore making an important contribution to the prevention and treatment of osteoporosis.



The structure of a healthy bone and one with osteoporosis.



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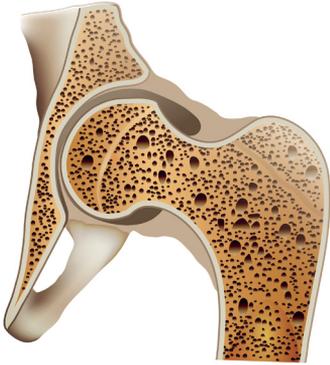
Osteoporosis is also referred to as a “silent epidemic” because it is an insidious disease – it can be present for a long time without any noticeable symptoms, despite its high association with health risks.

The same tensioning force as steel: Why collagen is so important for our bones

About 70% of our bones consist of inorganic mineral, and 10% is water. Collagen makes up almost another 20%, and forms the basic framework of the bone to which the calcium “attaches”. This results in a very solid and flexible composite material.

Imagine calcium is the concrete bridge and collagen is the steel core – collagen actually has a tensile force similar to steel, forming a flexible core in bones. In this analogy, calcium is comparable with the concrete, which provides the mineral component of the structure’s strength.

For this reason, collagen is extremely important for strong bones. Of course, a sufficient supply of calcium and vitamins D and K is vital for healthy bone density. However, if the collagen is missing, it is difficult to prevent the degradation of bone mass, and the stability of even high-density bone is endangered.



Scientifically proven efficacy

Many scientific studies have proven that a dietary supplement containing collagen peptides supports the structure of bone tissue and counteracts bone loss. A patent for collagen peptides was granted as early as 1996 for the treatment of osteoporosis. It is also advisable to take collagen peptides in addition to conventional osteoporosis agents.

Many doctors prescribe a hormone called calcitonin, formed in the thyroid gland, for osteoporosis. It plays an important role in the metabolism of calcium and phosphate. These two crucial minerals are particularly important in ensuring the strength of the bone tissue. Scientific studies show that the effect of calcitonin can be improved if patients take collagen peptides at the same time [2; 3]. There are also other studies that prove the benefits of collagen peptides. More than 20 years ago a research group found that subjects who regularly consumed 10 grams of collagen peptides per day had less depleted bone collagen residue in the urine, indicating that collagen breakdown in the bone had been reduced [2].

In 2012, the same research group found that collagen peptides can reduce bone fractures by an impressive 75%. This study was carried out with approximately 100 women over a period of three years. In a further study, which has not yet been published, the University of Freiburg has succeeded in demonstrating that 5 grams of a specially adapted collagen peptide taken daily, significantly increases the bone density of the femoral neck and spine.





Taking collagen peptides is not only an effective preventive measure but also an important and valuable supplement in the treatment of osteoporosis. Good nutritional supplements for strong bones are ones that contain FORTIBONE®, a brand of collagen peptides specifically tested and designed to increase bone density.

19 Collagen peptides: Important for athletes

A young and healthy body usually produces a sufficient amount of collagen, so joint, ligament and tendon discomfort is rare. However, there are exceptions: A lot of athletes are well aware of the risk of injuries and wear and tear. Even though most active people enjoy good health, many are all too aware of the painful symptoms of physical strain, where severe pain is a daily occurrence. Some careers in sports are terminated early because of an injury to the ligaments or tendons. Many amateur athletes of all age groups also have to reduce physical activity because their musculoskeletal system cannot cope with the strain.

Athletes are especially at risk after a long break, or where their bodies are not yet accustomed to the strain. While our musculature is very quick to adapt to new stresses, often requiring only three to six weeks to do so, our tendons and ligaments need at least three to six months – and our joints between six and twelve months – to adapt.

Prevention instead of treatment

Anyone who exposes his or her musculoskeletal system to severe stress should make sure their system is able to cope with it. Collagen peptides not only support muscle growth and joint cartilage, but also strengthen ligaments and tendons and provide more flexibility. Because of this, they are ideal for reducing the risk of sports injuries. Their excellent supply of amino acids also helps to shorten the regeneration phase after training or competition [23].

“The earlier the better” is the motto. There may be little or no physical pain for a long time when connective tissue is damaged. However, if the connective tissue is damaged and causes pain or restricted movement, regeneration or even repair is much more lengthy and difficult.

Collagen peptides help with discomfort caused by physical stress

A study conducted by Penn State University in Pennsylvania, showed that after taking 10 grams of collagen peptides daily for 24 weeks, athletes had reduced stress-related joint discomfort and increased mobility and performance [9].

A recent study of 139 athletes carried out by the University of Freiburg showed similar results after taking only 5 grams of specific collagen peptides daily, sports-related symptoms decreased significantly and massages, ice packs and pain gels were used much less frequently [30].



Bodybuilders beware!

People who attach importance to strong muscle growth should be especially aware of one thing – the musculoskeletal system is doubly burdened. First, most strength exercises are associated with a lot of pressure on joints and cartilage. Second, a significant increase in weight is generally also a result of muscle growth, which results in an additional physical load, especially on the joints. Collagen peptides effectively contribute to the protection of cartilage tissue, joints, tendons and ligaments.

Reducing the risk of injury

Intensive training is associated with a high risk of injury, especially when unfit people are exposed to high levels of physical stress. Studies have shown that in most sports, injuries are attributable to damage to the connective tissue. A view that is shared by Dr. Müller-Wohlfahrt, the long-standing doctor of the German national soccer team. Building and maintaining collagenous structures in a targeted manner and thus ensuring strong and healthy connective tissue, reduces the risk of injury. This applies particularly to sports involving a high load factor and hard physical contact. A new study by the University of Freiburg corroborates

this. Young athletes received 5 grams of a defined chain length collagen peptide every day. After a few weeks, the risk of injury decreased significantly [30].

Collagen peptides protect the muscles and shorten regeneration time

Those who participate in repetitive endurance training are asking a lot of their joints, ligaments and tendons – repeating the same movement often causes problems. Here too, collagen peptides can support the structures and function of the musculoskeletal system, provided they are used regularly. A welcome side effect is that collagen peptides also improve energy and stamina.

The fact that proteins reduce muscle injuries caused by training has been confirmed by a study in which creatine kinase levels in athletes' blood were measured after training. If the level of this enzyme is raised, it indicates damage to the muscle tissue or the membranes of the muscle cells. The athletes who had consumed a carbohydrate protein drink after training had creatine kinase levels 83 % lower than athletes who received only carbohydrates [24].

The personal and subjective assessment of the athletes supported the findings – if they consumed a protein drink, they felt muscle fatigue was much lower after training than if they had only consumed a carbohydrate drink.

Collagen peptides protect against endogenous and exogenous injury risks

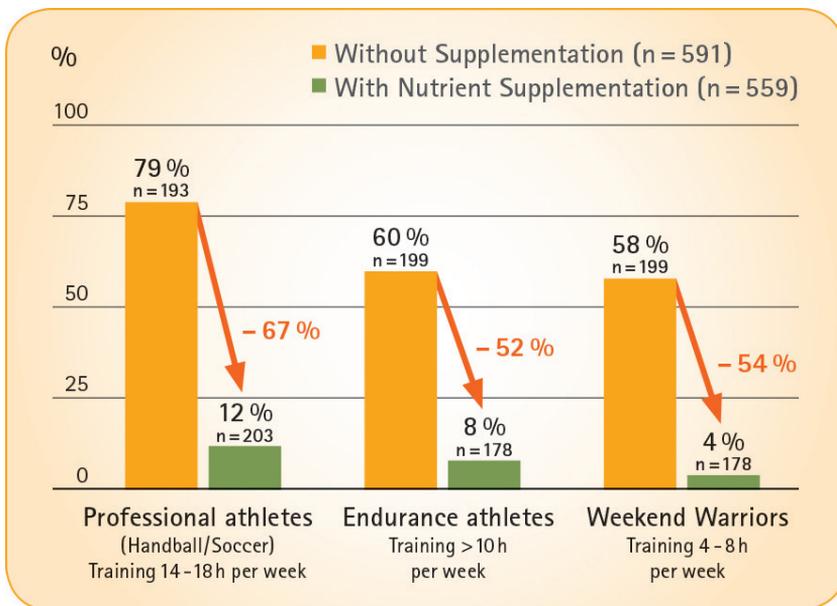
Studies have shown that collagen structures are strengthened when protein intake is optimized, and protection against the endogenous and exogenous (of internal and external cause) risk of injury is increased. If the connective tissue is intact, it is better protected against damage caused by physical stress. It also protects against exogenous risks such as falls or hard physical contact in certain sports [30].



Athletes' amino acid balance

Professor Dr. Elmar Wienecke was one of the first scientists to systematically examine amino acid profiles over a long period of time in more than 1500 athletes, including professional athletes. It was found that many of them had significant deficits and did not have sufficient levels of some amino acids. As a result of these findings, the athletes adjusted their diet in accordance with the DGE (German Society for Nutrition) guidelines to achieve an optimal supply of amino acids [29].

Despite following this diet, a large number of participants continued to complain of discomfort in tendons, ligaments and musculature. A selected group was then given a personalized amount of collagen peptides, enriched with arginine and BCAAs (Branched Chain Amino Acids). Amino acid levels in the athletes who had received a sufficient amount of collagen peptides rose to the optimum level. At the same time, recovery and regeneration improved after training, and most importantly, discomfort in tendons and ligaments was significantly reduced [29].



© Wienecke, E.: Leistungsexplosion im Sport (2011), Meyer & Meyer Verlag.

Better endurance without doping

Many studies have proven that supplementing carbohydrates with proteins can improve stamina. Small amounts are sufficient. Scientists have succeeded in documenting improved training performance when the diet is supplemented with proteins. Even 10 grams of protein, added to a conventional carbohydrate sports drink, were sufficient to achieve positive effects. Athletes involved in endurance training could train for significantly longer periods before fatigue set in – compared to those taking only a sports or placebo drink [14]. These results have been confirmed by further studies. Since collagen peptides are hydrolyzed and therefore well tolerated, they are the optimal protein source before, during and after training.

Proteins improve training performance and regeneration

- ✎ Proteins are used to provide for higher energy requirements. They increase the available energy pool and limit the breakdown of protein structures in the muscles and connective tissue.
- ✎ Proteins accelerate the glucose uptake of the muscle cells and restore glycogen levels. They contribute to more effective regeneration.
- ✎ Glucose, regulated by higher insulin levels, increases the uptake of amino acids into the body's tissue. The combination of carbohydrates and proteins in sports drinks is therefore ideal.
- ✎ The additional amino acids available can be used immediately after training for protein synthesis, leading to the repair of damaged muscle and connective tissue.



Questions and Answers:

When is the best time to take proteins, before or after your workout?

This depends entirely on the source and form of the proteins. Intact proteins such as whey proteins cannot be absorbed and metabolized quickly by the body; so they literally remain heavier and for longer in the stomach. If they are taken immediately before or during training, it can lead to discomfort and physical complaints and, of course, this can also affect performance. Collagen peptides, on the other hand, are hydrolyzed proteins. In a sense they are predigested and thus do not remain in the stomach for long. So, you can take them without hesitation immediately before or after your workout.

I run marathons. Can I consume collagen peptides during my training?

Yes, very easily. Collagen peptides do not cause a feeling of fullness and they promote a healthy stomach, and intestinal tract. That is why they can be taken immediately before, during and after exercise, even by people who normally suffer digestive problems and intolerances to protein isolates. They are highly soluble in water and can be easily stirred into drinks without increasing viscosity.

I want to take up sports can collagen peptides help?

Collagen peptides help protect muscles, ligaments, tendons, joints and bones. An inadequate amount of collagen peptides makes the connective tissue more prone to injury. The most important thing – start slowly and allow your cardiovascular system to get used to higher levels of stress and your musculoskeletal system to adapt to the new challenges. Training too intensively is more damaging than useful, and can significantly increase your risk of injury.

Is taking collagen peptides considered doping?

No. Collagen peptides are considered a foodstuff in all countries and can be consumed without any reservations by athletes. For professional athletes, specially tested products are available which include all ingredients of a dietary supplement.

Overview: Branded collagen peptides and recommended daily doses

Areas of Application	Recommended Branded Collagen Peptides	Recommended Daily Dose
Skin, Hair, Nails	VERISOL®	2.5 grams
Joints	FORTIGEL®	5 grams
Muscle Building and Body Toning	BODYBALANCE®	15 grams
Sarcopenia	BODYBALANCE®	15 grams
Ligaments and Tendons	TENDOFORTE®	2.5–5 grams
Dogs/Cats	PETAGILE®	According to size: 1–9 grams

DOGS

DOSAGE

	Extra-small 1 – 5 kg 2 – 11 lbs	≈ 1 grams
	Small > 5 – 10 kg > 11 – 22 lbs	≈ 2 grams
	Medium 11 – 25 kg 24 – 55 lbs	≈ 3–5 grams
	Large 26 – 44 kg 57 – 97 lbs	≈ 6–8 grams
	Giant > 45 kg > 99 lbs	> 9 grams

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born in Bochum and now living in Schwelm/Germany close to Düsseldorf. He studied chemistry in Bochum and finished his studies with a PhD thesis in 1993. Since 1996, he worked in various companies in the pharmaceutical and food industry in Germany and abroad. He worked there in the fields of marketing and development, sales and business development. During this time he gained a comprehensive knowledge of the market for health-enhancing nutrients and their producers. It is his goal as consultant to support the development, distribution and promotion of new products and health ingredients in the areas of nutritional supplements, FSMP (Food for Special Medical Purposes), sport nutrition and more. As part of his work he has written or produced about 30 books on various topics of nutrition and various nutrients.

Based on his long experience, he believes that health ingredients can offer a chance to increase human health, whether we are young or old, sick or healthy. Many of us could benefit from nutrient supplementation if we would know more about our own nutritional status and how specific health ingredients could help us.

Ongoing science continuously expands our knowledge about the benefits of new and existing health ingredients, but the communication to consumers is limited today by the EFSA (European Food Safety Authority) health claims regulation. Serious information is needed and new ways of communication, via multipliers or books to inform more people about the safety and the benefits of health ingredients.

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He worked as an R&D Scientist and Project Manager within the former HOECHST AG and Aventis R&D. Prior to his position as a Project Manager, he worked in the area of food-biotechnology and bioprocess-engineering.

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After having completed a bank apprenticeship Dr. Kneféli studied human medicine at the University of Heidelberg, Germany. Licensed as a physician, he completed his Medical Doctorate in Orthopedics at the University of Heidelberg, Germany. Subsequently he gained several years' experience in all specific fields of Surgery (incl. Orthopedics and Traumatology) with a final degree as a specialist in General Surgery, a special degree in Sports Medicine and a special degree in Emergency Medicine.

Several years in the superior management as a chief representative of two health care companies in Mannheim and Stuttgart, Germany, followed. Furthermore, he gained experience in Vascular Surgery and Internal Medicine in a kidney specialized hospital with integrated dialysis department before joining GELITA in 2010.

Dr. Kneféli holds degrees and certifications in Medical Business Management of the University of Heidelberg and in Public Health of the Health Care Academy Düsseldorf, Germany. His function as a Director of the Health Care Academy Stuttgart, Germany, was combined with numerous activities as a lecturer. He holds a special degree as a clinical investigator in functional leadership for clinical studies and several certificates for clinical examination of medical devices and regulatory environment.

In his current position at GELITA, Dr. Kneféli conducts studies in the area of health and nutrition and is responsible for worldwide science presentations at business congresses and KOL meetings to spread the global knowledge of Collagen Peptides.