

NDS

Nutrient Delivery System

NDS[®] Collagen[®]

– why is NDS[®] Collagen so effective?

BY EVA LYDEKING, MARTS 2020

It is about supplying the right collagen peptide to the right place – wherever the need has arisen. Every NDS[®] Collagen-peptide is designed to carry out a specific job in the body. Well-documented and effective.

What is it about connective tissue? – why has it suddenly become so important?

The physical composition of the body can be determined in several different ways, for example, the weight of the organs and how many kgs/what percentage the tissue makes up.

We know that every organ performs a specific task, for example, that the heart pumps blood round the body through the vessels and that the small intestine absorbs most nutrients and is important for regulating the immune system.

The lungs ensure that oxygen reaches all cells, tissue, generates energy and separates out the old, used air.

The liver, the kidneys and colon generate a long list of vital substances and cleanse the body of waste substances so that we can maintain a suitable renewal of the unavoidable wear and tear that occurs in everyday life.

The bones are our skeleton so we can keep ourselves upright and the joints enable us to move flexibly. Communication between the nervous system, muscles and tendons, attachments and ligaments are crucial to appropriate and coordinated movement. The skin is our largest organ and covers and holds everything inside the body together.

Connective tissue is the basic substance that is in between and all around, ALL the other cell-based organs and physiological functions – overall, it is a bigger tissue than any other organ, and as such the actual basic structure and stability in the body.

The connective tissue comprises a combination of compound proteins (several different types of fibre etc. supporting, elastic and shock-absorbing) and some large sugar molecules, proteoglycans linked together in relation to the needs of the individual areas of the body.

Thus, tendon membrane is thin and elastic, cartilage is tight, compact and shock-absorbing, the basic substance of the bones is light, porous and allows room for the incorporation of the mineral structure that makes the bones strong. The skin and the connective tissue of the intestines is elastic and can be stretched in all directions.

All of this is called the extracellular matrix and the predominant structure protein in the connective tissue is **collagen**.



Table 1 shows selected organs and the approximate weight of the tissue and the collagen content.

Organ/tissue	% of Body weight, kg	Weight at 75 kg, kg	Collagen, % (Of dry weight)	Collagen volume, at 75 kg, kg
The skin*, surface layer	6	4.5	75	3.375
The bones, the entire skeleton	14	10.5	20-25	Approx. 2.8
Proteins in the body	16	12	30	4

* The skin, including the subcutaneous layer, is 16% of the body weight, approx. 12 kg

As table 1 shows, in terms of volume, collagen constitutes a large part of the body's composition as this protein actually represents our ability to keep ourselves together physically. Moreover, collagen is the main constituent of countless other structures, namely

- the tendon membranes around the muscles (which ensures that the muscles can glide smoothly when they move)
- the intestinal walls, the blood vessel walls and the mucous membranes (and internal organs)
- all cartilage tissue: Cartilage discs in the spinal column, articular cartilage (protects and acts as a shock absorber for the joint ends), ligaments and joint capsules (link the bones together over the joints) and tendons (bind the muscles to the joints). In total, we have approximately 700 muscles, several different types of joint and all the different attachments in which collagen is incorporated as a physical substance.

Besides being the basic physical structure of the body, recent research shows that collagen also helps in the communication process between different tissues.

Collagen, structure, wear and tear and recovery

There are approximately 16 different types of collagen in all, all of which consist of specific amino-acid sequences for which there is no exact match anywhere else in the body.

Collagen is formed by different types of cells, depending on which tissue is involved, for example, fibroblasts in the skin, chondroblasts in the joints and osteoblasts in the bones: All collagen is constructed of amino-acids added to the diet. These amino acids are the same in all types of collagen, always glycine and, more often than not, proline and hydroxyproline (plus a few other amino acids) and they are bound together in long chains with over 1000 amino acids.

The construction and breaking down of collagen occurs throughout a person's life via the proteins, peptides (smaller amino acid sequences) and amino acids that we eat and digest, circulate around our blood (oxygen is important) and incorporate in the body's tissue and organs.

With age, genetic predispositions and the accumulation of different environmental impacts, the ingestion of medicines, (sport) injuries, work causing repetitive strain injury (RSI) (including excessive sport), heavy lifting and general physiological wear and tear due to lifestyle, stimulants, tobacco, excessive sunbathing, collagen is broken down more than it is constructed and the symptoms sneak their way into day-to-day life:



- The unformed, jelly-like part of the connective tissue contains a large number of immunologically active cells including, for example, macrophages and mast cells and is therefore also the site of non-specific inflammation, with tenderness, stiffness, fluid accumulation, and reactions to pain that cannot be attributed to specific tissue.
- The joints become stiff and tender, mobility is reduced, recovery is more difficult after injury or a sprain, but the actual nourishment of the cartilage only occurs when it is moved as the nutrients are dissolved in the joint fluid and must be pressed into the cartilage through movement, just like when you squeeze a sponge.
- Tendons, tendon sheaths, fascia and ligaments can become stiffer, less elastic, become irritable and need to “get started” in the morning and after sitting still for a while. Here, for example, conditions like inflammation of the plantar fascia under the foot (plantar fasciitis), inflammation of the shinbone, shoulder problems, RSI etc. Athletes often experience that the recovery following an injury takes significantly longer once they reach 40-50.
- The skin loses its elasticity and becomes wrinkled, and perhaps wounds and scratches don't heal as well.
- Weakening of the bone mass (osteopenia, osteoporosis) and protracted healing time or failure to heal following physical trauma, for example, a break, small fractures in the bones or other stresses.

Table 2 shows Engholm NDS Nutrition's specific collagen products and their target areas in the body

Product name	Organ/tissue	Molecule weight	Daily dose
SkinActive® (CPV101)	Skin, hair, nails	2kDa	2.5 grams (5 ml)
Ezy Move® (CPF 218)	Joints	3kDa	5 grams (10 ml)
BoneX® (CPFB 105)	Bones	5kDa	5 grams (10 ml)
Multi Collagen Total® (CPV 101, CPF 218, CPFB 105)	Skin, hair, nails, joints, bones	2+3+5 kDa	7.5-15 g (15-30 ml)
Multi Collagen Sport® (CPF 218, CPB 227, CPT 202)	Joints, ligaments, muscles and tendons Body composition (<i>satiety, burning fat, building muscle</i>)	3+2+3,5 kDa	7.5 g- 15 g

References

Feng and Betti, 2017; Guo et al., 2015; Liang et al., 2014; Parmentier et al. 2014; Roberts et al., 1999; Keith and Bell, 1998; Oesser et al. 1999; Siebert et al., 2010; Srivastava 2017 p.457; Miner-Williams et al. 2014; Lorkowski 2012; Wada and Lönnerdal 2014.



NDS Collagen products

The collagen products from Engholm NDS Nutrition are characterised by being produced from pure Bioactive Collagen Peptides® for which the molecule weight, absorption by the body and incorporation in the relevant tissue has been documented.

The long-established understanding of physiology in relation to the digestion of proteins is that these are broken right down to amino acids before they are digested, but more recent research shows that molecules of sizes between 2 and 5 kDa (20-50 amino acids) can easily be absorbed via the access routes located between the intestinal cells (paracellular), just as it has been documented that small peptides with 2-3 or more times amino acids are absorbed well. Even whole small proteins with up to 200 amino acids can be absorbed intact and produce a biological effect at tissue level.

These collagen products are so specific that after the hydrolyzation process, which has broken down the very large amino acid chains, it is not possible to measure what the starting point was and they also fall outside the prevailing division into collagen types I, II and III. They have a unique structure which consists of collagen-specific Proline-Hydroxyproline-Glycine amino-acid repetitions. Their form is such that they can travel from the intestine to the blood and beyond to the specific tissue that needs to be built up.

25 % of the peptides are proline, which stabilises the structure so that they are not easily broken down during digestion.

When NDS® Collagen products are ingested, approximately 10% of the molecule passes, intact and directly from the intestine over to the body and out to the specific tissue where it binds itself to receptors in the relevant connective tissue-building cells and emits a signal that sets the recovery process

in motion. The remaining 88.4% is broken down by digestion to dipeptides and tripeptides as well as individual amino acids which are incorporated directly in the building-up and recovery process by the appropriate tissue in the body.

Therefore, specific collagen peptides work on two fronts as they both

- send a communication signal to the connective signal via the intact peptide (10%), and
- supply the relevant, easily-incorporated amino acids and small peptides to the connective tissue that needs to recover and be built up (just under 90%).

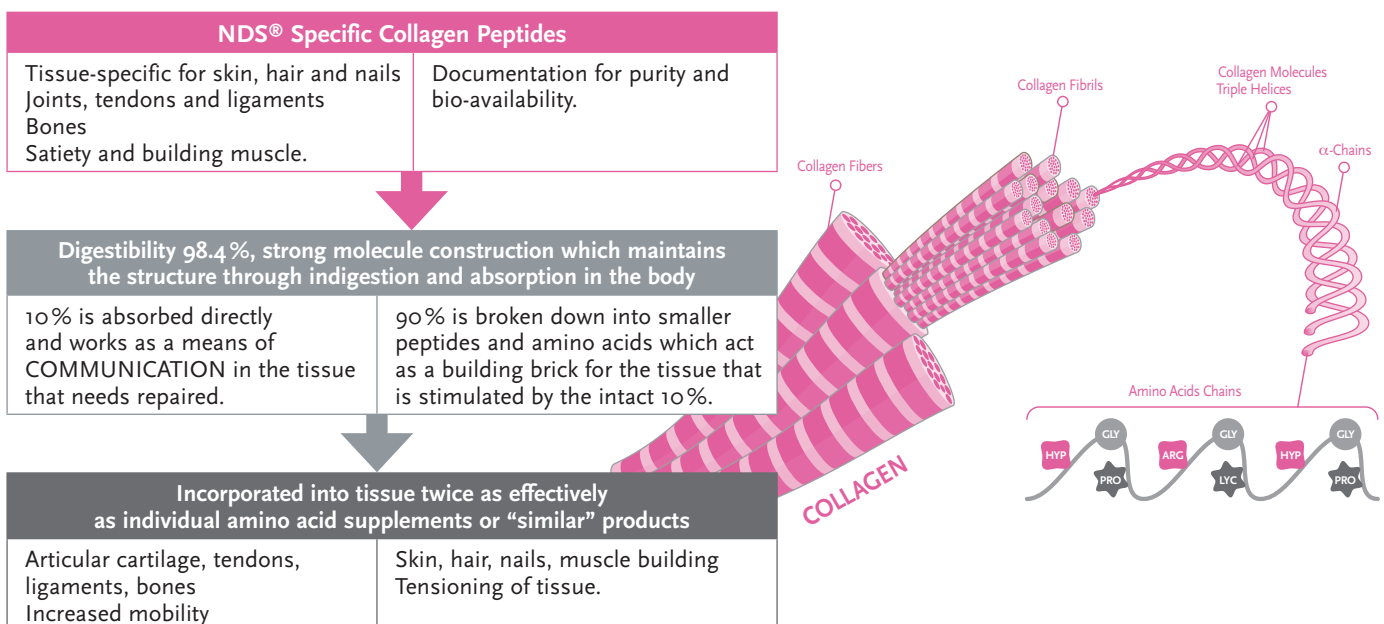
Furthermore, NDS® Collagen Peptides have a very low content of the amino acid histidine (1%), which creates weak connections in the connective tissue (as opposed to proline, which creates strong connections). The insignificant content of histidine aids more intact absorption and there are almost no substrates which can be converted to histamine in the body.

Incorporation into the connective tissue

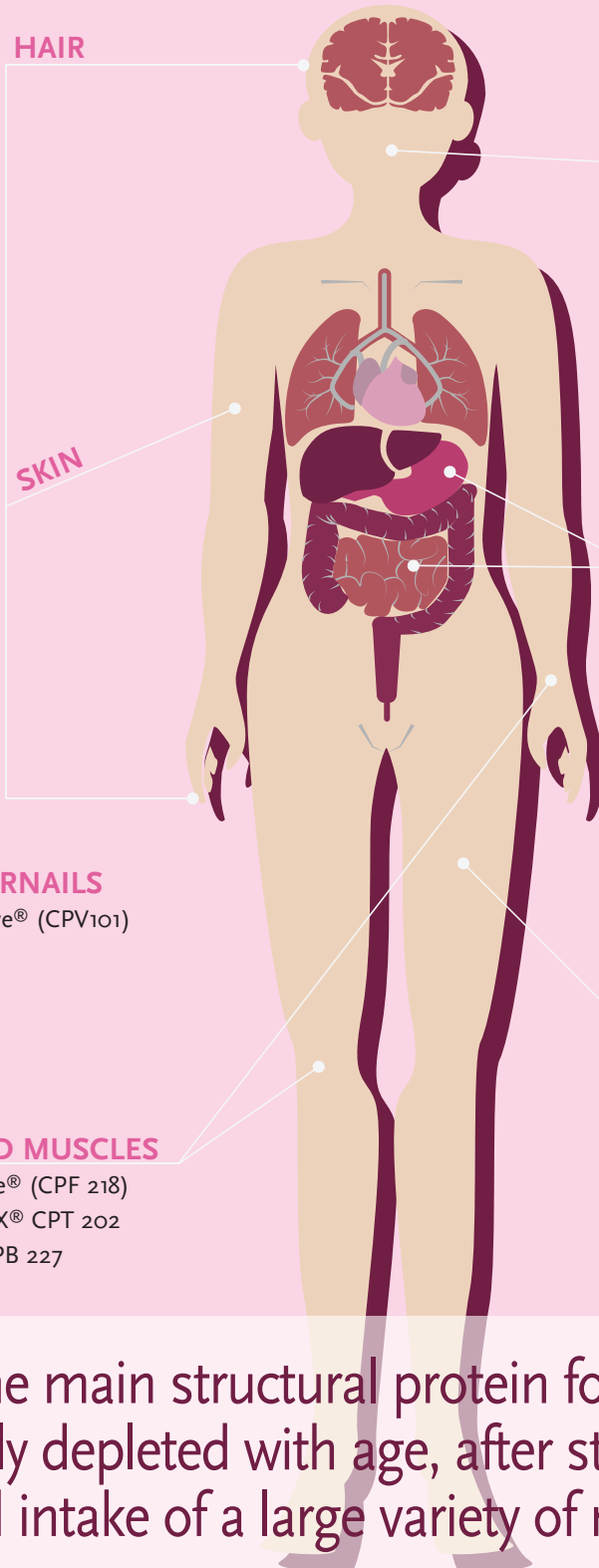
Well, could you not just take individual amino acids for the desired purpose?

You perhaps could, but tests on radioactively marked peptides show that some of these are incorporated twice as well as individual amino acids into the cartilage tissue, presumably because the body perceives the peptides as food, which is just as necessary for the recovery of tissue.

Ongoing tests on cell cultures from humans also show that precisely these collagen peptides stimulate the genetic communication of the cells to rebuild joint cartilage and skin twice as well as products with a similar declaration (but which have no documentation proving the effect).



WHAT HAPPENS WHEN YOU CHOOSE TO TAKE EXTRA COLLAGEN PEPTIDES?



HAIR

SKIN

INGESTION:

- All NDS® Collagen peptides have
- Neutral flavour
 - Can be mixed into both cold and hot beverages, e.g. smoothies, fruit pulp, yoghurt, soup, hot dishes
 - Pure products without contamination and unwanted substances

DIGESTION AND ABSORPTION:

- Digestibility is top-notch, 98.4%
- No wastage of active substance
- 10% enter the body intact and act as a signal for tissue build-up in specific tissues
- 90% are transformed into building blocks that can be used for the regeneration of specific tis-

HAIR, SKIN, FINGERNAILS

NDS® Collagen SkinActive® (CPV101)

CONNECTIVE TISSUES FOR THE BONES

NDS® Collagen BoneX® (CPFB 105)
Molecular weight 5kDa
(approx. 50 amino acids)

JOINTS (BIG & SMALL) AND MUSCLES

NDS® Collagen Ezy Move® (CPF 218)
NDS® Collagen TendoneX® CPT 202
NDS® Collagen F2M® CPB 227

Collagen is the main structural protein for the body's tissues. It is gradually depleted with age, after stress-related events and intake of a large variety of medicines.

These collagen peptides have a unique structure which consists of collagen-specific Proline-Hydroxyproline-Glycine amino-acid repetitions. Their form is such that they can travel from the intestine to the blood and beyond to the specific tissue that needs to be supported, strengthened and built up.

The two broad-spectrum collagen products are aimed at tissue with the following composition?

NDS® Multi Collagen Total® covers the construction of connective tissue in skin, hair, nails, joints and bones

NDS® Multi Collagen Sport® is aimed at joints, ligaments and tendons, i.e. It is highly suitable for sprains or for recovery from damage to these tissues. It also helps optimise the body composition through the effect of a high level of satiety, improved fat burning and effective muscle building.

Countless situations throughout life have an impact on the strength and quality of the connective tissue, including hereditary factors, age, lifestyle (tobacco and alcohol are worst), general inflammation due to an imbalanced diet and immunological activation following infection and injuries. In particular, the use of painkillers whether steroids (cortical hormones) or non-steroids (other “anti-arthritis agents”, such as Ibuprofen etc.) and the long-term use of Paracetamol should be mentioned as these ease pain and are anti-inflammatory in the short-term, but in the long term they hamper normal connective tissue recovery and can also weaken tendons and ligaments.

The role of amino acids in relation to the immune system

Proline

25 % of the amino acids in the collagen peptides are proline, which stabilises the structure so that they are not easily broken down during digestion. In addition to the effect of proline on the connective tissue, this amino acid has a lesser known role in the immune system as proline is the precursor to the creation of P5C (Pyrroline-5-carboxylic acid), and this process regulates, among other things some of the growth and function of white blood cells so that they survive better and promote the creation of antibodies for fighting infections. Proline is absolutely necessary for the healing of all kinds of tissue damage and also as a precursor to the creation of H₂O₂ (hydrogen peroxide) which the immune system’s cells use partly as a communicator and partly to fight off unwanted bacteria and infected cells.

Glycine

Glycine is an amino acid forms around 20% of collagen. Besides its importance to the creation of collagen, glycine is used directly as a building block in the antioxidant glutathion and the hema molecule that transports oxygen around the body.

Glycine is a direct antioxidant which protects the white blood cells’ function and effectiveness in the event of infection. In trials on animals, glycine acts as a balance even in the event of life-threatening immune activation due to its anti-inflammatory tissue-protecting properties in many different tissues. Glycine aids sleep quality, stress management and the brain function, and moderates central processes in the presence of serious infections and injuries.

References

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Peng Li, Yu-Long Yin, Defa Li, Sung Woo Kim and Guoyao Wu: Amino acids and immune function. *British Journal of Nutrition* (2007), 98, 237–252 doi: 10.1017/S000711450769936X

Meerza Abdul Razak, Pathan Shajahan Begum, Buddolla Viswanath, and Senthilkumar Rajagopal Multifarious Beneficial Effect of Nonessential Amino Acid, Glycine: A Review *Oxid Med Cell Longev.* 2017; 2017: 1716701. doi: 10.1155/2017/1716701

NEW STUDY

Beyond skin:

NDS® HairActive® Collagen Peptides improve hair metabolism & structure

FIRST PEER-REVIEWED STUDY REVEALS INCREASED HAIR THICKNESS WITH NDS® HAIRACTIVE® COLLAGEN PEPTIDES

New randomized, placebo-controlled study shows that supplementation with the specific NDS® HairActive® Collagen Peptides can result in improved hair structure, by significantly increasing hair thickness and proliferation of human hair follicle cells.

The study was conducted on 44 healthy women aged between 39 and 75, who each received a daily dose of 2.5 g NDS® HairActive® or placebo for 16 weeks. At the end of the supplementation period, the use of NDS® HairActive® led to a significant increase in hair thickness, whereas a slight decrease was observed in the placebo group. The comparison of the two groups revealed a statistically significant increase in hair thickness in the NDS® HairActive® group compared to placebo, confirming the benefits of NDS® HairActive® to hair thickness, a key aspect of healthy hair appearance.

In addition, the study investigated if the previously demonstrated efficacy of NDS® HairActive® in stimulating cells of the skin extracellular matrix could have a positive impact on hair follicle cells and promote their proliferation.

The in vitro test showed a statistically significant increase of 31% in the proliferation rates of human hair follicle cells after exposure to NDS® HairActive® for 4 hours, compared with the untreated control cells. This suggests a positive effect of NDS® HairActive® on hair metabolism, building on previous data showing NDS® HairActive® to increase mitochondrial activity of hair follicle cells.

“The positive effects of NDS® HairActive on skin elasticity and wrinkle reduction have been demonstrated by several clinical trials, performed over the last 10 years and testing nearly 500 study participants”. “With this new study, we add improved hair structure to the many positive benefits of NDS® SkinActive®. It can be assumed that the increased hair thickness observed also leads to improved textural and physical properties of hair, making it stronger and more resistant to breakage.

Recognizing that collagen peptides can exhibit different biological activities, Oesser (2020) stated that the effects measured in the study apply only to the specific Collagen Peptides tested and cannot necessarily be applied to other collagen products.

In summary, this is the first published, peer-reviewed study to clearly demonstrate a positive effect of specific Collagen Peptides intake on hair metabolism and structure.





The NDS® Collagen range includes these products:

NDS® Multi Collagen Total®
NDS® Multi Collagen Sport®
NDS® Collagen SkinActive®
NDS® Collagen EZY Move®
NDS® Collagen BoneX®
NDS® Collagen HairActive®

NDS® Pets EZY Move® (dog & cat)
NDS® Equine EZY Move® (horse)

In all, 8 different collagen peptides with studies to document their effectiveness.



It is all about biology

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