

Collagen SAP

Science-based collagen for bone and skin health.*

Collagen is an important protein and the primary component of various connective tissues in the body, accounting for at least 30% of the whole-body protein content.* Collagen is mostly made of a repeating sequence of three amino acids (Gly- X-Y), where Gly is glycine; X is often proline, and Y is hydroxyproline or hydroxylysine.*

This atypical amino acid profile is suggested to be one of the possible aspects that stimulates collagen synthesis in the cartilage and the extracellular matrix of other tissues.* Hydrolyzed collagen peptides can be easily absorbed through the gastrointestinal tract and hence have greater bioavailability compared to native collagen.*

NFH **Collagen SAP** provides high quality collagen hydrolysate (derived from a combination of type I and III collagen) that can help alleviate joint pain, especially associated with osteoarthritis, improve bone mineral density, enhance skin health, promote muscle strength, support wound healing, and reinforce cardiovascular health.*

NFH **Collagen SAP** is sourced from grass-fed, pasture raised, BSE free cattle and is generally recognized as safe (GRAS).

SUPPLEMENT FACTS

Serving Size: 1 Level Scoop (approx. 10 g)		Servings: 40
	Amount Per Serving	% Daily Value*
Calories	35	
Total Fat	0 g	0%
Cholesterol	0 mg	0%
Sodium	50 mg	2%
Total Carbohydrates	0 g	0%
Protein	9 g	18%

Not a significant source of vitamin D, calcium, iron, and potassium

* Percent Daily Values are based on a 2,000-calorie diet.

Ingredient: Hydrolyzed collagen (Bovine).

Contains no: Gluten, wheat, soy, corn, eggs, dairy, yeast, citrus, preservatives, artificial colors and flavors, or sugar.

This product is non-GMO.

Collagen SAP contains 400 g per bottle.

DIRECTIONS FOR USE

Adults: Take 1 level scoop (approx. 10 g) daily or as directed by your healthcare practitioner. Mix into half a cup or more of water, juice, smoothies, tea, coffee, soup, or your favorite beverage or food.

DURATION OF USE

Use for at least 5 months to see beneficial effects.

INDICATIONS

Collagen SAP can help:

- Reduce joint pain associated with osteoarthritis.*
- Increase bone mineral density and confer protection on articular cartilage.*
- Improve skin health by enhancing skin elasticity, hydration and increasing collagen density.*
- and may:
- Help improve muscle strength and muscle mass and support weight management.*
- Promote wound healing and management of pressure ulcers.*

CAUTIONS AND WARNINGS

Consult a health care practitioner prior to use if you are pregnant or breastfeeding.

KNOWN ADVERSE REACTIONS

May cause mild gastrointestinal disturbances.

PURITY, CLEANLINESS, AND STABILITY

All ingredients listed for each **Collagen SAP** lot number have been tested by an ISO 17025 accredited third-party laboratory for identity, potency, and purity.

* These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

Scientific Advisory Panel (SAP):
adding nutraceutical research
to achieve optimum health



351, Rue Joseph-Carrier, Vaudreuil-Dorion, Quebec, J7V 5V5
T 1 866 510 3123 • F 1 866 510 3130 • nfh.ca

BIOCHEMISTRY

Collagen is the primary component of various connective tissues in the body, especially predominant in fibrous tissues such as tendons and skin, representing at least 30% of whole-body protein content.[1] Collagen is a protein composed of 19 different amino acids, however, is mostly made of a repeating sequence of three amino acids (Gly- X-Y), where Gly is glycine, X is often proline, and Y is hydroxyproline or hydroxylysine. Approximately, collagen contains about 30% glycine, 12% proline, 11% alanine, 10% of hydroxyproline, and 1% of hydroxylysine. [2] The abundance of hydroxyproline is noteworthy as this amino acid is not found in other proteins.[2] Collagen's atypical amino acid profile is suggested to be one of the primary reasons that induces the synthesis of collagen in the cartilage and the extracellular matrix of other tissues.[2, 3]

So far, 29 different types of collagen have been identified, although, type I, II, or III collagen represent the majority of collagen in the human body. Collagen typically has the basic structure of a triple helix and forms long, thin fibrils.[2, 3]

Collagen type I is the most common form in bones, ligaments, and tendons, whereas collagen type II is primarily distributed in cartilage, and collagen type III, alongside type I, is most prevalent in skin, blood vessels, and internal organs.[4, 5] Noteworthy, type I also is present in skin, largely responsible for skin's elasticity and strength and it has been established that it's degradation in skin results in wrinkles and aged appearance.[4, 5] Type I collagen represents 25% of the total body protein and 80% of connective tissue in humans and its synthesis plays an crucial role in osteoblast differentiation, enhancing bone mineral density, and bone mineral content.[6]

DIGESTION AND ABSORPTION

Collagen must be broken down during the digestive process before being absorbed into the bloodstream as the body cannot absorb collagen in the whole form. [1, 2, 7] Ingested collagen after partial hydrolysis in the stomach undergoes luminal hydrolysis of proteins and polypeptides into free amino acids (AA) and short peptides in the small intestine through the action of enteropeptidase. The AA and small peptides are then hydrolyzed by brush border peptidases into AA, dipeptides, and tripeptides, which are mainly absorbed at the proximal jejunum by simple diffusion, facilitated diffusion, or active transportation.[7] Hence, typically collagen is hydrolyzed (the resultant product called collagen hydrolysates; whereby the long amino acid chains are broken down via a chemical or enzymatic process into peptides consisting of just two or three amino acids which enhances collagen's bioavailability. These peptides can then be easily absorbed through the gastrointestinal tract. Vitamin C is a necessary cofactor in collagen synthesis.[2]

COLLAGEN VS COLLAGEN HYDROLYSATE (CH)

In a randomized, blinded, cross-over study clinical study, ten healthy male subjects consumed either 35 g of enzymatically hydrolyzed collagen protein (EHC), 35 g non-enzymatically hydrolyzed collagen protein (NC) or a placebo (250 mL water) on three non-consecutive days.[9] A significant increase in the plasma concentration of nearly all amino acids (AAs) was observed over a 240 min period for both EHC and NC. In addition, the absorption rate and bioavailability of glycine, proline and hydroxyproline were significantly higher for EHC.[8] The prevalence of glycine and proline in CH is essential for the stability and regeneration of cartilage.[2, 3] *In vivo* studies in animal models have shown that after intestinal absorption, peptides derived from CH accumulate preferentially in cartilage and bone.[9] The resultant peptides and amino acids from collagen hydrolysates serve as building blocks for the production of collagen or other proteins in the body.[2]

CLINICAL INDICATIONS

JOINT HEALTH, OSTEOPOROSIS AND ARTHRITIS

A vast majority of the clinical studies on collagen are focused on its potential for improving joint health and management of osteoporosis and arthritis. A systematic review revealed that hydrolyzed collagen exerts a positive therapeutic effect

on osteoporosis and osteoarthritis with a potential increase in bone mineral density, protecting articular cartilage and the symptomatic relief of pain. [2] Collagen consumption has been shown to reduce exercise-related joint pain among healthy volunteers.[10, 11, 12] Results from a systematic review showed that hydrolyzed collagen supplements provided significant relief from osteoarthritis-associated pain, at least in the short term.[13] In a 24-week study with 147 athletes divided into two groups, one group received a formulation containing 25ml of liquid that contained 10g of CH, and another group received a placebo consisting of 25ml of liquid with xanthan gum. Significant improvement in pain was observed in the group supplemented with CH, especially in the subgroup with knee arthralgia. [11] In another study, researchers evaluated the efficacy and safety of CH supplementation in a randomized double-blind study with 200 patients aged 50 years or older suffering from joint pain. One half of the

participants received a daily dose of 1,200 mg of CH and the other half received a placebo (gel cap) for six months. The researchers noted that by the end of the sixth month, the improvement in pain was significantly higher in the group that ingested the CH capsules.[14] Collagen peptides have also been shown to stimulate the proliferation and differentiation of osteoblasts. [2, 3]

SKIN HEALTH

Evidence from clinical studies suggest that supplementation with collagen peptides significantly improves skin elasticity, hydration, and increase collagen density in the skin, while also reducing collagen fragmentation.[15, 16] A number of studies have also demonstrated the potential of collagen supplementation in improving visible signs of skin aging, including wrinkles and skin dryness.[17, 18]

WEIGHT MANAGEMENT AND MUSCLE COMPOSITION

Collagen has been suggested to promote satiety. A small study with 22 participants showed that CH increased gut hormones associated with satiety. [19] A similar effect was observed in another study.[20] Collagen can also be beneficial for maintaining muscle mass. In a small randomized trial of 53 older men with sarcopenia, CH supplementation with resistance training was found to improve muscle strength and muscle mass over resistance training combined with placebo.[21]

CARDIOVASCULAR HEALTH

Evidence from animal model and clinical studies supports the antihypertensive effect of CH.[22, 23] It has been shown that oral administration of collagen derived Gly-Leu-Pro significantly decreases systolic blood pressure by inhibiting angiotensin I converting enzyme (ACE).[23] In an animal model study, oral administration of collagen tripeptide had an inhibitory effect on atherosclerosis development in hypercholesterolemic rabbits.[24].

A number of randomized controlled trials of individuals with pressure ulcers (bed sores) have found that giving standard care in combination with a collagen hydrolysate supplement resulted in significantly faster recovery than giving only standard care.[25, 26, 27]

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