



CollaGEM™-V

is a Biomimetic Vegan Collagen Peptides Powder That is Highly Effective for Skin Improvement



Summary

Oral intake of hydrolyzed collagen has beneficial effects on human skin physiology. Collagen is an important protein that constitutes connective tissue. Therefore, the source of collagen supplements is mainly from animals, and that is why it is posing some difficulties for vegetarians to consume collagen.

CollaGEM™-V is an innovative, biomimetic vegan collagen peptides with an amino acid composition approximately 98% similar to that of human skin collagen. The purpose of this study was to confirm had the highest olfactory and taste acceptance, and that oral administration of 5 grams of CollaGEM™-V supplementation could be helpful for skin physiology within four weeks. Results include:

1. Sensory evaluation showed that CollaGEM™-V in powder or dissolved in liquid had perfect performance of olfactory and taste.
2. Within four weeks, CollaGEM™-V can significantly help to control oil secretion, and improve skin elasticity, skin hydration and collagen content of the cheeks and around the eyes compared to week 0.
3. Oral administration of CollaGEM™-V, the smoothness of the epidermal of the cheek skin and around the eyes were improved.
4. Oral administration of CollaGEM™-V can help to reduce fine lines on the skin surface.

Introduction

20% of human body is protein, among which collagen accounts for 1/3, equivalent to 6% of body weight¹. Collagen is the most abundant protein. Currently 28 types have been defined, which are distributed throughout the body, with different functions in different organs and parts^{2,3}. Collagen is vital to the body, and it is a structural protein found in the skin, bones, joint and muscles of animals⁴. Therefore, the source of collagen supplements is mainly from animals. For example, swine or bovine skin, fish skin and scale are common sources in the nutraceutical market. As we know, animal foods may have impact on the environment and health. More and more people around the world are changing their eating habits to vegan food for the sake of their health, environmental protection and animal rights. In the diet, animal meat can be replaced with plant-based meat, and animal milk can be replaced with plant-based milk. However, collagen is a high-demand nutritional supplement in the nutraceutical market but it is difficult to find reasonable plant-based collagen in the market. Vegetarianism desire vegan-sourced collagen supplement, thus driving the market value of vegan collagen. According to the survey, the market value of vegetarian collagen products will reach 900 million US dollars by 2028⁵.



People are actively looking for vegan collagen supplements for vegetarians available on the market. However, among the products currently claimed to be "vegan collagen", some products are amino acid blends with low flavor acceptance and do not contain physiologically active peptides; some are genetically engineered products that may not be recognized by food regulations; some products are so-called "collagen boosters," and the ingredients don't provide the materials needed to synthesize collagen. MCB utilizes protease to hydrolyze allergen-free rice and pea proteins to provide physiologically active plant protein peptides, containing high levels of glycine and proline required for collagen synthesis in the human body, and has 9 human Essential amino acids; highly concentrated lemon essence (containing natural vitamin C) and vegan sodium hyaluronate were introduced in the process, which help to synthesize collagen and provide synergistic physiological functions of collagen in the body. The molecular weight distribution of CollaGEM™-V is <5000 Daltons, and the molecular weight distribution of 40% is <1000 Daltons, which is consistent with the molecular weight of most collagen peptide products in the market. In addition, the amino acid composition similarity between CollaGEM™-V and human skin collagen⁶ is >97.6%, which can provide sufficient raw materials for the natural construction of collagen in the human body.

CollaGEM™-V was evaluated by the subjects in both olfactory and taste, and both had high flavor acceptance. Subjects were received 2.5 grams / serving, twice once daily of CollaGEM™-V for 4 weeks. Skin elasticity, hydration and collagen content of the cheeks and the skin around the eyes showed significant improvement. Moreover, the smoothness of the epidermal of the cheeks and the skin around the eyes were improved, and also reduce fine lines on the skin surface. CollaGEM™-V is an innovative, allergen-free, food-safe, biomimetic vegan collagen peptide that is closest in composition and function to animal-derived collagen peptides and will be highly competitive in the collagen supplement market.





Methods



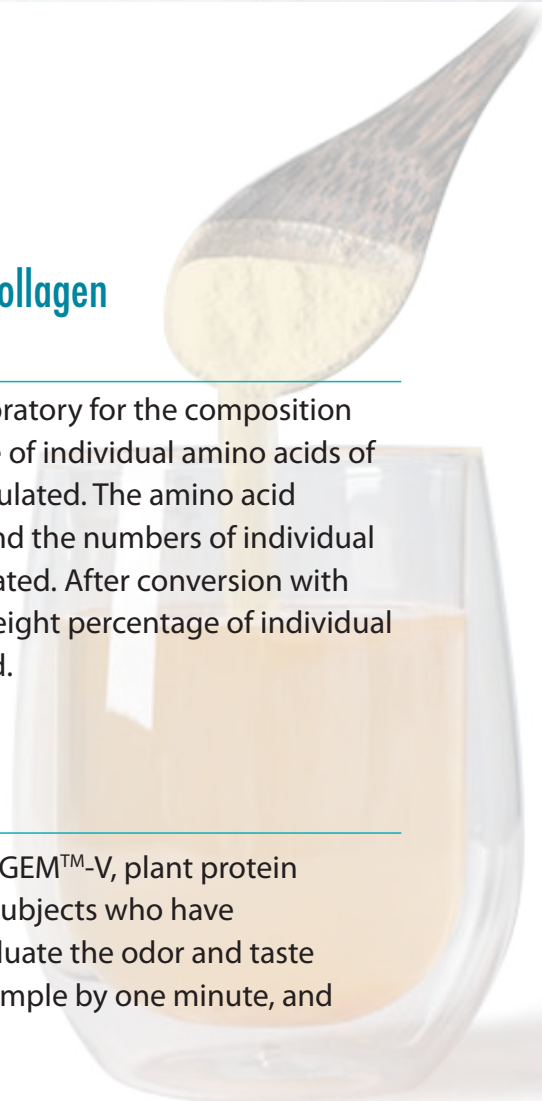
Comparison of CollaGEM™-V and Human Skin Collagen Amino Acid Composition

CollaGEM™-V has been tested by Eurifins German laboratory for the composition and content of 18 amino acids. The weight percentage of individual amino acids of CollaGEM™-V to the total amino acid content was calculated. The amino acid composition of 24-93-year-old human skin collagen and the numbers of individual amino acids per 1000 amino acid residues were calculated. After conversion with the molecular weight of individual amino acids, the weight percentage of individual amino acids in total amino acid content was calculated.



Tests of Olfactory for Collagen Powder

Vegan collagen materials used in this study were CollaGEM™-V, plant protein peptides complex and amino acid blends. 30 healthy subjects who have frequently used collagen products were invited to evaluate the odor and taste of these 3 vegan collagen materials, separated each sample by one minute, and filled out the questionnaire of sensory evaluation.





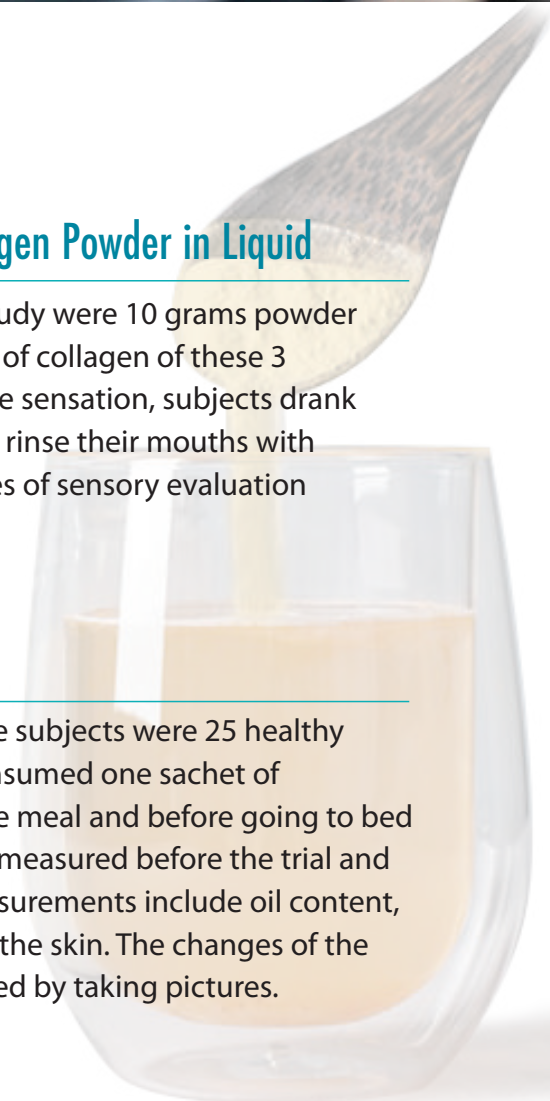
Tests of Olfactory and Taste Sensation for Collagen Powder in Liquid

The liquids of Vegan collagen materials used in this study were 10 grams powder dissolved in 100 ml water. Subjects smelled the liquid of collagen of these 3 above-mentioned materials. In the experiment of taste sensation, subjects drank 5 ml of each test sample, respectively. Subjects would rinse their mouths with water before drinking each sample. The questionnaires of sensory evaluation were filled out by subjects.



Skin Analysis

This was a one-group pretest-posttest design trial. The subjects were 25 healthy women that aged 31- to 55-year-old. The subjects consumed one sachet of CollaGEM™-V (2.5 g/ sachet) every morning before the meal and before going to bed for 4 consecutive weeks. Skin conditions of face were measured before the trial and at Week 4 by the skin measuring instrument. The measurements include oil content, skin hydration, skin elasticity and collagen content of the skin. The changes of the subject's facial skin texture and fine lines were recorded by taking pictures.



Results

Compare the composition and content of amino acids

The comparison results of amino acid composition and content between CollaGEM™-V and **human skin collagen** showed a **similarity of 97.6 % (Fig.1)**. CollaGEM™-V does not have Hydroxyproline and Hydroxylysine, which are produced by posttranslational modification in animals, whereas human skin collagen does not have tryptophan, which is the main difference that affects the similarity.

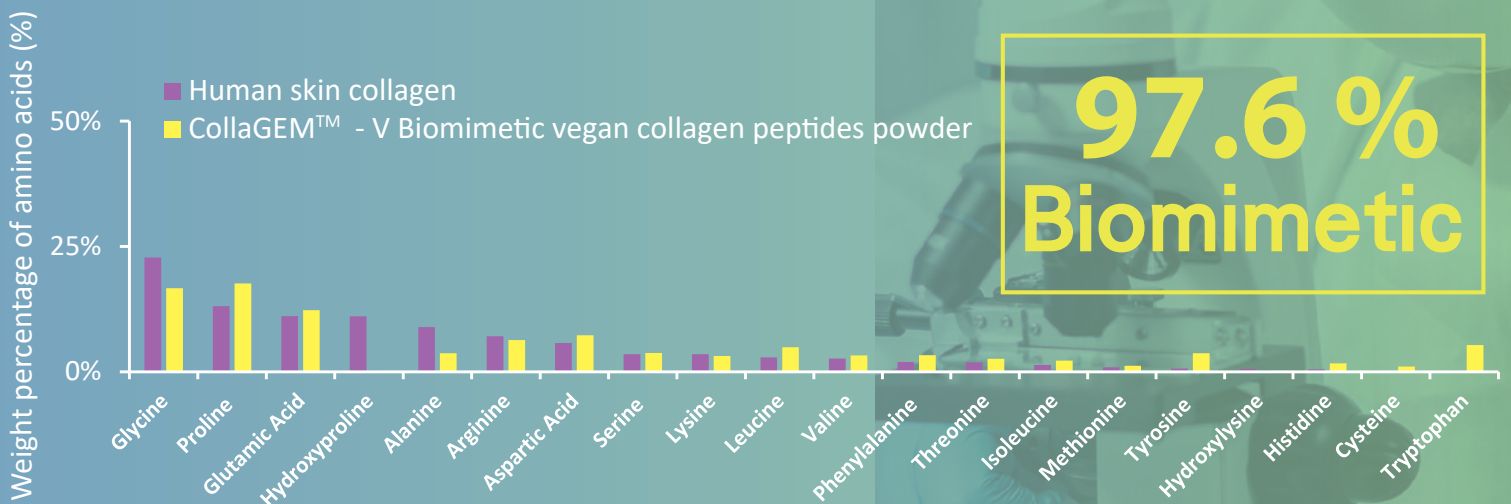


Figure 1. Comparison of Amino Acid Composition and Content of CollaGEM™-V and Human Skin Collagen



Olfactory and taste sensation

After the olfactory and taste sensation experiment of CollaGEM™-V and the other two vegan collagen materials, 100% and 93% of subjects expressed that there was no unpleasant smell from CollaGEM™-V powder and liquid, respectively (Fig.2A). In the olfactory satisfaction score of CollaGEM™-V powder and liquid, the score was 3-5 points higher than the other two vegan collagen materials. In the taste satisfaction score of CollaGEM™-V powder and liquid, the score was 3-4 points higher than the other two vegan collagen materials (Fig.2B, 2C). Among 3 vegan collagen materials, subjects agreed that CollaGEM™-V provided the best taste.

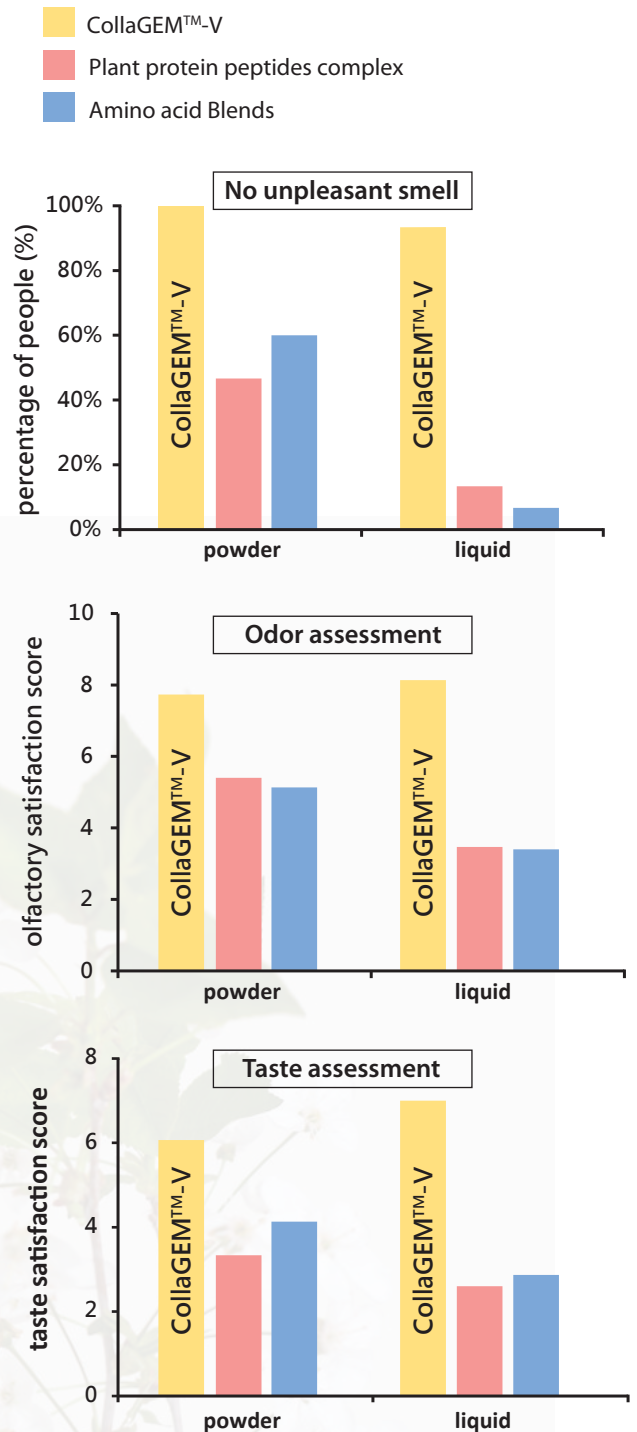
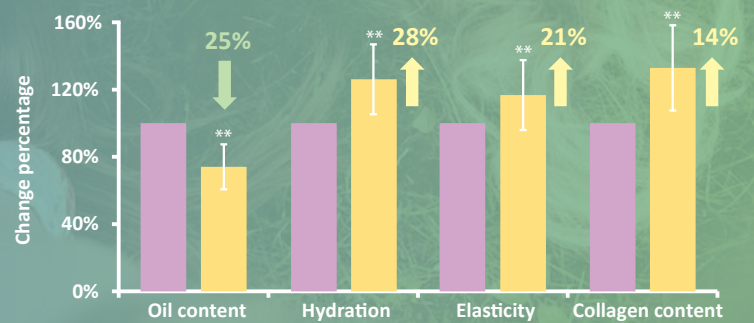
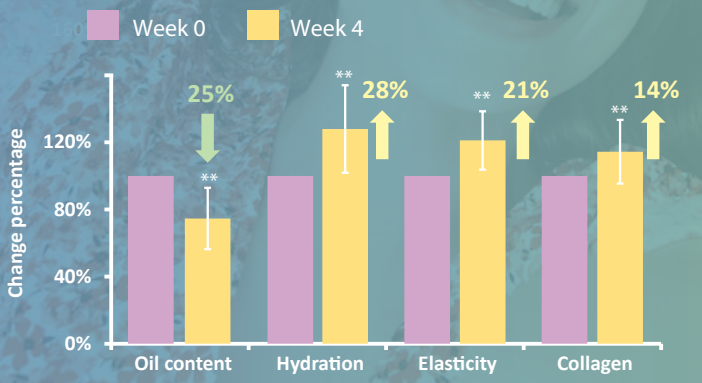


Figure 2. Perfect performance for olfactory and taste sensation in liquid of CollaGEM™-V





Changes of skin conditions

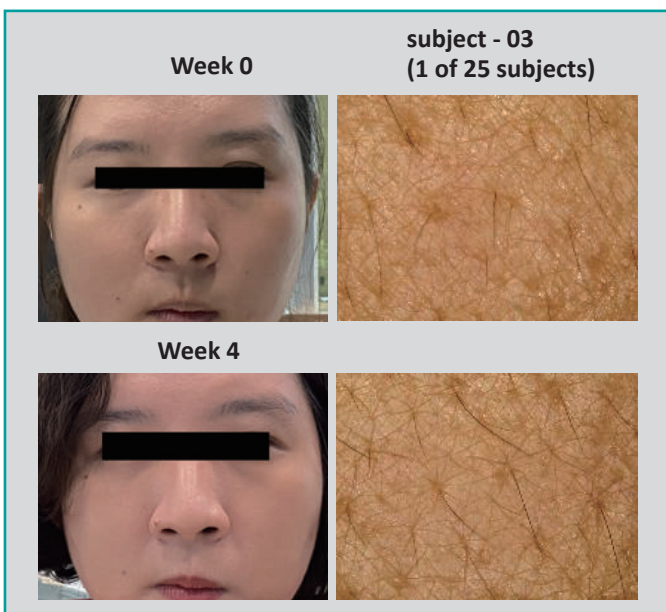
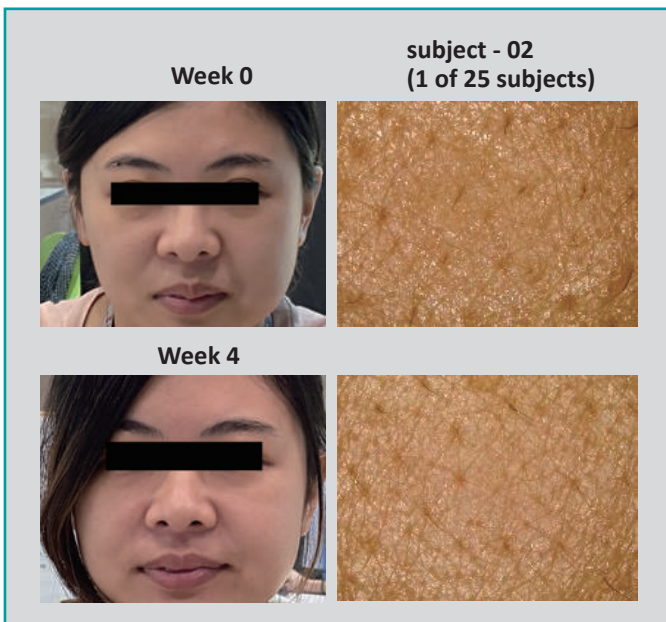
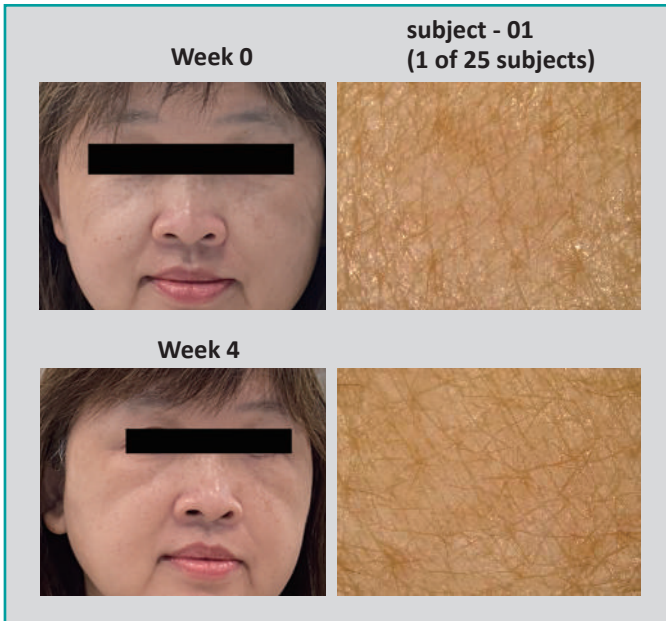
Compares with week 0, the skin conditions of the cheeks and around the eyes of the subjects in CollaGEM™-V group were improved in the 4th week of the clinical trial. Through oral clinical trial in which subjects had taken 5 grams CollaGEM™-V for 4 weeks consecutively, the results showed the oil content of the subjects' cheeks was significantly reduced by 25%, and the hydration, elasticity and collagen content were significantly increased by 28%, 21% and 14%, respectively (Fig.3A). In the around the eyes, oil content was significantly reduced by 26%, and hydration, elasticity, and collagen content were significantly increased by 26%, 17%, and 33%, respectively (Fig.3B). The clinical trial demonstrated that consuming low dosage of CollaGEM™-V daily can improve skin condition and has significant effects for skin health.

Skin smoothness and skin texture

The skin surface flatness and skin texture changes were detected by the lens of the skin measuring instrument, and the skin texture changes were recorded by visual observation before and after oral administration of CollaGEM™-V. The results of the skin surface detected by the skin detector are displayed in the simulated 3D image. The detection results showed that many uneven and sharp peaks appeared on the skin surface of the subjects' cheeks and around the eyes at week 0. After supplementing CollaGEM™-V for 4 consecutive weeks, the peaks were decreased, indicating that the surface skin became smoother (Fig.4). The subject's skin texture was measured with the skin measuring instrument. The results showed that after 4 consecutive weeks of CollaGEM™-V supplementation, the texture of the subjects' skin were improved, and reduce fine lines on the skin surface (Fig.5). The visual observation also found that the subject's skin became finer and smoother.



Figure 4. Orally administered CollaGEM™-V can improve skin smoothness in the 4th week



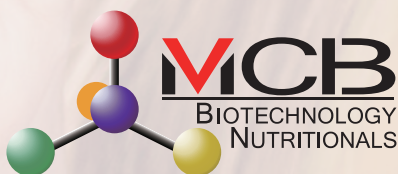
Conclusions

Providing "vegan" collagen products that vegans can supplement and assist in collagen synthesis in the body is a trend and challenge in the nutritional supplement market. CollaGEM™-V Biomimetic vegan collagen peptides is a vegan product that can substantially provide physiologically active protein peptides and conditional essential amino acids (such as glycine and proline) necessary for collagen. After analysis and comparison, its amino acid composition has as high as 97.6% similar to that of human skin collagen. The results of this study demonstrate that daily oral supplementation of 5 grams of CollaGEM™-V can help to improve skin condition. We believe it has the same ability as animal collagen peptides, and it is the "vegan solution" to provide the function of anti-aging, muscle support and joint health. CollaGEM™-V is also the most potential vegan product on the market that can solve the urgent need of vegetarians to supplement collagen.

Figure 5. Orally administered CollaGEM™-V can improve skin texture in the 4th week

References

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