



Peptan™

Hydrolyzed Collagen and Skin Health
2009 clinical studies results

RHC

Rousselot Healthy Choice

Peptan™

Comprehensive clinical studies carried out in Japan and France confirm the effect of taking Peptan™ Hydrolyzed Collagen and highlight exciting new benefits on skin health.

Background

Fine lines, wrinkles, and loss of elasticity are symptoms commonly associated with aging skin. Accumulated environmental exposure and a natural decrease in cell renewal contribute to other signs less often associated with aging: dull, rough, or dry skin.



Skin aging: progression of visible effects

Targeting these skin care concerns can dramatically improve the youthful, healthy appearance of skin. Maintaining the amount of collagen is the key to a beautiful skin. Glycine, proline, alanine and hydroxyproline are the main constituents of collagen; replenishing these constituent amino acids appears to be needed to maintain the amount of collagen at healthy levels and thus prevent skin aging.

Objectives

A growing body of research is showing how nutricosmetics can contribute to healthy skin (11). While topical creams and cosmetic products can affect skin condition from the outside, nutritional supplements taken orally can have an impact from within the skin: this is called “Beauty from Within”.

To assess the efficacy and acceptability of Peptan™, two double-blind randomized clinical studies versus placebo were carried on 80 healthy female subjects aged 35 to 59. The objective of these clinical studies was to evaluate the effect of oral intake of 10g of Peptan™ Hydrolyzed Collagen on dermophysiological measures and its tolerance.

Methodology

The latest investigative studies using state-of-the-art technology have challenged the effect of Peptan™ Hydrolyzed Collagen. Two clinical studies were carried out by global independent skin health research organizations having a well proven approach for verifying product performance claims. Mechanical measurements and volunteers were assessed by certified skin experts.

These studies were performed according to local regulations on clinical studies and approved by the local Ethical Committee. Consent was obtained from each subject before entry in the study. Prior to each measurement, the volunteers were placed, for at least 20 minutes, in a room with controlled temperature and humidity.

Study YNTKK – 2008 – 4144

Double-blind placebo-controlled trial of oral supplementation of Peptan™ Hydrolyzed Collagen in improving skin condition. The study was conducted in Tokyo (Japan) by SOUKEN on 33 women from 40 to 59 years old for 8 weeks during winter. 10g of collagen were ingested once daily in liquid form.

Study 2008 – A00654 – 51

Evaluation of the effects of an oral intake of Peptan™ Hydrolyzed Collagen on cutaneous properties versus placebo. The study was conducted in Lyon (France) by DERMSCAN on 47 women from 35 to 55 years old, for 12 weeks during winter. 10g of Peptan™ were ingested, 5g in the morning and 5g at night, powder to mix with liquid.

Moisturizing effect measuring principle

Cutaneous hydration measurements were performed with a COURAGE & KHAZAKA **Corneometer® CM 825**. This instrument determines the humidity level of the most external cutaneous layers of the stratum corneum. The principle of the Corneometer® is based on the modification of the electrical capacity of the detector. The surface of the probe head, in contact with the skin, modifies its electrical capacity according to the humidity level of the skin.

Anti-aging effect measuring principles

Polymer silicone skin prints are taken on the studied area, before and at each time of measurement, then studied using the **Skin Image Analyser® (SIA)** or **3D Roughness analyzer ASA-03R** (Asahi biomed co).

Oblique lighting (35°) brings out the relief of the replica that is then observed with a digital camera linked to a computer. A 1cm² area is studied. This produces a digitized image enabling different parameters to be obtained by analyzing shades of grey.

Cutometer® by COURAGE & KHAZAKA was used with a 2mm probe to measure the way skin reacts to the mechanical constraints. This method measures the degree of deformation and the time required for the skin to return to its original state.

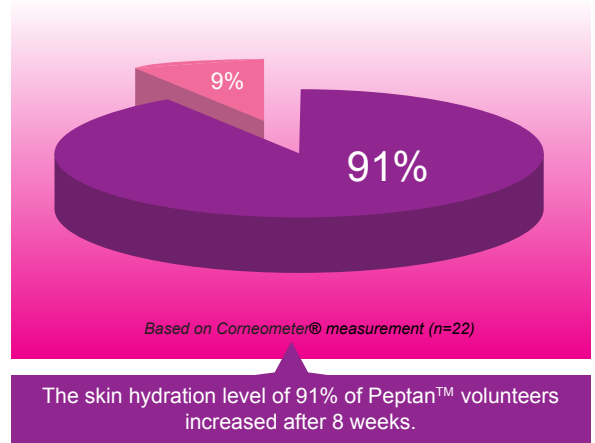
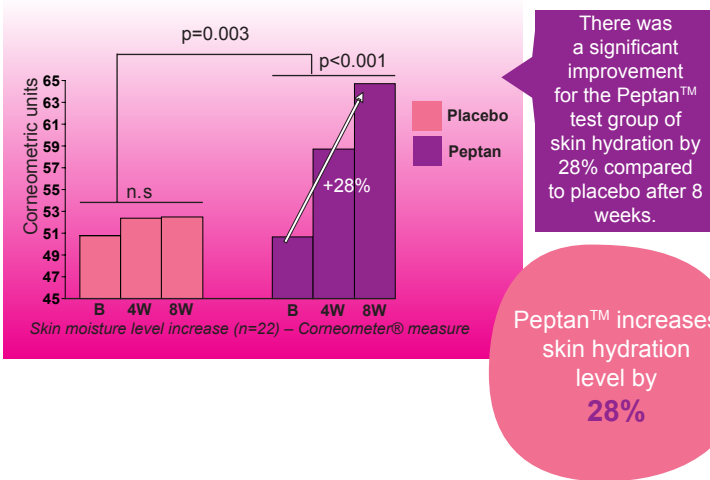
Acceptability questionnaire

The volunteers' perception of how Peptan™ performs was an integral part of the clinical study and, in addition to a daily diary record, all the women completed self-assessment questionnaires at the end of the study.

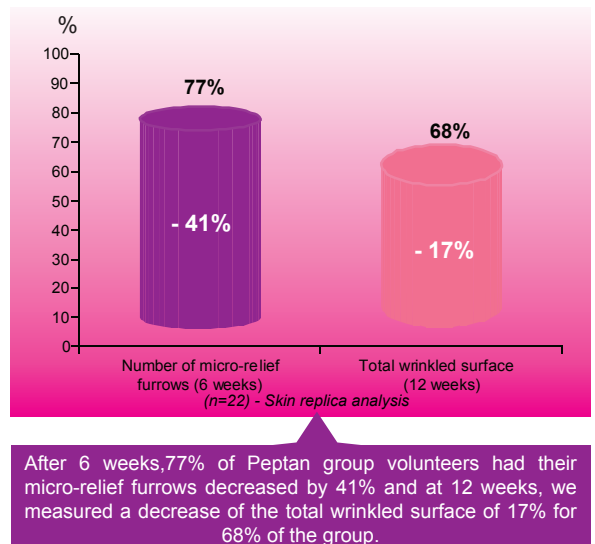
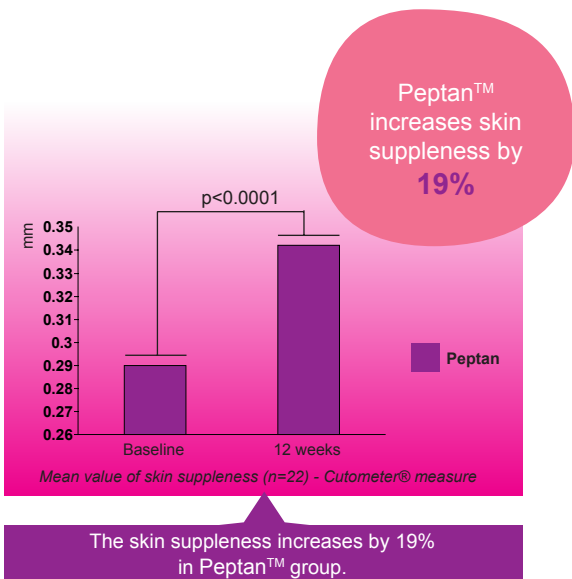
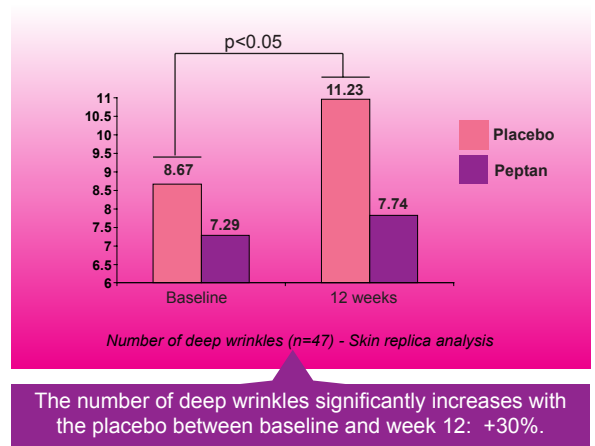
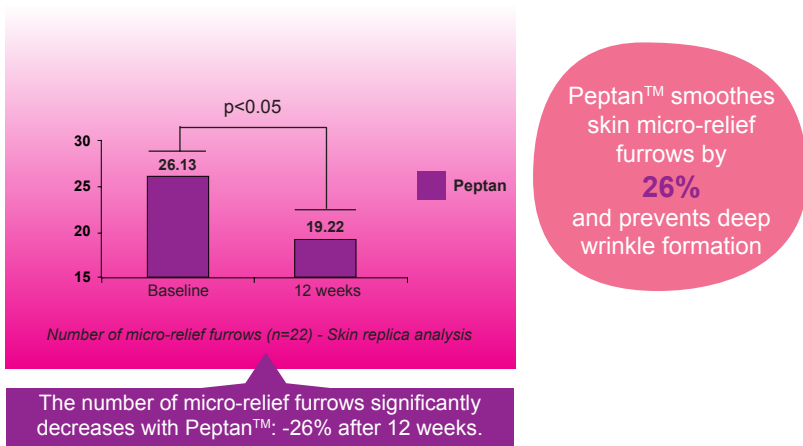
The answers provided by the volunteers on the subjective self-assessment questionnaire were used to evaluate the efficacy of Peptan™ Hydrolyzed Collagen. These subjective criteria give an accurate indication of product acceptability over time and its tolerance.

Results

Moisturizing effect (Study YNTKK – 2008 – 4144)



Anti-aging effect (Study 2008 – A00654 – 51)



Acceptability

At the end of the study, the answers provided by the volunteers on the subjective assessment questionnaire were used to evaluate the organoleptic characteristics and efficacy of the tested products. These subjective criteria give an accurate indication of products acceptability over time.

Study YNTKK - 2008 - 4144

Skin hydration, reported by volunteers, significantly increased in the Peptan™ group. 68% of women have perceived the positive effect of Peptan™ Hydrolyzed Collagen on their skin dryness. The volunteers have assessed an improvement of the perceived loss of moisture after cleansing and in the make-up application.

The positive effect of Peptan™ Hydrolyzed Collagen oral intake on daily skin care routine is here confirmed. All the results lead to the same conclusion: Peptan™ improves significantly skin dryness and associated signs.

Study 2008 - A00654 - 51

Peptan™ was perceived as being more efficient than the placebo by volunteers on:

- skin suppleness
- skin tonicity
- skin brightness

Tolerance of the product was evaluated through a clinical examination and volunteer's questionnaire. No adverse effects were reported on the Peptan™ group.

Conclusion

These two clinical studies demonstrated the benefits of Peptan™ on skin health.

Taken daily, up to 12 weeks, the results verify that regular intake of Peptan™ Hydrolyzed Collagen improves the basic skin condition and structure.

Thanks to these results and its regulatory status, Peptan™ represents a very potent ingredient for the nutricosmetic market.



Peptan™

has

clinically shown to: **Improve skin moisture level**

Improve skin smoothness
by reducing the number of
micro-relief furrows

Prevent the formation of
deep-wrinkles

Improve skin suppleness

Peptan™, a completely characterized and scientifically objectivized natural bioactive ingredient that improves epidermis moisture content and prevents skin aging.

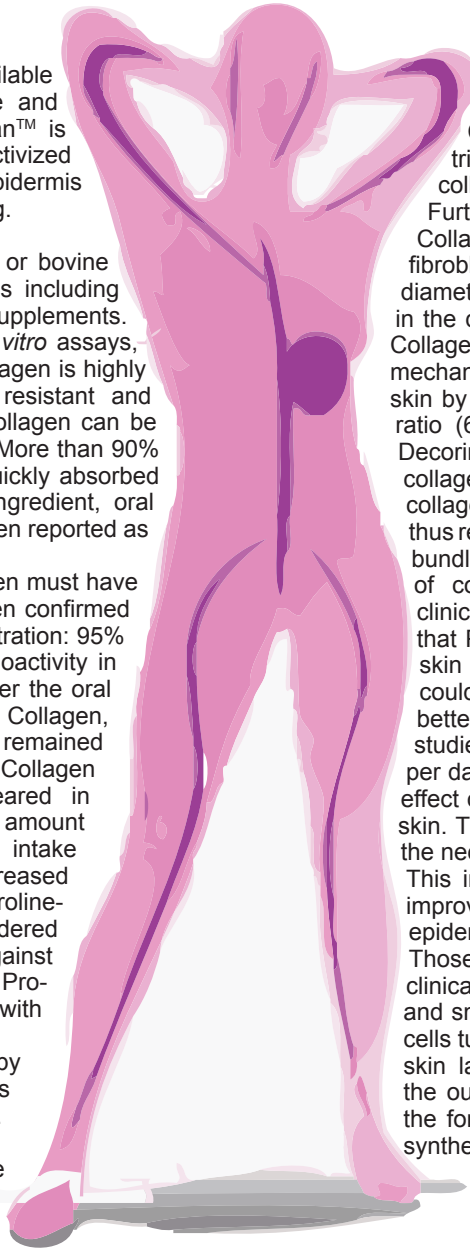
Mechanism of action

This commentary compiles the available scientific information, existing literature and Peptan™ clinical studies results. Peptan™ is a completely characterized and objectivized bioactive ingredient that improves epidermis moisture content and prevents skin aging.

Hydrolyzed Collagen from fish, porcine or bovine origin is currently used in various fields including functional food, beverages and dietary supplements. Several studies, including Rousselot *in vitro* assays, have demonstrated that Hydrolyzed Collagen is highly digestible. If native collagen is very resistant and regarded as indigestible, Hydrolyzed Collagen can be easily attacked by proteolytic enzymes. More than 90% of the hydrolysates are digested and quickly absorbed after oral ingestion (2,3). As a food ingredient, oral ingestion of Hydrolyzed Collagen has been reported as safe (1).

In order to be active, Hydrolyzed Collagen must have an excellent bioavailability. This has been confirmed in animals and human after oral administration: 95% was absorbed within the first 12h. Radioactivity in cartilage attained its peak value 12h after the oral administration of ¹⁴C labeled Hydrolyzed Collagen, and in contrasts to plasma, ¹⁴C-activity remained relatively high after 96h (3). Hydrolyzed Collagen derived hydroxyproline peptides appeared in human blood after 12h fasting. Their amount increased after Hydrolyzed Collagen intake with a peak level after 2h and then decreased to half after 4h from the ingestion. Proline-Hydroxyproline (Pro-Hyp) can be considered as one of the indigestible peptide against peptidase in human blood since 75% of Pro-Hyp remained after the *in vitro* reaction with human serum for 24h (4).

When type I collagens are digested by collagenase, the resulting peptides are chemo-attractants for fibroblasts. Chemotactic response of dermal fibroblasts of collagen derived peptide was quantified through an *in vitro* assay.



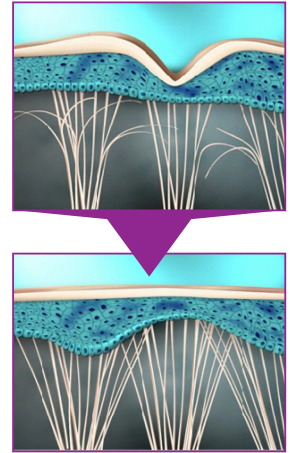
In addition, synthetic di- and tri- Hyp containing peptides were also chemotactic. Collagen peptides may act as messenger and trigger the synthesis and reorganization of new collagen fibers by stimulating fibroblast cells (5).

Furthermore, some studies show that Hydrolyzed

Collagen increases the fibroblast density and the diameter of collagen fibrils in the dermis. Hydrolyzed Collagen may improve the mechanical strength of the skin by increasing decorin ratio (6,7).

Decorin interacts with collagen and influences collagen fibrillogenesis, thus regulating excessive bundle-like aggregation of collagen. Rousselot clinical studies show that Peptan™ increases skin suppleness which could come from the better cohesion of collagen fibers. Some clinical studies have shown that the oral intake of 5 to 10g per day of Hydrolyzed Collagen may have a positive effect on human tissues containing collagen such as skin. The moisture content of forearms and backs of the necks increased significantly.

This implies that ingestion of Hydrolyzed Collagen improves the function of the outermost part of the epidermis. Skin's relief was also improved (8,9,10). Those results were perfectly in line with Rousselot clinical studies: Peptan™ improves skin's hydration and smoothness. Therefore it might boost epidermis cells turnover, speeding the water moves through the skin layer, improving the water-binding function of the outermost part of the epidermis and preventing the formation deep-wrinkles by stimulating collagen synthesis.



References

1. Wu, J., Fujioka, M., Sugimoto, K., Mu, G. and Ishimi, Y. 2004. Assessment of effectiveness of oral administration of collagen peptide on bone metabolism in growing and mature rats. *Journal of bone and mineral metabolism*, 22:47-553.
2. Asghar, A and Henrickson, R.L. 1982. Chemical, biochemical, functional characteristics of collagen in food system. *Advances in food research*, 28 :231-372.
3. Oesser, S., Adam, M., Babel, W. and Seifert, J. 1999. Oral administration of ¹⁴C labeled gelatinhydrolysate leads to an accumulation of radioactivity in cartilage of mice (C57/BL). *Journal of nutrition*, 129:1891-1895.
4. Iwai, K., Hasegawa, T., Taguchi, Y., Morimatsu, F., Sato, K., Nakamura, Y., Higashi, A., Kido, Y., Nakabo, Y. and Ohtsuki, K. 2005. Identification of food-derived collagen peptides in human blood after oral ingestion of gelatin hydrolysates. *Journal of agricultural and food chemistry*, 53: 6531-6536.
5. Postlethwaite, A.E., Seyer, J.M., and Kang, A.H. 1978. Chemotactic attraction of human fibroblasts to type I, II, and III collagens and collagen-derived peptides. *Proceedings of the National Academy of Sciences of the United States of America*. 75(2): 871-875.
6. Minaguchi, J., Koyama, Y-I., Meguri, N., Hosaka, Y., Ueda, H., Kusubata, M., Hirota, A., Irie, S., Mafune, N. and Takehana, K. 2005. Effects of ingestion of collagen peptide on collagen fibrils and glycosaminoglycans in Achilles tendon. *Journal of nutritional science and vitaminology* 51:169-174.
7. Matsuda, N., Koyama, Y-I., Hosaka, Y., Ueda, H., Watanabe, T., Araya, S., Irie, S. and Takehana, K. 2006. Effects of ingestion of collagen peptide on collagen fibrils and glycosaminoglycans in the dermis. *Journal of nutritional science and vitaminology*. 52: 211-215.
8. Matsumoto, H., Ohara, H., Ito, K., Nakamura, Y. and Takahashi, S. 2006. Clinical effects of fish type I collagen hydrolysate on skin properties. *ITE Letters on batteries, new technologies and medicine*, 7(4):386-390.
9. Sumida, E., Hirota, A., Kuwaba, K., Kusubata, M., Koyama, Y., Araya, T. Irie, S. and Kasugai, S. 2004. The effect of oral ingestion of collagen peptide on skin hydration and biochemical data of blood. *Journal of nutritional food*, 7(3): 45-52.
10. Morganti, P., Randazzo, S.D. and Bruno, C. 1988. Oral treatment of skin dryness. *Cosmetics and Toiletries*, 103: 77-80.
11. Cosgrove, M.C., Franco, O.H., Granger, S.P., Murray, P.G. and Mayes, A.E. 2007. Dietary nutrient intakes and skin-aging appearance among middle-aged American women. *The American journal of clinical nutrition*, 86: 1225-1231.

VION

Rousselot is part of VION N.V.,

an international food company

with production and sales facilities

on all continents. With two international

divisions, VION Food and VION Ingredients

the company is active

in the field of high quality foodstuffs

and health products for humans and animals.

Rousselot is part of the Ingredients division.

VION has annual sales of EUR 9.6 billion

and provides employment

for 31,000 people worldwide.

VION's head office is in Son,

The Netherlands.

www.vionfood.com

Rousselot Headquarters:
Kanaaldijk Noord 20-21
5691 NM SON
The Netherlands

rhc@rousselot.com
www.rousselot.com
www.rousselot-rhc.com

OUR SALES OFFICES AROUND THE WORLD

For France, Southern Europe, Middle-East, Africa

Rousselot S.A.S.
6, rue Jean Jaurès
92807 Puteaux Cedex
France
Phone: +33 (0)1 46 67 87 00
Fax: +33 (0)1 46 67 87 01

For Northern, Central and Eastern Europe, U.K. and Ireland

Rousselot N.V.
Meulestedekaai 81
9000 Gent
Belgium
Phone: +32 (0)9 255 18 60
Fax: +32 (0)9 255 18 61

For Spain and Portugal

Rousselot Gelatin S.L.
Paratge Pont de Torrent, S/N
17464 Cervia de Ter
(Girona)
Spain
Phone: +34 972 49 67 00
Fax: +34 972 49 62 79

For South America and Central America

Rousselot Gelatinas Do Brasil S.A.
Rua Santo Agostinho, N° 280
Distrito de Arcadas
CEP 13908-080
Amparo - São Paulo - Brasil
Teléfono: + 55 (19) 3907 9000
Fax: + 55 (19) 3907 9010

Rousselot Argentina S.A.
Avenida Gobernador Vergara 2532
1688 Villa Tesei - Hurlingham
(Provincia de Buenos Aires)
Argentina
Teléfono: + 54 11 44 89 81 00
Fax: + 54 11 44 89 81 01

For North America and Mexico

Rousselot Inc.
1231 South Rochester Street
Suite 250
Mukwonago, WI 53149
USA
Phone: +1 (888) 455 3556
Fax: +1 (262) 363 2789

For China

Rousselot China
25/A, No. 18 North Cao Xi Road
Shanghai - PO: 200030
China
Phone: +86 21 6427 7337
Fax: +86 21 6427 7336

For Japan

Rousselot Japan K.K.
Teikokushoin Bldg.
3-29 Kandajinbochou
Chiyoda-Ku
Tokyo - Zip 101-0051
Japan
Phone: +81 3 3239 2800
Fax: +81 3 3239 2801

For South East Asia, Taiwan, Hong Kong, Australia, New Zealand, India, Malaysia and Sri Lanka

Rousselot (M) SDN. BHD.
Block P3-21, Plaza Damas
Jalan Sri Hartamas 1
50480 Kuala Lumpur
Malaysia
Phone: +603 6201 8282
Fax: +603 6201 8787

