

Improvement of aged skin in Chinese subjects with a cream containing five peptides

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Introduction:

Peptides as cosmetic ingredients are comprised of short amino acid chains. They are able to penetrate the upper layer of the skin and act as dispatchers capable of triggering specific functions, such as collagen support so that skin can be firmer, thicker, and more elastic[1-3]. Skin wrinkles are caused by hyperkinesia of skin muscles, and also appear because of the degeneration of extracellular matrix proteins, such as collagen. Depending on the mechanism of action, topical peptides can be classified as signal peptides, carrier peptides, neurotransmitter inhibitor peptides, and enzyme inhibitor peptides[4-7]. As a milder alternative anti-wrinkle ingredient to retinol, peptides have the advantage of high efficacy without the irritant side effects.

Currently, some peptides are developed and utilized in cosmetic products, including natural peptides and synthetic peptides, but little in vivo efficacy of the peptides containing product was reported, especially in the Chinese population[8-10]. A multi-ingredient peptide-based treatment cream has been designed to target the signs of facial aging due to expression lines and photo-damaged skin. Effective ingredients are five different peptides, including acetyl hexapeptide-1, palmitoyl tripeptide-5, hexapeptide-9, acetyl tetrapeptide-9, and acetyl tetrapeptide-11. Acetyl hexapeptide-1, a new neurotransmitter inhibitor peptide, can identify the optimum amino acid sequence to target presynaptic muscle contraction processes, for a Botox-like activity. Four signal peptides can trigger a signaling cascade and stimulate collagen, elastin, proteoglycan, glycosaminoglycan, and fibronectin production, resulting in skin rejuvenation.

Systematic studies were conducted to verify the anti-aging efficacy of the peptide-containing cream. An ex vivo study was performed on human skin explants via topical surface application. A clinical trial was conducted on 31 healthy Chinese females with visible facial wrinkles with a period application of 8 weeks.

Materials & Methods:

Ex vivo collagen synthesis in human skin tissue

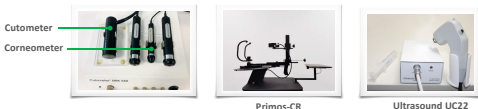
Human skin tissue from a plastic surgery institution has been utilized in this ex vivo study. The level of collagen fibers of the ex-vivo skin tissue was assessed by Mason staining. The expression of type I, III, IV, and XVII collagen of the ex-vivo skin tissue was assessed by immunostaining. After staining, the slices were photomicrographed and then the level of collagen was analyzed through Image-Pro Plus.

In vivo research

A randomized, double-blind clinical research was carried out from November 2020 to January 2021 in SGS Testing Center Cosmetics. Before clinical research, the cream had applied a 24-h occlusive patch test and proved no adverse effects.

Thirty-one healthy Chinese females aged 33-60 (average age 50 ± 5.9 years) with dry skin and conspicuous cheek lines, nasolabial folds, and forehead wrinkles were screened and enrolled by experienced technicians in the 8 weeks clinical study. Subjects were instructed to apply the cream twice daily, in the morning and at night. The usual sunscreen must be cooperatively applied in the daytime.

Skin aging parameters were measured at 0, 4, and 8 weeks by the following biophysical techniques and skin image analyses: Corneometer, Cutometer, Ultrascan UC22, and Primos-CR. Meanwhile, Subject self-assessments were conducted via questionnaire using a five-point scale (change from baseline).



Statistical analysis

Data were reported as Mean ± Standard Error of Media(SEM). All statistical analyses were carried out by SPSS. Statistical significance was performed by paired Student's t-test. Results were considered significantly different when P < 0.05 (*P < 0.05, **P < 0.01, ***P < 0.001). Improvement degree of each parameter was expressed change of percent, which was defined as: Improvement (%) of week 4/8 = [(After treatment value(week4 or week8) - baseline value) / baseline value].

Results & Discussion:

Ex vivo collagen synthesis in human skin tissue

Table1 Collagen I, collagen III, collagen IV, collagen XVII and collagen fiber expression in the ex-vivo skin tissue.

		IOD/Area	SD	Improvement(%) compared with NC	P-value
Collagen Fiber	BC	1.000	0.04	/	/
	NC	0.340	0.05	/	/
Collagen I	TC	1.140	0.17	235%	0.003 **
	NC	1.000	0.03	/	/
Collagen III	TC	0.691	0.10	/	/
	NC	1.385	0.19	100%	0.006 **
Collagen IV	TC	0.100	0.13	/	/
	NC	0.832	0.08	/	/
Collagen XVII	TC	0.770	0.03	22%	0.045 *
	NC	1.000	0.03	/	/
Collagen fiber	TC	0.630	0.06	/	/
	NC	0.960	0.04	52%	0.001 **
Collagen fiber	TC	1.000	0.14	/	/
	NC	0.897	0.02	/	/
Collagen fiber	TC	0.225	0.04	130%	0.007 **
	NC	0.897	0.02	/	/

In vivo research



Figure1 Instrumental measurement data and subject self-assessment response after the application of the peptides-containing cream. Improvement(%) are also presented in instrumental measurement results.

All 31 subjects completed the study and no irritation occurred during the study. Most importantly, the test peptides cream achieved overall anti-aging efficacy within 8-week treatments by instrumental measurement and subject self-assessment (Figure 1). The cheek lines, nasolabial folds, and forehead wrinkles experienced significant reduction to varying degrees at early 4 weeks. Further improvements in wrinkles were observed at 8 weeks, indicating that the peptide-based cream benefits the entire facial wrinkles. At 8 weeks, the dermal density and thickness were significantly increased. An increase in skin smoothness (90%), firmness (87%), elasticity (81%), and hydration (81%) was reported by subjects. In conclusion, the peptides cream was highly rated on performance and well-accepted on tolerance by subjects throughout the study.

Conclusions:

This cream consisting of acetyl hexapeptide-1, palmitoyl tripeptide-5, hexapeptide-9, tetrapeptide-9, and tetrapeptide-11 is effective as a mild topical anti-aging formula. In vivo results revealed obvious improvement in the appearance of smoothness, elasticity, cheek lines, nasolabial folds, and forehead wrinkles during this single-center study in 31 women with visible wrinkles. Ex vivo study indicated that the peptide-based cream had a significant repair effect on the decreased collagen density caused by UV irradiation, and on the increased expression of collagen fibers (collagen I & collagen III) in the dermis, and collagen IV and XVII in dermal-epidermal junction structure. Collagen content increasing ex vivo and the dermal density and thickness increasing in vivo mutually confirmed its anti-aging mechanism of preventing collagen breakdown and boosting collagen synthesis. Also, the peptides cream was highly rated on performance and well-accepted on tolerance by subjects throughout the study. For those with mild anti-aging and global rejuvenation needs, this cream provides a good cosmetic ingredients solution.

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