

The anti-acne and anti-ageing activity of a new hexapeptide in complex with zinc and its comparison to retinol



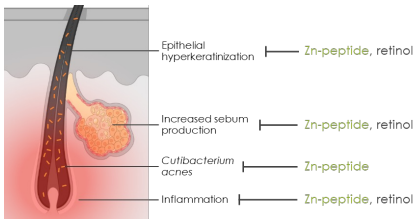
Iva Dolečková¹, Paulina Orzola¹, Kateřina Vašíčková¹, Sergej Karel¹, Ludmila Petrovičová¹, Gloria Huerta-Angeles¹, Vladimír Velebný¹

Poster ID: 416

¹Contipro a.s., Dolní Dobruč 401, 561 02 Dolní Dobruč, Czech Republic

Introduction:

Acne vulgaris is among the most common skin diseases worldwide. Its pathogenesis is characterized by four core events: hyperseborrhoea, epithelial hyperkeratinization, *Cutibacterium acnes* colonization and inflammation. Due to the multifactorial nature of the disease, a combination therapy or use of multifunctional compounds are the preferred approaches. Retinoids are among the most effective compounds targeting multiple acne-associated pathways. However, they often cause negative adverse effects including skin dryness and irritation. Therefore, there is still a need for more effective and safer alternatives. In this study, we evaluated a new hexapeptide in complex with zinc (Zn-peptide) for its ability to inhibit the key acne-related processes *in vitro* and to improve the appearance of the acne-prone skin *in vivo*. The effects were compared to its individual components and retinol as a representative retinoid.



Conclusion:

Zn-peptide proved to be a new, multifunctional cosmetic active compound targeting the key processes involved in acne pathogenesis. It improved appearance of the acne-prone skin and showed an anti-ageing effect as well. Its activity was better than that of its individual components and retinol. Importantly, Zn-peptide did not show any irritation potential in contrast to retinol which irritated the skin and impaired skin barrier function.

Materials & Methods:

The hexapeptide was prepared by solid phase peptide synthesis and zinc sulfate was used for the preparation of the Zn-peptide complex. HaCaT keratinocytes were treated with the corresponding concentrations of Zn-peptide: hexapeptide and ZnSO₄·7H₂O (Zn); and 10 μM retinol for 72 h. For induction of the pro-inflammatory interleukins, the cells were irradiated with 10 mJ·cm⁻² UVB and treated as described above for 24 h. Expression of the selected genes was determined by qRT-PCR. The antimicrobial activity was determined by OD₅₅₀ measurement of *C. acnes* suspension culture treated with the corresponding concentrations of Zn-peptide, hexapeptide and Zn of corresponding concentrations for 72 h. Then, we performed a double-blind, placebo-controlled, split-face *in vivo* study on Caucasian volunteers with acne-prone skin. 30 volunteers (27 women/3 men, 18-48 years) applied emulsion with 13.5 μg/mL Zn-peptide and placebo emulsion; and 10 volunteers (9 women/1 man, 24-49 years) applied emulsion with 0.2% retinol and placebo emulsion once daily in the evening for 6 weeks. The number of inflammatory acne lesions, number of skin pores and skin redness was determined by VisiaCR. Sebum was determined by a sebumeter, TEWL (transepidermal water loss) by a tewameter, and wrinkle depth by Primos 3D camera.

In Vitro Results & Discussion:

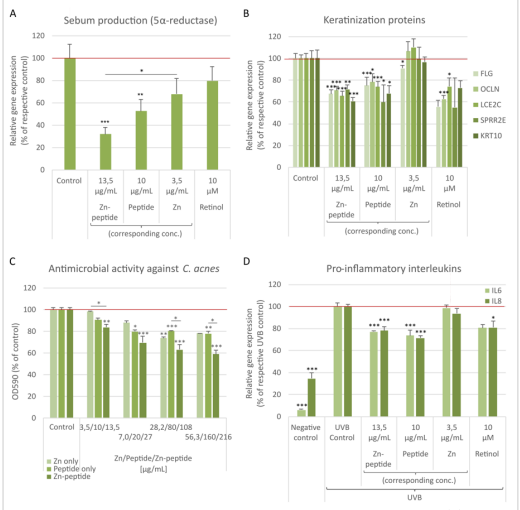


Figure 1. Zn-peptide inhibited all four key events in acne pathogenesis: (A) sebum production represented by inhibition of 5α-reductase, a key enzyme in androgen-driven lipogenesis, (B) hyperkeratinization (representative keratinization proteins), (C) *Cutibacterium acnes* overgrowth, (D) inflammation (pro-inflammatory interleukins IL6, IL8). When compared to retinol, its effect was similar or even better. The peptide alone was effective in all these experiments and the presence of Zn in the Zn-peptide complex enhanced its effect on 5α-reductase and the antimicrobial activity.

In Vivo Results & Discussion:

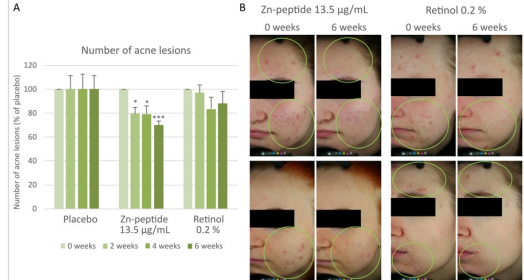


Figure 2. Zn-peptide reduced the number of acne lesions (A) and improved the overall appearance of the acne-prone skin (B) slightly better than retinol.

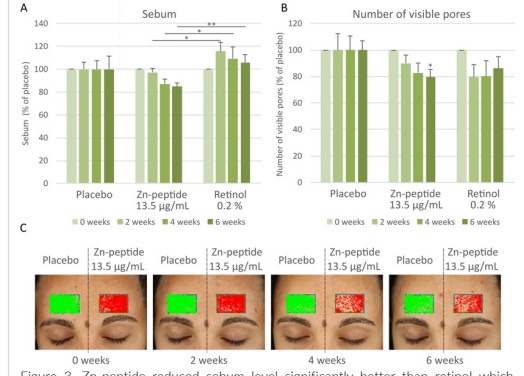


Figure 3. Zn-peptide reduced sebum level significantly better than retinol which increased skin oiliness at the beginning of the treatment and even in further timepoints, the sebum level was never lower than placebo (A). Zn-peptide also decreased the number of visible skin pores similarly to retinol; quantification (B), representative images (C).

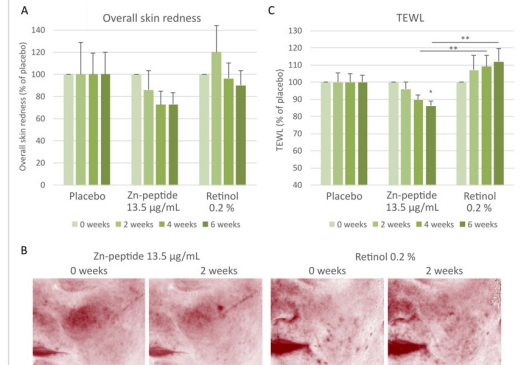


Figure 4. The effect of Zn-peptide and retinol on the overall skin redness: quantification (A), representative images (B); and TEWL (C). Zn-peptide calmed the skin as shown by decreased skin redness and reinforced skin barrier function by lowering TEWL. Retinol, on the other hand, increased skin redness after two weeks of treatment which suggests skin irritation. Retinol also gradually increased TEWL associated with the skin barrier impairment. These results confirm a well-documented skin irritation potential of retinol which hinders its use by many people especially those with sensitive skin.

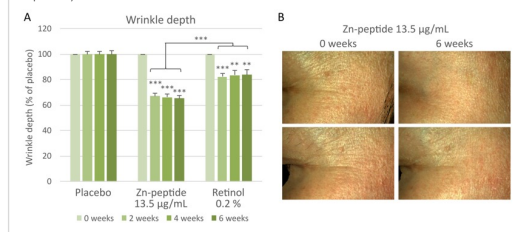


Figure 5. Zn-peptide reduced wrinkles more effectively than retinol; quantification of crow's feet wrinkle depth (A), representative images (B).