

## **MALDI -TOF evidence of GDP20 antibacterial activity against Cutibacterium acnes**

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**Objective.** To evaluate the anti-C.acnes activity of twice-daily GDP (granulysin-derived peptide) 20 .

**Material and methods.** The pilot study included 12 subjects. Determining the colonization of C.acne with help of MALDI-TOF (matrix-assisted laser desorption/ionization Time Of Flight) method. In the acne treatment patients were using the GDP-20 as monotherapy daily for 2 weeks.

**Results.** Topical GDP-20 therapy contributed to rapid dynamics of colonization of C. acnes. All subjects with mild to moderate severity of acne was marked by clinical remission. 41.7% subjects having excellent results, 33.3% with good results, 25% with fair results. No serious adverse effects occurred.

**Conclusion.** The application of topical agents GDP20 in this pilot study appeared to demonstrate a remarkable effect on the improvement of acne.

**Keywords:** antimicrobial peptide; acne vulgaris; cutibacterium acnes; GDP-20; MALDI TOF

### **Background**

Acne vulgaris(AV) is the eighth most prevalent disease worldwide [1] and affects pilosebaceous units with the multifactorial pathogenesis. It's typically begins in adolescence when androgen hormones stimulate the production of sebum and proliferation of follicular epidermis[2]. In consequence, comedones is further colonized by Cutibacterium acnes (C. acnes) which promote inflamed acne lesions characterized by papules and pustules.

By affecting the visible areas of the skin lesions, acne with negatively affect psychosocial distress, occupational consequences and potential psychiatric disturbances like anxiety states and depression, which leads to a significant decrease the quality of life [3].

Although the pathogenesis of acne remains uncertain, C.acnes is considered to plays an essential role in acne vulgaris. C.acnes is the relatively slow-growing, aerotolerant anaerobic, gram-positive bacteria that is the main inhabitants of the hairline and is closely associated with the development of acne [4]. Although they are also found on the surface of healthy skin. C. acnes as the dominant flora in the sebaceous glands of hair follicles in acne patients, accounting for up to 90% of all detected microbiota[5].

Antibiotics are considered first-line therapy in the management of moderate to severe acne[6]. Topical and oral antibiotics play an important role, providing anti-inflammatory effects, in addition to antibacterial actions. However, currently available agents may be associated with adverse effects, their prolonged usage potentially leading to antibiotic resistance, which may occur in *C. acnes*, and limit the efficacy of antibiotics for the treatment of AV. These limitations demonstrate a need for antibacterial agents for acne with improved safety profiles and a targeted, well-tolerated.

An antimicrobial peptide(AMP) called GDP20 (granulysin-derived peptide) is novel, topical agents has anti-inflammatory properties and the highest antimicrobial activity against *C. acnes* among other granulysin-derived peptides (1000 times higher than GDP 04) [7]. It may destroy tumor cells and induce apoptosis. At a concentration of 0.6-57  $\mu\text{M}$ , GDP-20 also has a bactericidal effect against many Gram-positive (*S. aureus*, *S. mutans*), Gram-negative (*E. coli*) and acid-fast bacteria, as well as fungi[8].

### **Objective**

To evaluate the anti-*C.acnes* activity of twice-daily topical antimicrobial peptides GDP-20 a novel, broad-spectrum antimicrobial peptide, in mild to moderate acne.

### **Material and methods**

Twelve subjects with mild to moderate acne were enrolled into this pilot study. All subjects were under dermatologic care and were maintained on their acne agents throughout the study. To identify bacteria was taken swabs from each patient untreated cheek skin lesions, then the patient applied the topical agents containing GDP-20 (lotion or gel) to the skin of the face, mainly of the cheeks. Patients applied to the bacteriological analysis by method of MALDI-TOF mass spectrometry at two weeks intervals. The results were documented at baseline and after visits and simultaneously assessed the dynamics of the clinical manifestations and *C. acnes* growth.

### **Results**

At the end of the therapeutic study, the number of skin lesions and *C. acnes* growth of all patients and compared the result with the before indicators. According to the MALDI-TOF data, in 5 of 12 patients, the initial colonization of *C. acnes* was especially pronounced, therefore it was in them that the contamination was assessed after two weeks of treatment of the facial skin with GDP20. The results of this comparative analysis, expressed in CFU / cm<sup>2</sup>, are presented in Fig. 1.

A clinical assessment of the dynamics of the severity of acne manifestations showed that in 41.7% (5/12) subjects having excellent results, 33.3% (4/12) with good results, 25% (3/12) with fair results. The results of this pilot study convincingly demonstrate the pronounced antimicrobial activity of GDP20 against *C. acnes*, leading to a 5-10-fold decrease in the number of CFU / cm<sup>2</sup>.

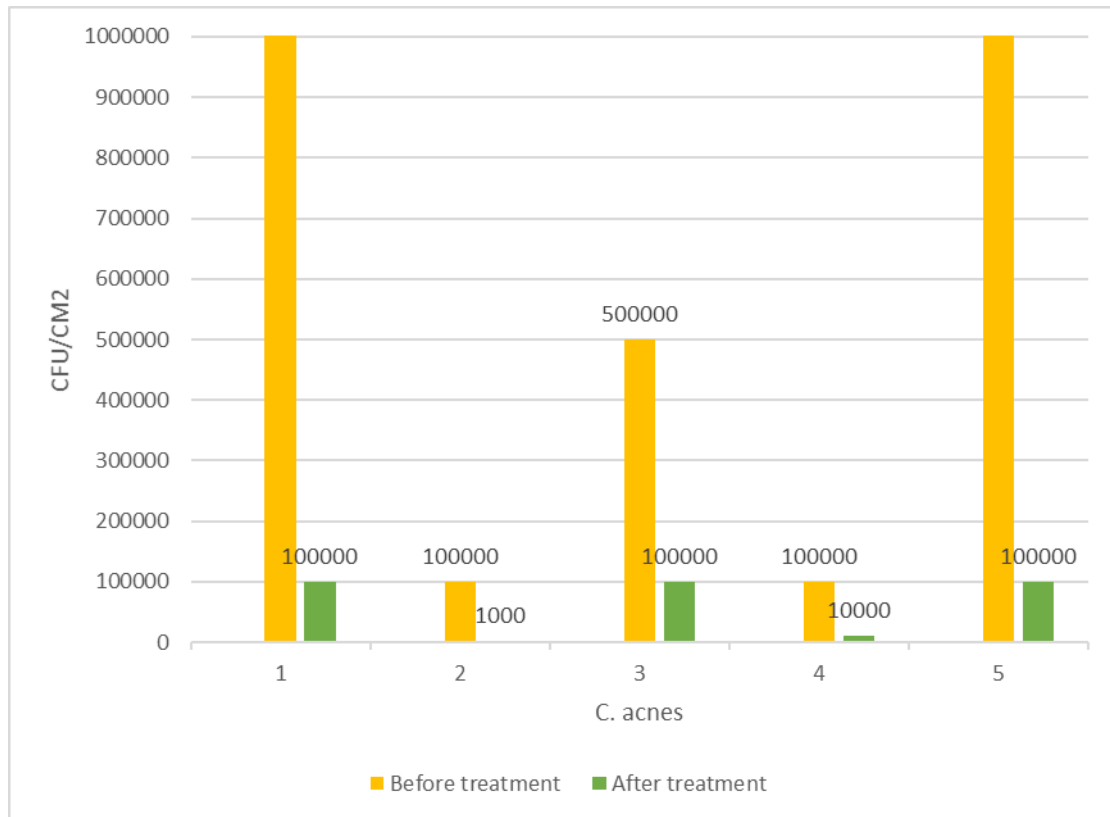


Fig 1. Comparison of the colonization of C.acne before and after treatment of Acne patients

### Discussion

Currently, there are various oral and topical antibiotic agents such as doxycycline, minocyclin and clindamycin are effectively utilized in the treatment of acne. However, associated with formation of resistance in C.acnes and other bacteria, with clinical consequences including increased skin dryness, scaling and photosensitivity limit their widespread and long-term use[9]. Therefore, increasing trend for the use of alternative treatments for acne is observed.

### Conclusions

The application of topical agents GDP20 in this pilot study appeared to demonstrate a reduction in C.acnes growth and remarkable effect on acne manifestation. It should be noted that the treatment of acne should not be limited to the use of standard treatment methods. These results topical GDP 20 has achieved significant clinical effects, indicate the possibility to use GDP20 as a new substitute for widespectrum antibiotics due to antibiotic resistance.

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