Engineering of a Conjugated Endolysin as an Efficient Method for Acne Treatment

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Acne vulgaris is a common inflammatory disorder of the pilosebaceous unit with both physical and psychological ramifications. It is widely accepted that both Propionibacterium acnes and Staphylococcus epidermidis are involved in the aetiology of acne; however, recent evidence suggests that pro-inflammatory cytokines are also heavily involved in all stages of lesion development (Tanghetti, 2013). Many of the most common treatments are ineffective or have negative side effects. In this research, both the properties of endolysins and antimicrobial peptides were exploited by engineering a conjugated endolysin. This was done in hopes of creating an efficient treatment for acnes vulgaris in relation to conventional antibiotics. In the first stage of research, homology modeling and comparative sequence analysis was done in order to determine possible conjugation targets. It was determined that the many amino groups on the outside of the endolysin would be optimal targets for conjugation. The P. acnes endolysin was then conjugated to a modified peptide using 3-Maleimidobenzoic acid N-hydroxysuccinimide ester (MBS). The conjugated endolysin was tested for and displayed antibacterial properties against both P. acnes and S. epidermidis. Anti-inflammatory properties were also observed of the conjugated endolysin; the conjugated endolysin was able to inhibit the production of IL-1 beta in human keratinocytes. There was little to no P. acnes resistance to the conjugated endolysin observed. The conjugated endolysin shows promise as a better treatment for acne vulgaris than conventional antibiotics.

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