Exploring the Potential of Enzymes to Combat Acne

Acne vulgaris, commonly known as acne, affects up to 85% of adolescents and young adults, significantly impacting their quality of life. The condition arises from various factors, including genetics, environmental influences, or physical and psychological imbalances. The skin hosts several beneficial bacteria, including Cutibacterium acnes, which can cause acne when it grows excessively.

Acne development begins in the pores, where oil production creates an ideal environment for C. acnes. Breakouts occur due to overproduction of oil and abnormal shedding of skin cells, leading to clogged pores. This results in the overgrowth of C. acnes, causing inflammation and acne lesions. Within the pores the bacteria forms biofilms as illustrated in Figure 1 – protective clusters composed of proteins, carbohydrates, and DNA – that enhance bacterial resistant to treatments.

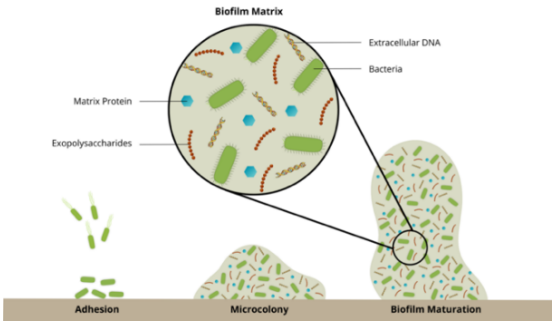

Figure 1. Formation and composition of a general biofilm.

Traditional treatments, such as antibiotics and retinoids, often come with side effects and can contribute to antibiotic resistance, highlighting the need for alternative treatments. This study explores the use of enzymes to break down these biofilms. Enzymes such as proteases and nucleases can break down the components of the biofilm matrix, making bacteria more susceptible to treatment, while lysozymes can directly kill the bacteria. This enzymatic approach promises a milder and more effective acne treatment.

The research focuses on identifying which enzymes are most effective against C. acnes and its biofilm, using two staining methods called Crystal Violet and Resazurin assay. Several modifications were made to optimize conditions for consistent biofilm formation before enzyme treatment. It is crucial to create a biofilm model that accurately reflects the one found on the skin.

Enzymatic treatments show promise in combating acne, but continued research is essential to establish the most effective enzymes and their optimal concentrations