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Hyaluronidase Involvement in *Streptococcus pneumoniae* Biofilm Activity

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Abstract

Streptococcus pneumoniae causes numerous severe infections and results in a significant number of mortality cases due to various virulence factors, including its ability to form a biofilm. The antimicrobial resistance and the challenges the host immune system faces in combating the biofilm make treatment against *S. pneumoniae* increasingly difficult. Consequently, investigations into pneumococcal biofilm are of paramount importance. The formation and enhancement of pneumococcal biofilm have been found to be influenced by various molecules, including hyaluronic acid. The degradation of hyaluronic acid by its specific enzyme, hyaluronidase, is believed to amplify the pathogenicity of pneumococci through increased colonisation. To delve deeper, the roles of hyaluronidase and hyaluronic acid in pneumococcal biofilm formation were investigated. The wild-type and Δ hyl *S. pneumoniae* strains were cultivated in Brain Heart Infusion (BHI) media, both with and without the addition of hyaluronic acid, for six days. The formation of the biofilm at each incubation interval was identified using a crystal-violet (CV) microplate biofilm screening assay. These readings were analysed using the non-parametric Mann-Whitney test. The Δ hyl mutant strain generally exhibited lower biofilm production during the initial four days but significantly surpassed the wild-type strain on days 5 and 6. No notable differences in biofilm measurements were observed between the two strains when cultured in media enriched with hyaluronic acid. Hyaluronidase appears to play a role in the biofilm cycle of *S. pneumoniae*, whereas additional hyaluronic acid in the culture medium seems to have no marked impact on biofilm activities. Further research is necessary to gain a clearer understanding of hyaluronidase's function in *S. pneumoniae* biofilm activities. © (2024), (Akademi Sains Malaysia). All rights reserved.

Author Keywords

biofilm; hyaluronic acid; hyaluronidase; *Streptococcus pneumoniae*

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