Autoinducing Peptide Mimetics: An Advanced Method to Inhibit Quorum Sensing in Staphylococcus aureus

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Staphylococcus aureus is currently a predominant issue in the medical community. This bacterium has been shown to adapt to the antibiotics which are presented to it, causing scientists to struggle in the search of an effective and permanent method to prevent fatalities. Quorum sensing has been shown to play a vital role in S. aureus's lethal ability, controlling a series of encoded functions—like the production of α and δ hemolysins—through the release and bondage of autoinducing peptides (AIP). Taking an innovative approach to inhibit quorum sensing in S. aureus, AIP-I was cleaved within its thiolactone ring between phenylalanine and isoleucine, creating a mimetic peptide in which has never been tested before. This "decoy" peptide was then added to cultures of CA-MRSA USA300 LAC (AIP-I) as well as ATCC 25923 (AIP-III), with monitoring of their hemolytic activity. It was observed that the cleaved AIP-I did not impact the hemolytic activity of the AIP-I strain, while in the AIP-III strain, hemolytic activity was limited to ~67% . These findings suggest that although a modified AIP of the same type has limited effects, cross-modified AIPs can be applied for reduced hemolytic activity, thus reduced quorum sensing activity. The results additionally provide further insight into the possible role of AIP mimetics in quorum sensing inhibition as well as how quorum sensing functions in S. aureus as a whole.