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The implications of quorum sensing inhibition in bacterial antibiotic resistance- with a special focus on aquaculture

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Abstract

The aquaculture industry is an expanding and demanding industry and due to an increase in urbanization, with rise in income of developing countries population, it offers to provide a sustainable food supply. However, the industry is facing a number of challenges, out of which few needs to be tackled immediately to maximise the productivity. An upcoming problem is the emergence of antibiotic resistant pathogens due to the unchecked use of antibiotics in aquaculture and human clinical practices. A wide variety of aquatic pathogens such as Edwardsiella, Vibrio, and Aeromonas spp. use quorum sensing (QS) systems, a regulatory process involving cell communication via signalling molecules for the collective function of pathogens which regulates the genes expression including virulent genes. Quorum sensing results in bacterial biofilms formation, which leads to their reduced susceptibility towards antimicrobial agents. The usage of quorum sensing inhibitors (QSIs) has been proposed as an attractive strategy to tackle this problem. Due to the modulation of virulence genes expression, QSIs can be used as novel and viable approach to overcome antibiotic resistance in aquaculture. In this review, we direct our attention to the quorum sensing phenomenon and its viability as a target pathway for tackling the ever-growing problem of antimicrobial resistance in aquaculture. This review also provides a concise compilation of the currently available QSIs and investigates possible natural sources for quorum quenching.

Keywords: Anti-biofilm; Autoinducers; Marine pathogens; N-acyl homoserine lactone; Quorum quenching.

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