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Poster 6

Efficacy of selected phenolic acids in inhibiting the LasI/LasR and PQS quorum sensing pathways of *Pseudomonas aeruginosa*

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Abstract

Background: Quorum sensing (QS) is a bacterial intercellular communication mechanism mediated by extracellular signalling molecules known as autoinducers [1]. LasI/LasR and pseudomonas quinolone signalling (PQS) are fundamental components of the QS system in *Pseudomonas aeruginosa*. These systems perform a crucial role in the regulation of gene expression in response to cell density, coordination of biofilm formation, and expression of virulence factors, as well as antimicrobial resistance [2]. Therefore, the use of QS inhibitors (QSI), especially those that interact with multiple QS systems, could be a promising strategy, not only because it can increase the efficacy of bacterial infection treatment, but also because it reduces the selective pressure for the development of resistance [2]. In particular, phenolic acids are a group of plant secondary metabolites (*i.e.* phytochemicals) that exhibit a broad spectrum of antibacterial activity and have excellent properties in modulating bacterial cell-cell communication [3]. **Objective:** In this study, the efficacy of ferulic acid and sinapic acid in disrupting the LasI/LasR and PQS-QS system of *P. aeruginosa* was investigated. **Methods:** The efficacy of phenolic acids (ferulic and sinapic acids) as QSI of *P. aeruginosa* was investigated using bioreporter strains (*P. aeruginosa* PA14-wild type, PA14-R3, PAO1-wild type, and PAO1-CTX). For this purpose, the ability to inhibit the production of the autoinducers *N*-acyl-homoserine lactone (AHL) and PQS as well as the QS responses mediated by AHL were evaluated by a high-throughput QS inhibition screening system based on a co-cultivation assay. **Results:** Phenolic acids have the potential to inhibit the LasI/LasR and PQS systems by more than 85%, even at subinhibitory concentrations. In addition, reductions of 80% were observed in the production of AHL by the LasI/LasR system of *P. aeruginosa*. **Conclusions:** This study has shown that the phenolic acids tested are promising as inhibitors of LasI/LasR and PQS, allowing them to reduce the pathogenicity/virulence of *P. aeruginosa*.

Keywords: antibiofilm activity; biofilm infections; ferulic acid; sinapic acid; quorum sensing inhibition

References

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