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Let's quench the quorum: Indigenous microbial flora with quorum sensing inhibition potential

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Quorum Sensing (QS) is a communicating mechanism among bacteria and a vital factor in enhancing resistance against most of the antibacterial agents. Gram-negative bacteria have been reported to use N-acyl Homoserine Lactones (AHLs) as QS signals. This cell-cell communication system plays a critical role in the coordination of their gene expression and thus in the formation of the biofilms. Therefore, Quorum Quenching (QQ) is a promising new alternative for the control of infections in multi-drug resistant bacteria. It is basically enzymatic interruption of QS and poses fewer resistance risks. In this study, bacterial strains were isolated from the soil samples of Margala hills in Islamabad and its QQ ability was analyzed against the pathogenic *Pseudomonas aeruginosa*. Specific genes encoding the QQ enzymes were screened and confirmed via PCR and sequencing. Strategy for enhanced production of these enzymes in *E. coli* was devised and proceeded for further evaluation. Our results has predicted and verified the AHL degrading enzymes, lactonases and acylases in the novel identified bacterial strains. Genes encoding the particular AHL degrading enzymes were fully sequenced and for phylogenetic analysis of these novel strains, 16S rRNA sequencing has been done and a comparative analysis with the already known bacterial strains was performed. Currently we are working on enhanced production of these AHL degrading enzymes and their sustainable expression in the *E. coli*. The QQ-associated genes can be potential transgenes in other most suitable hosts to produce large amount of QQ enzymes. And they could potentially be used to inhibit biofilm formation in the MDR bacteria which is not only a big concern in the health sector but also a major issue in the Membrane Bioreactors (MBR) where microbial biofilm causes bio-fouling.

Biography

Fazal Adnan is an assistant professor at the Atta-ur- Rahman School of Applied Biosciences, National University of Sciences and Technology. He has completed his Bachelor's degree in Biotechnology from the University of Peshawar and MPhil in Industrial Biotechnology from the Government College University, Lahore. During his stay at the Institute of Molecular Microbiology in Giessen, he investigated role of protein and RNA-based regulators in the photo-oxidative stress response mechanisms of alpha-proteobacteria *Rhodobacter sphaeroides*.

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