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Characterization of the multiple molecular mechanisms underlying RsaL control of phenazine-1-carboxylic acid biosynthesis in *Pseudomonas aeruginosa* PA1201

Phenazines are important secondary metabolites that have been found to affect a broad spectrum of organisms. Two almost identical gene clusters phz1 and phz2 are responsible for phenazines biosynthesis in the rhizobacterium *Pseudomonas aeruginosa* PA1201. Here we show that the transcriptional regulator RsaL is a potent repressor of Phenazine-1-Carboxylic Acid (PCA) biosynthesis. RsaL negatively regulates phz1 expression and positively regulates phz2 expression via multiple mechanisms. First, RsaL binds to a 25-bp DNA region within the phz1 promoter to directly repress phz1 expression. Second, RsaL indirectly regulates the expression of both phz clusters by decreasing the activity of the las and pqs Quorum Sensing (QS) systems, and by promoting the rhl QS system. Finally, RsaL represses phz1 expression through the downstream transcriptional regulator CdpR. RsaL directly binds to the promoter region of cdpR to positively regulate its expression and subsequently CdpR regulates phz1 expression in a negative manner. We also show that RsaL represents a new mechanism for the turnover of the QS signal molecule N-3-oxododecanoyl-homoserine lactone (3-oxo-C12-HSL). Overall, this study elucidates RsaL control of phenazines biosynthesis and indicates that a PA1201 strain harboring deletions in both the RsaL and cdpR genes could be used to improve the industrial production of PCA.

Biography

Ya-Wen He has obtained his PhD from National University of Singapore in 2006. He has then worked as a Research Fellow at the Institute of Molecular and Cell Biology (IMCB), Singapore. In June of 2010, he joined Shanghai Jiao Tong University as a Principal Investigator. His lab is interested in quorum sensing of plant pathogenic bacteria *Xanthomonas* and regulatory network of virulence factor production and functional genomics of plant growth promoting rhizobacteria *Pseudomonas* and development of novel bio-pesticide using the secondary metabolite.

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