Poster Presentation

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Structural basis for bacterial quorum sensing-mediated oxalogenesis

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Bacterial quorum sensing (QS), a cell-to-cell communication process in many Proteobacteria, controls the gene expression for bacterial population-wide characteristics, including bioluminescence, motility, and virulence-related factors. Recently, QS has been recognized to provide further benefits at the population level by regulating the production of public goods, the function of which could be beneficial to all members of the group. In Burkholderia species, oxalic acid was recently identified as an excreted public good for the QS-dependent growth. In these species, QS-mediated oxalogenesis via the oxalate biosynthetic component (obc) is a cellular event indispensable for the survival of bacteria in the stationary phase. Specifically, the acidity of the oxalic acid produced regulates the pH of the environment, avoiding a possible sudden collapse of the bacterial population caused by an alkaline pH in the stationary phase of their growth. In B. glumae, obc consists of two genes encoding ObcA and ObcB for coordinating the production of oxalic acid, as well as acetoacetate and CoA, by using oxaloacetate and acetyl-CoA as substrates. In contrast, the two substrates are also utilized by citrate synthase in the TCA cycle. To investigate any structural and functional differences between ObcA and citrate synthase, we are now carrying out structural and functional analysis of ObcA. Here, we will report our progresses on crystallization and structure determination of ObcA from B. glumae. Our analyses will provide structural insights into the first step in oxalogenesis and the mechanistic features of ObcA.

Keywords: Oxalate biosynthetic component, Burkholderia glumae, acetyl-CoA