Structural And Biophysical Characterization of The Vibrio Cholerae Ferrous Iron Transport Protein B (Feob)

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The acquisition and transport of ferrous iron (Fe2+) is essential for the survival and the virulence of many infectious prokaryotes. While bacteria possess several methods to acquire Fe2+, the ferrous iron transport (Feo) system is the most important Fe2+ transport complex, and the Feo system has strong ties to bacterial pathogenesis. The most conserved component of the Feo system is FeoB, a polytopic transmembrane protein containing a soluble N-terminal domain (termed NFeoB) that has been shown to have GTP hydrolysis activity. Intriguingly, some studies have revealed that a select number of FeoBs hydrolyze both GTP and ATP, making them NTPases rather than strict GTPases. While sequence analyses suggest key differences between GTPase and NTPase FeoBs, there is a lack of structural information defining the nucleotide promiscuity of these G-protein like domains.
In this work, we report the crystallization of apo Vibrio cholerae NFeoB (VcNFeoB), which was previously defined as an NTPase. Comparisons to other GTPase and NTPase type NFeoBs reveal key differences that are hypothesized to play a role in nucleotide discrimination.
These results give insight into ferrous iron acquisition of this problematic pathogen, which could be leveraged for future therapeutic developments.