Transcriptional Regulation of Choline Catabolism in *Burkholderia thailandensis*

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Species of the genus *Burkholderia* are commonly found in soil and are thought to occupy a niche similar to many species of the genus *Pseudomonas*. Catabolism of choline, abundant in association with eukaryotes, as a sole nitrogen or carbon source in *P. aeruginosa* is under primary control of the AraC-family transcription factor, GbdR. The choline catabolic product glycine betaine (GB) is a potent osmoprotectant and induces the virulence factor PlcH in *P. aeruginosa*. The choline catabolism genes in *Burkholderia* are very similar to those found in *Pseudomonas*. However, *Burkholderia* species maintain two close homologs of GbdR: *gbdR1*, divergently transcribed from the catabolic operon, and *gbdR2*, part of an ABC transporter operon homologous to *cbcXWV*, a transport system important for growth on choline and GB in *P. aeruginosa*. Our objective is to determine the roles of each GbdR homologue in the choline catabolic pathway of *Burkholderia thailandensis*.

We deleted *gbdR1* and *gbdR2* in *B. thailandensis*, and performed growth assays in minimal media. We determined that in *Burkholderia thailandensis*, *gbdR1* is necessary for growth on choline and its immediate break down products, as sole carbon source in minimal media. Growth was restored by complementation using a plasmid with *gbdR1* under the control of its native promoter region. In contrast, deletion of *gbdR2* elicited a slow growth phenotype under similar conditions. Homologues of *cbcWV* are expressed when *B. thailandensis* is grown in the presence of choline and their expression is dependent on *gbdR1*. Interestingly the homolog for *cbcX,* which is present *in B. thailandensis*, is not required for growth on choline. 6xHis-tagged GbdR1 and GbdR2 were purified for DNA binding assays. We are currently examining DNA binding specificities of the two GbdR homologues.