ABSTRACT

TITLE:	Glucose Metabolism, Cloning and Expression of Phosphofructokinase-1 from Acidobacterium Capsulatum
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ABSTRACT: Acidobacteria capsulatum was first isolated from acid mine drainage in 1987. Phenotypic and chemotaxonomic studies indicate that this organism does not fit known gram-negative taxa, and as a result, the phylum Acidobacteria was created. An annotated genome of this acidophilic bacterium, published in 2009, shows no aldolase sequence, however a sequence for phosphofructokinase (PFK1) has been found. A. capsulatum has the ability to utilize glucose as a sole carbon source. In other organisms, there is little evidence of any enzyme, aside from aldolase, using the PFK1 metabolite, fructose-1,6-bisphosphate. Our hypothesis is that glucose is metabolized through a modified glycolytic pathway involving a transaldolase that has been identified in the genome. This hypothesis explains how A. capsulatum can utilize glucose as a sole carbon source for both energy production and building biomass. Experiments involving 13C-NMR, GC-MS, and cloning and expression of PFK-1 have been initiated to investigate how this organism gains energy from metabolizing glucose. Cultures were incubated in media containing 13C labeled glucose. 13C -NMR of the cell supernatant and lysate was analyzed to characterize metabolites. The gene coding for A. capsulatum PFK1 was cloned into E. coli. This strain will be used to express PFK1 to study its enzymatic and allosteric regulatory characteristics. Future work includes developing qRT-PCR assays for measuring transcriptional control of the PFK1 gene and more 13C and 1H-NMR to better understand glucose metabolism.