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Analysis of Carbohydrate Production in Response to Stasis in *Desulfovibrio vulgaris*

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Desulfovibrio vulgaris is an anaerobic, δ-*Proteobacterium* that can reduce toxic heavy metals such as chromium and uranium. *D. vulgaris* has become an important model system for bioremediation by sulfate-reducing bacteria, and much work has focused on the biochemical processes that mediate sulfate and heavy metal reduction. However, less is known about the cellular responses to heavy metal and/or environmental stresses in the *Desulfovibrio* species. Initial experiments indicated that *D. vulgaris* Hildenborough (DVH) had a spike in the total carbohydrate level as cells entered stationary-phase growth. A similar spike was observed in the *D. vulgaris* strain ATCC29579, but the total carbohydrate was approximately 2-fold decreased. Different methods (e.g., salt/formaldehyde wash, zwittergent wash, and centrifugation) were evaluated for the determination of internal versus external carbohydrate in *D. vulgaris*, and the best results were obtained with the centrifugation method. The DVH strain had more internal carbohydrate than the ATCC strain (approximately 3-fold), and the ATCC strain appeared to have increased levels of carbohydrate in the culture supernatant (approximately 2-fold). In addition, DVH maintained a higher proportion of total carbohydrate that was localized internally. The data suggested that *D. vulgaris* changes the carbohydrate levels in response to growth conditions with lactate and sulfate as electron donor and acceptor, respectively. The *D. vulgaris* genome contains the presumptive ORFs required for the production and utilization of glycogen, and the megaplasmid contains 10 ORFs annotated as glycosyl transferases or polysaccharide biosynthesis. The data suggested that an increase in carbohydrate occurred during transition to stationary phase, and may play a role in a general stress response. Initial results indicated that growth of DVH and ATCC29579 was inhibited at different concentrations of Cr(VI).