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Year in School: Sophomore
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Funding Source: US Department of Energy

Utilization of lactate by wild-type *Desulfovibrio desulfuricans* strain G20 and a Cytochrome c3 mutant

The anaerobic sulfate-reducing bacterium, Desulfovibrio desulfuricans strain G20 is a naturally occurring soil microbe. This bacterium is able to use a number of carbon substrates as electron donors for growth. Typically the organic acid Lactate is the electron donor, which is metabolized, via pyruvate, to acetate and carbon dioxide. Sulfate as the terminal electron acceptor yields hydrogen sulfide. During this growth Desulfovibrio is able to reduce metals enzymatically such as manganese(IV), iron(III), technetium(VII), and particularly uranium(VI), and thus render the metal insoluble. This offers a mechanism potentially useful for the removal of these contaminants can be removed from ground water. One electron carrier protein in the pathway of electron flow from organic acids to sulfate is a tetraheme cytochrome c3. This cytochrome has been shown to be involved in uranium reduction by G20. A mutant of G20 denoted I2 has been created in which the c3 gene is interrupted resulting in the protein not being produced. Consequently, uranium reduction is impaired significantly. To better understand metal reduction by Desulfovibrio and the involvement of cytochrome c3 in this process, we are comparing the metabolism of the I2 mutant to that of the wild type G20. Using lactate and sulfate as electron donor and recipient, respectively, we have accounted for the carbon utilization and production of reducing equivalents by each strain. Results to be presented indicate that the mutation in cytochrome c3 results in significant redirection of electron flow and an alteration in metabolism.