Recent Work

Title
Identification of Desulfovibrio desulfuricans Genes Involved in Response to Oxidative Stress

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Desulfovibrio are ubiquitous gram negative bacteria that can be found in various anaerobic environments such as soil, groundwater, and the intestinal tract of animals. Although classically thought of as strict anaerobes whose sole mode of energy metabolism is sulfate respiration, Desulfovibrio strains have been shown to survive exposure to transient levels of oxygen. In addition, some Desulfovibrio strains can enzymatically reduce molecular oxygen, although their ability to generate ATP via oxygen reduction has been questioned. To identify genes involved in the oxidative stress response, we screened a partial library of Tn5-generated mutants in the parent strain Desulfovibrio desulfuricans G20 for increased sensitivity or increased resistance to molecular oxygen. Examination of one of the mutants with an increased resistance to oxygen revealed that the transposon had inserted into a gene encoding a putative uracil DNA N-glycosylase (ung). In Escherichia coli, Ung is the first enzyme in the pathway of uracil excision and repair from DNA, and E. coli ung mutants have previously been shown to be more resistant to some types of DNA damage. We hypothesize that exposure of Desulfovibrio to molecular oxygen results in cytosine deamination, and that the excision and repair of this DNA damage by Ung has the potential to create a lethal double stranded break in the chromosome. Therefore ung mutant cells of Desulfovibrio are more resistant to killing by molecular oxygen.