

ABSTRACT

In a bacterium's environment, life conditions are subject to constant changes. One of the proposed mechanisms of adaptation to these changes is the increase in mutation rate. Bacterial mutability is generally kept very low by action of various mechanisms of control and repair, one of the most important ones being the Mismatch Repair, which is the master regulator of genetic stability of organisms. When its function is impaired, larger amounts of mutations occur in cells. In adverse conditions, these might be beneficial for cells' adaptation.

The role of these repair mechanisms in adaptive processes in *Bacillus subtilis* has not yet been definitely resolved. The previous work in our lab focused on establishing an experimental system to measure the extent of mutagenesis in *B. subtilis*, and the influence of several stresses on mutation rate was assessed. No significant increase in mutability was found to be triggered by nutrient limitation in stationary growth phase, hyperosmotic stress or increased cultivation temperature. Furthermore, a system to monitor the expression of mismatch repair proteins was constructed, which has not revealed significant differences between stressed and nonstressed growth conditions.

This thesis follows the results of previous experiments, expanding the range of stresses used. Mutation rates were determined upon exposition to stressors of physical (cold, heat) and chemical (ethanol, low and high pH, detergent) nature. None of these stresses have led to significantly increased mutation rate. The expression of *mutSL* operon was monitored and shown to correlate between stressed and nonstressed conditions. Finally, the extent of activation of general stress response was determined. Differing values of stress response activation were observed.