

Investigations on interlinked stress response in some antarctic and mesophilic bacteria

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Bacteria in natural environments are most often challenged with more than one stress factor at a time. Hence they evolve with molecules, which confer to them the ability to tolerate more than one stress condition. These multistress-protectants interlink mechanisms involved in adaptation of bacteria to different environmental stressors and are useful for various purposes. Some time back, a DBT-sponsored project was undertaken at CCMB to look for the multistress-protectants in some cold-adapted Antarctic bacteria. Association between cold stress and oxidative stress was demonstrated earlier in an isolate by measuring the specific activity of two antioxidant enzymes and the intracellular level of free radicals (using EPR-spectroscopy) in cells grown at room temperature and 4°C. Enzyme activities and production of free radicals (oxidative stress) were higher in the cold-grown cells. Studies on tolerance of 8 Antarctic and 2 mesophilic bacteria to different environmental stress factors (high and low temperature and pH, high salt, oxidative stress, ultraviolet radiation) revealed remarkable variation in stress-tolerance of organisms belonging to the same genera and isolated from the same environmental niches. Increase in the amount of unsaturated lipids was observed in a salt and cold-adapted mesophile by GC-MS analysis of the total lipids. Mutants of an Antarctic strain, sensitive to multiple stress factors, were obtained by transposon mutagenesis. Mutation in a gene encoding citrate synthase was detected in a mutant using inverse-PCR, implying the role of the enzyme in multiple stress-tolerances. Further studies are in progress.

Biography

Madhab K. Chattopadhyay (born 1956, M.Pharm, Ph.D from Jadavpur University, Kolkata) worked on control of methionine biosynthesis in *Escherichia coli* at the Indian Institute of Chemical Biology (CSIR), Kolkata as a graduate student; on chemical chaperones at the Institut Jacques Monod, Paris University (France) as a post-doctoral fellow (2001); on physiological characteristics, antibiotic and heavy metal tolerance of some lake bacteria at the Leibniz Institute of Freshwater Ecology and Inland Fisheries, Neuglobsow (Germany), as a visiting scientist (2006, 2009). At present, he is working on stress adaptation of bacteria at CCMB (CSIR). He is actively involved in popularization of science.

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