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Salmonella typhimurium has the growth-phase specific osmotic tolerant systems

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Most enteric bacteria are thought to evolve its own protective mechanism against harsh environment including extremly high osmotic condition in nature and their host. We studied the viability of wild types and various mutant strains of *Salmonella typhimurium* at extremly high osmotic stress condition in accordance with growth phase and found the protective ability of the organism, called OTR(Osmotic Tolerance Response). *S.typhimurium* can adapt and survive lethal osmotic exposures(eg. 2.5M NaCl) by way of at least two possibly overlapping systems. The first system is an induction in response to non-lethal high osmoshock(eg. 0.3-0.7 M NaCl) at log-phase(LP-OTR) and the second system is induced by the famine condition of stationary-phase (SP-OTR). The viability of wild types(UK1,LT2) under this unfavorable condition was increased by both LP-OTR and SP-OTR. Viability of the stationary-phase cells was higher than that of the cells adapted at log-phase. A few regulatory genes(eg. *rpoS, fur, crp*), some carbon-starvation- inducible(eg. *cst*A104) and osmotic-inducible genes(eg.*pro*U) played an important role in osmotic tolerance at both growth phase. To isolate a mutant whose gene is necessary to OTR, MudJ(*km,lac*) operon fusion techniques were used. Of the 18 *otr* mutants newly isolated, YK3092(*otr2*::MudJ) was the most sensitive regardless of growth phase and had no catalase activity. It was mapped nearby at 57min on chromosome, but not linked to *rpoS*, a putative alternative sigma factor (σ^{38}). We suggest it might be a *rpoS*-related regulatory gene not found before.