

Hysteresis in myo-inositol utilization by *Salmonella Typhimurium*.

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Abstract

Growth of *Salmonella enterica* serovar Typhimurium strain 14028 with myo-inositol (MI) as the sole carbon and energy source is characterized by a bistable phenotype that manifests in a growth phenotype with an extraordinarily long and length-variable lag phase. However, in the presence of hydrogen carbonate, in the absence of IolR that represses the MI degradation pathway, or if cells are already adapted to minimal medium (MM) with MI, the lag phase is drastically shortened, and the bistable phenotype is abolished. We hypothesized that memory development or hysteresis is a further characteristic of MI degradation by *S. Typhimurium*; therefore, we investigated the transition from a short to a long lag phase in more detail. Growth experiments demonstrated that memory on the population level is successively lost within approximately 8 hr after cells, which had been adapted to MI utilization, were transferred to lysogeny broth (LB) medium. Flow cytometry (FC) analysis using a chromosomal fusion to P_{iolE} , a promoter controlling the expression of the enzymatic genes *iolE* and *iolG* involved in MI degradation, indicated a gradual reversion within a few hours from a population in the "ON" status with respect to *iolE* transcription to one that is mainly in the "OFF" status. Growth and FC experiments revealed that IolR does not affect hysteresis.

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KEYWORDS:

Salmonella ; hysteresis; metabolism; myo-inositol