S3-2

ROLE OF OXIDATIVE DEFENSE SYSTEMS IN THE GROWTH AND DIFFERENTIATION OF S.COELICOLOR.

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We have investigated the regulation and the role of several oxidative enzyme systems in the growth and differentiation of Gram-positive, antibiotics-producing bacteria, *Streptomyces coelicolor*. Genes for catalase A (*catA*; monofunctional vegetative catalase), catalase B (*catB*; monofunctional stationary phase specific), catalase C (*catC*; catalase-peroxidase, late exponential), Fe-containing SOD (*sodF*), and Ni-containing SOD (*sodN*) were examined for their regulation. Transcriptional regulators governing the regulation of these genes in response to thiol-oxidation (RsrA/SigR), nickel (SodRF), hydrogen peroxide (CatR), osmolarity (RsbA/SigB), or others (FurA, OxyR) were found and partially characterized. Disruption of *catB* gene made cells unable to form aerial mycelium, and become sensitive to osmotic stress. The *catB* gene is regulated by a sigma factor SigB, whose action is regulated by an anti-sigma factor RsbA, in response to osmolarity. The way these oxidative genes are regulated will be discussed in comparison with other bacteria.

S3-3

ROLE OF MLC, A NEW GLOBAL REGULATOR OF CARBOHYDRATE METABOLISM, IN REGULATION OF THE *PTS* EXPRESSION IN *ESCHERICHIA COLI*

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Products of *pts* operon of *E. coli* have multiple physiological roles and the operon is controlled by two promoters, P0 and P1. Based on the existence of a sequence that has a high similarity with the known Mlc binding site in the promoter, the effects of the Mlc protein on the *pts* P0 promoter expression were studied. *In vivo* transcription assays indicate that Mlc negatively regulates expression of the P0 promoter and Mlc-dependent repression is relieved by glucose. *In vitro* transcription assay using purified recombinant Mlc showed that Mlc repressed transcription from the P0 but did not affect activity of the P1. DNase I footprinting experiments revealed that a Mlc binding site was located around +1 to +25 of the promoter and that Mlc inhibited binding of RNA polymerase to the P0 promoter. Cells overexpressing Mlc showed a very slow fermentation rate compared to the wild type when grown in the presence of various PTS sugars but few differences in the presence of non-PTS sugars except maltose. These results suggest that the *pts* operon is one of major targets for the negative regulation by Mlc