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Changes in enzyme activities by hydrogen peroxide resistance gene of *Streptomyce coelicolor*.

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After a 5kb DNA fragment related with hydrogen peroxide resistance of *S.coelicolor* Müller was introduced into *S.coelicolor* A3(2), the resistance against hydrogen peroxide of this strain increased. The transformant carrying only plasmid vector pIJ 702 showed that the activity of 6-phosphogluconate dehydrogenase was increased, but isocitrate dehydrogenase was decreased on native-polyacrylamide gel. In the case of transformant carrying pIJ 702 with 5kb insert, the activities of 6-phosphogluconate dehydrogenase and hexokinase were increased. Therefore the hydrogen peroxide resistance seemed to have multiple effects on the different enzymes which were involved in the defense reaction against hydrogen peroxide.

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The Response of the Fission Yeast against Oxidative Stresses

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We have tested the responses of the fission yeast, *Schizosaccharomyces pombe*, against oxidative stresses. On challenging the yeasts at an early log phase, 0.15 of OD₅₉₅, with 40 mM H₂O₂ for 60 min, only about 5% of the initial inoculum survived. Pretreating the cells with 0.2 mM H₂O₂ for an hour gave them higher survivability. This adaptation phenomenon was also observed after pretreating with 0.2 mM menadione (MD).

Treating the cells with sublethal amount of oxidants increased the activities of some antioxidant enzymes in an oxidant-specific manner. The activity of the catalases increased about 2 to 4 fold upon H₂O₂ or MD treatments. That of superoxide dismutase (SOD), however, increased when treated only by MD, not by H₂O₂.

Measuring their activities along the growth, some enzymes like catalase, glucose-6-phosphate dehydrogenase (G6PDH), glutathione reductase, and peroxidase were revealed to acquire higher activities as the cells went far into the stationary phase. SODs, however, came to lose their expression when the cells reached the stationary phase.

We could see that catalases of this yeast are of two kinds, one of which lies in the cytosol and the other in a subcellular organelle, and these are under nutrient, especially carbon-source regulation. We also could find similar tendencies in the case of the SODs.