Cloning of Fatty Acid Desaturase Genes from White-Rot Fungi

Saeko Tsuda
Laboratory of Biomass Conversion, RISH, Kyoto University

A selective lignin-degrading fungus, *Ceriporiopsis subvermispora* is able to degrade lignin selectively without intensive damage of cellulose. This fungus produces large amounts of unsaturated and saturated fatty acids such as linoleic acid (18:2n-6) and palmitic acid (16:0) at an early stage of wood decay, and oxidizes them to produce free radicals and TBARS [1,2]. In addition, *C. subvermispora* suppresses ion redox reactions by producing new fungal metabolites (ceriporic acids A, B, and C), resulting in the inhibition of the production of a cellulolytic active oxygen species (hydroxyl radical: $^{\bullet}$OH) [3-5]. Especially, ceriporic acid C contains a carbon-carbon double bond; hence, it may be synthesized from oleic acid (18:1n-9) which contains a double bond at the C9 position. These observations suggest that unsaturated fatty acids (UFAs) might act as a precursor of various low molecular mass compounds involved in a key reaction of the selective lignin degradation, such as lipid peroxidation. In the biosynthesis of UFAs, fatty acid desaturases are key enzymes that are responsible for the insertion of double bonds into alkyl chains. These enzymes are almost universally found in microbial, plant, and animal cells, where they play important roles in a wide range of physiological processes. However, the molecular relationship between the biosynthesis of UFAs and the lignin degradation in white rot fungi is still remained to elucidate. In this study, we focused on UFAs and related metabolites produced by white rot fungi, and tried to clone fatty acid desaturase genes from a well-known white-rot fungus, *Phanerochaete chrysosporium*, as well as a selective lignin-degrader, *C. subvermispora*.

REFERENCES

[1] Enoki, M., Watanabe, T., Nakagame, S., Koller, K., Messner, K., Honda, Y., and Kuwahara, M. (1999) *FEMS Microbiol. Lett.* **180,** 205-211.
[2] Watanabe, T., Katayama, S., Enoki, M., Honda, Y., and Kuwahara, M. (2000) *Eur. J. Biochem.* **267,** 4222-4231.
[3] Enoki, M., Honda, Y., Kuwahara, M. and Watanabe, T. (2002) *Chem. Phys. Lipids*, **120,** 9-20.
[4] Watanabe, T., Teranishi, H., Honda, Y., and Kuwahara, M. (2002) *Biochem. Biophys. Res. Commun.* **297,** 918-923.
[5] Amirta, R., Fujimori, K., Shirai, N., Honda, Y. and Watanabe, T. (2003) *Chem. Phys. Lipids* **126,** 121-131.