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BIODEGRADATION OF 17α-ETHINYLESTRADIOL BY EDIBLE WHITE ROT FUNGUS–A MECHANISTICAL STUDY

Zdena Kresinova[1,2], Martin Ezechias[1,2], Tomas Cajthaml[1,2]

[1]Laboratory of Environmental Biotechnology, Institute of Microbiology ASCR, v.v.i., Division Ecology, Vídeňská 1083, 142 20, Prague 4, Czech Republic, e-mail: zkresin@biomed.cas.cz; [2]Institute for Environmental Studies, Science Faculty, Charles University of Prague, Benátská 2, 128 01, Prague 2, Czech Republic

Abstract

The presence of trace amounts of endocrine disrupting chemicals (EDCs) in the environment is of great scientist interest around the world. Long-term exposition to EDCs can cause adverse effects on water organisms and humans, because of their negative influence of hormonal systems. Bioremediation represents in many cases effective, non-expensive and environment-friendly solution. However, the knowledge of degradation mechanisms including the transformation products is of high importance. In this study, degradation of synthetic estrogen 17α-ethinylestradiol (EE2) was performed using widespread edible ligninolytic fungal strain *Pleurotus ostreatus*. In order to elucidate EE2 degradation pathways, a broad set of *in vivo* and *in vitro* experiments has been performed. The study involved extracellular and intracellular degradation experiments with the fungal culture, purified ligninolytic enzymes and isolated microsomal fractions. EE2 derived metabolites were identified using gas chromatography coupled with mass spectrometry technique. Generally, the EE2 transformation led to more polar compounds and involved mainly hydroxylation and methoxylation mechanism, but in some cases also dehydrogenation and ring fission of B- and C-rings. Changes of estrogenic activities during the biodegradation were monitored by a recombinant yeast assay and the results did not always correlate with the EE2 concentration decrease. The biodegradation results and the metabolites structures proved a possible involvement of both extracellular and intracellular enzymes in fungal EE2 removal mechanisms.

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