

Endosulfan-Induced Biomarkers in Japanese Rice Fish (*Oryzias latipes*) Analyzed by SELDI-TOF-MS

Sung-Eun Lee^{1,*}, Choi Young-Woong^{2,*}, Hyung-ho Mo², Jino Son², Kyeonghun Park³, Kijong Cho^{2,?}

1. School of Applied Biosciences, Kyungpook National University, Daegu 702-701, South Korea; 2. Division of Environmental Sciences and Ecological Engineering, College of Life Sciences and Biotechnology, Korea University, Seoul 136-701, Korea; 3. Division of Pesticide Safety Evaluation, Department of Crop Life Safety, National Academy of Agriculture Science, Suwon 441-707, South Korea.

Abstract :

The objective of this study was to find and validate estrogen-related biomarkers from plasma proteins in *Oryzias latipes* after exposure to an estrogen disrupting compound, γ -endosulfan. The acute toxicity of γ -endosulfan on *O. latipes* after 96 h of exposure was 13.72, 16.18, and 22.18 $\mu\text{g L}^{-1}$ for the LC_{10} , LC_{20} , and LC_{50} values, respectively. To confirm estrogenic disturbance by γ -endosulfan, the expression level of vitellogenin in the liver of male fishes was measured at the LC_{10} value, and it was found to be significantly different from the reference group, confirming the estrogenic effect of endosulfan in this concentration range. Proteinchip® array techniques using a weak cation exchange (CM10) and a strong anion exchange proteinchip (Q10) in conjunction with surface-enhanced laser desorption/ionization time of flight mass spectrometry (SELDI-TOF-MS) were used to determine plasma proteins of *O. latipes* differently expressed in response to endosulfan exposure at LC_{10} and LC_{20} concentrations. Analysis of protein profiling of the male fish exposed to γ -endosulfan detected 48 significantly different protein peaks and the proteins at m/z 2819, 8462, 8860, and 9462 were significantly different ($p < 0.05$). The protein peaks at m/z 2819, 8860, and 9462 were up-regulated and the peak at m/z 8462 was down-regulated. Therefore, these four differentially expressed proteins could be used as biomarkers to rapidly determine a possible risk of endosulfan on aquatic ecosystems, although these are not necessarily produced as a result of endocrine disruption.

Key Word :

Oryzias latipes, γ -endosulfan, SELDI-TOF-MS, vitellogenin, biomarkers.