

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

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### 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,  $\gamma$ -endosulfan. The acute toxicity of  $\gamma$ -endosulfan on *O. latipes* after 96 h of exposure was 13.72, 16.18, and 22.18  $\mu\text{g L}^{-1}$  for the  $\text{LC}_{10}$ ,  $\text{LC}_{20}$ , and  $\text{LC}_{50}$  values, respectively. To confirm estrogenic disturbance by  $\gamma$ -endosulfan, the expression level of vitellogenin in the liver of male fishes was measured at the  $\text{LC}_{10}$  value, and it was found to be significantly different from the reference group, confirming the estrogenic effect of endosulfan in this concentration range. Proteinchip<sup>®</sup> 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  $\text{LC}_{10}$  and  $\text{LC}_{20}$  concentrations. Analysis of protein profiling of the male fish exposed to  $\gamma$ -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*,  $\gamma$ -endosulfan, SELDI-TOF-MS, vitellogenin, biomarkers.