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Biomarker Genes Useful for Immunotoxicity Assessment of Pirimiphos-methyl, an Organophospate Pesticide

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DNA microarray technology is rapidly becoming one of the tools of choice for large-scale toxicogenomic studies and available for high-throughput screening (HTS). In the present study, DNA microarray technology was applied to in vitro immunotoxicity assessment and the screening of biomarker geenes useful for immunotoxicity assessment of pirimiphos-methyl, an organophosphorous pesticide. Balb/c mice were used as animal models to determine the immunotoxic effects of pirimiphos-methyl. At first, pirimiphos-methyl was cytotoxic to immune cells (T, B, and NK cells) in murine spleen, T and NK cells at more than 10 μM, B cells at more than 2 μM. 11 genes related to cell death or immune function were selected as tentative biomarker genes in murine splenocytes exposed with pirimiphos-methyl through cDNA microarray analysis. These genes may be useful in immunotoxicity assessment. Quantitative RT-PCR analysis re-confirmed the expression decrease in 3 genes of tentative biomarker genes (TGF-beta, Stat1, Tmsb4x). The study using Balb/c mice was performed to confirm in vivo the expression changes in 3 genes of tentative biomarker genes.

Keyword: Organophosphorous pesticide, Pirimiphos-methyl, cDNA microarray, Immunotoxicity