

DNA Microarrays and Whole-cell based Environmental Biosensors

GU Man Bock*

National Research Laboratory on Environmental Biotechnology, Kwangju Institute of Science and Technology, 1 Oryong-dong, Puk-gu, Kwangju 500-712, Korea.

Recombinant bioluminescent bacteria using different stress response circuits have been implemented to develop many environmental whole-cell based biosensors for application in many environmental media and classification of PAHs, pesticides, and dioxins' toxicity. Previous efforts on findings of stress responsive genes, were based upon the traditional time-consuming gene expression analysis but the use of DNA microarray, as a high throughput analysis of stress-induced gene expression can be used in analysis and search for specific stress responsive gene. E.coli DNA microarray was subjected to analyze expressed gene after exposure to 2,3,7,8-TCDD and 2,8-DD. This analysis correlated with the results of the biosensors in addition to a few more up-regulated genes, which should stand as candidates in development of new biosensors to dioxin. In addition, a novel functional DNA chip with 22 different stress specific genes from Medaka fish was developed for analyzing stress specific responses such as estrogenicity, cytotoxicity, or carcinogenicity in fish. The results from DNA chip, after exposure of the fish to EDCs, were found to comparable with those of RT-PCR and real-time PCR.