

Possible Biomarkers for Low Dose Radiation Exposure and/or for Old Exposure

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Many studies have been performed to assess the development and application of potentially useful techniques for biodosimetry. Although chromosome dicentric assay has been used to estimate the exposed dose, the technique has limited dose ranges for detection from 0.2 to 4 Gy and has limited optimal time after exposure. Although translocation with FISH technique has been used for retrospective analysis, this technique contains high cost and long detection time. In biodosimetry field, specific biomarkers were needed to detect the responses at low dose less than 0.2Gy and a simple substitute for retrospective analysis.

We have investigated the altered patterns of genomic DNA methylation in the primary cultured fibroblast cells by various dose (0, 5, 50 and 500mGy) gamma irradiations. Irradiated fibroblast cells were harvested after 1 ~ 10 days (several sub-cultured cells after radiation exposure) and methylation status of gene promoter was analyzed by Illumina Methylation Array Chip. Hypermethylation, no-changes, or hypomethylation were detected by the dose and time in the screen. Regions of the stably hypermethylated and hypomethylated promoter by radiation were reexamined by the methylation-specific polymerase chain reaction (MSP) with selected candidates. Through this analysis, we selected potential biomarkers for biodosimetry study. This is the first report which introduces the application of promoter methylation analysis to biodosimetry field.