

## Improvements of cytogenetic techniques to detect the chromosome abnormalities for the biological dose estimation

Akiyama, Miho<sup>1)</sup>; Nakata, Akifumi<sup>1)</sup>; Takada, Misaki<sup>1)</sup>; Takashima, Yoshio<sup>1)</sup>; Yajima, Kazuaki<sup>3)</sup>; Suzuki, Toshikazu<sup>2)</sup>; **Yoshida, Mitsuaki A.**<sup>1)</sup>

<sup>1)</sup> Biodosimetry Section, <sup>2)</sup> External Dosimetry Section, Department of Radiation Dosimetry, Research center for Radiation Emergency Medicine, <sup>3)</sup> Environmental Radiation Effects Research Group, Research Centre for Radiation Protection, national Institute of Radiological Sciences. 4-9-1 Anagawa, Inage-ku, Chiba 263-8555, Japan.

[myoshi@nirs.go.jp](mailto:myoshi@nirs.go.jp)

Assay of dicentric chromosomes was considered to be the most sensitive and specific bio-indicator for the biological dose estimation in cases of accidental over-exposure. This method is based on the frequency of chromosome aberration such as dicentric chromosome, ring chromosome and fragment. Although the conventional Giemsa staining is used as the most reliable method to analyze such chromosome abnormalities in irradiated cells, it is often difficult to recognize the position of centromere on chromosomes because of the stage of cell cycle or condition of chromosome preparation. It also may be more difficult to distinguish a dicentric chromosome from that with twisted arm. In the present study, a modified C-band technique was developed in order to analyze more accurately dicentric, trivalent and ring chromosomes in irradiated human peripheral lymphocytes. Instead of the original method due to the treatment with barium hydroxide, Ba(OH)<sub>2</sub>, C-bands were obtained from the modification of heat treatment in formamide and following DAPI staining. Our modified C-band method may be easier to identify the location of centromere on the elongated and over-condensed chromosomes, a fragment and acentric ring than Giemsa stain only. Thus, this method may give more information about the location of the centromere and may be useful for biological dose estimation due to the analysis of dicentric in human lymphocytes exposed to the radiation.

In this study, we also analyzed the effects of time and concentration in the Colcemid treatment on the degree of chromosome condensation. No differences were morphologically observed in the Colcemid treatment with the concentration of 0.03-0.1µg/ml.