

Amonrat Jungtanasombut 2008: Determination of Gamma-Radiation Effect on Chromosomes using Cytokinesis-Blocked Micronucleus Assay. Master of Science (Applied Radiation and Isotopes), Major Field: Applied Radiation and Isotopes, Department of Applied Radiation and Isotopes. Thesis Advisor: Assistant Professor Wanwisa Sudprasert, Ph.D. 93 pages.

The purpose of this study was to determine the micronucleus (MN) frequency that was arisen from chromosome aberrations in human lymphocytes after *in vitro* and *in vivo* radiation exposure using cytokinesis-blocked micronucleus (CBMN) assay. For the *in vitro* technique, whole blood of 3 male healthy volunteers (with non smoking and non-alcoholic consumption who had never been exposed to radiation over 6 months preceding the study) was irradiated with ¹³⁷Cs gamma-rays at a dose rate of 10 cGy/min for different doses ranging between 1 and 5 cGy. The number of micronuclei in at least 1,000 binucleated cells (BN) was scored and reported as MN frequency (MN/1000 BN). The correlation between absorbed doses and MN frequency was studied. For the *in vivo* technique, a group of workers occupationally exposed to radiation in a radiological working place and a group of controls chosen from among administrative employees were monitored. The equivalent dose accumulated over the past 5 years was obtained from personnel dosimeter records. Information on age, smoking habits, use of therapeutic drugs and previous exposure to diagnostic x-ray was recorded. The effect of donor gender, age, alcoholic consumption, tea/coffee consumption and radiation burden on MN frequency was studied.

The *in vitro* results showed a dose-dependent highly significant increase ($p=0.004$) in levels of MN frequency. The average level of micronuclei in control was 29.4 ± 5.7 MN/1000 BN while those of exposed group were ranging between 45.9 ± 9.3 to 114.8 ± 40.2 MN/1000 BN for the absorbed doses of 1 to 5 cGy, respectively. Moreover, MN frequency was relatively linear-quadratic response ($R^2=0.9984$) with absorbed dose. For the *in vivo* results, MN frequency was highly significant difference ($p=0.000$) between control and exposed group. The average level of micronuclei in control was 39.1 ± 3.7 MN/1000 BN while those of exposed group were 60.9 ± 12.3 , 61.6 ± 13.0 and 62.6 ± 11.8 MN/1000 BN for the range of accumulative doses at 0.01-3.00, 3.01-6.00 and 6.01-9.00 mSv, respectively. Moreover, MN frequency showed a positive trend ($R=0.310$) with increased accumulative doses as a linear-quadratic relation ($R^2=0.4754$). No correlation of MN frequency with gender, age and alcoholic consumption could be observed in both exposed and control groups. However, the effect of tea/coffee consumption on MN frequency was clearly observed in the exposed individuals ($t\text{-test}=-2.018$, sig. (2-tailed)=0.030).

Student's signature

Thesis Advisor's signature

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