

# Incidences of Chromosome Aberrations and Clones in Splenocytes from Mice Continuously Irradiated with Low-Dose Rate Gamma-Rays

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## Abstract

Incidences of chromosome aberrations were analyzed in splenocytes from female SPF C3H mice continuously irradiated with low- or medium-dose-rate (LDR, MDR) of  $^{137}\text{Cs}$  gamma-rays to evaluate the dose and dose-rate effects. Dose response relationship of chromosome aberration frequencies (dicentrics and rings) was obtained at each dose rate using age-adjusted multiple linear regression analysis on the assumption that the relationship is shown by a linear or a linear quadratic model. Values of the linear term, which are shown as slope, were significantly decreased with reduction of dose rates from 400 mGy/22h/day (18.2 mGy/h) to 1 mGy/22h/day (0.045 mGy/h), indicating clearly positive dose-rate-effects. This finding also suggests that there is a discrepancy with the currently used formula to obtain dose and dose rate effectiveness factor (DDREF) recommended by ICRP and others. Incidences of translocation detected by M-FISH method were compared at 300 days after initial irradiation at 56 days of age among mice irradiated at three LDRs (20 mGy/22h/day, 1 mGy/22h/day and 0.05 mGy/22h/day). Translocations in mice irradiated at 20 mGy/22h/day were approximately 20 times higher than those at the other two LDRs. Clone formation was found at total doses of more than 4000 mGy in mice irradiated at LDR (20 mGy/22h/day), but was not at 300 days in mice irradiated at 1 mGy/22h/day. The results indicate that there might be a threshold dose or dose-rate for formation of clones. These are useful information for evaluating the risk of low dose radiation in human.

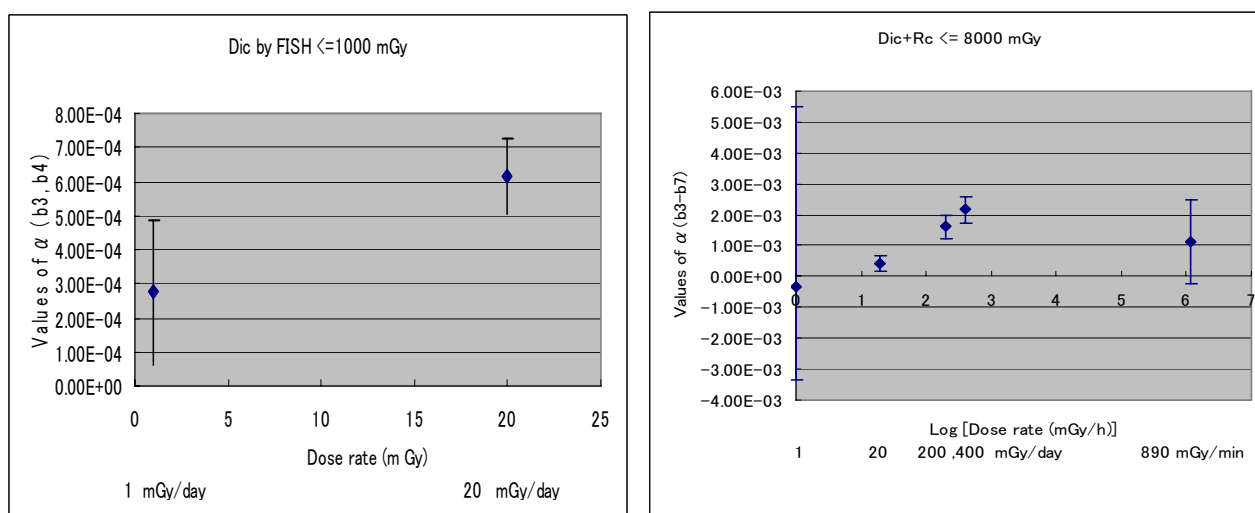


Fig. 1 The values of linear term in chromosome aberration frequencies (number of aberrations per 100 metaphases) and dose (mGy) response curve for LDRs (400 mGy/day and 200 mGy/day) and LDRs (20 mGy/day and 1 mGy/day) gamma-irradiations. Bars on each point show 95% confidence interval (CI). The left figure shows values of dicentric chromosomes detected by the FISH method. The right figure shows values of dicentric and ring chromosomes detected by conventional Giemsa method.