SENSITIVITIES OF PERIPHERAL LYMPHOCYTES FROM MONO- AND DI-ZYGOTIC TWINS AND THEIR PARENTS TO CHEMICAL AND RADIATION INDUCTIONS OF CHROMOSOME DAMAGE.

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Kanehisa Morimoto (1), Kunihiko Miura (1), Mayumi Sato-Mizuno (1), Akira Koizumi (1), Ichiro Yamada (2), and Akio Asaka (2).

(1) Department of Public Health, and (2) Department of Mental Health, University of Tokyo, Hongo 7-3-1, Bunkyo, Tokyo 113, JAPAN.

Human lymphocyte culture systems are now widely used for cytogenetic studies. The lymphocyte cultures exposed to chemicals or radiation usually show variability in cytogenetic responses to chemical and radiation exposure. To shed light on possible genetic factors affecting the response variabilities, experiments have been performed using peripheral lymphocytes from mono- and di-zygotic twins and their parents to see the frequencies of sister chromatid exchanges (SCEs) in lymphocytes exposed to mitomycin C (MMC) or 4-nitroquinoline 1-oxide (4NQO), and the frequency of dicentric and ring chromosomes (D+R) in lymphocyte exposed to —rays or to —rays plus cytosine arabinoside (ara-C).

The baseline and MMC ($3x10^{-8}$ M)- or 4NQO (40ng/ml)-induced frequencies of SCEs were analysed in 72-h cultures containing 40 μ M BrdUrd while the frequencies of D+R were analysed on the first-division cells in 52-h cultures containing Colcemid for the final 28 h exposed to 2 Gy –rays only, or 2 Gy –rays plus ara-C ($5x10^{-5}$ M) at G₀. The baseline SCE frequencies for a) monoand b) di-zygotic twins and c) their mothers were 7.15 \pm 0.20, 6.84 \pm 0.15, 8.20 \pm 0.24 (mean \pm S.E.), respectively. The MMC-induced SCEs were a) 26.13 \pm 0.55, b) 24.03 \pm 1.16, c) 25.70 \pm 1.10, respectively. The –ray- or –rays plus ara-C-induced D+R frequencies were a) 0.229 and 0.250, and b) 1.238 and 1.703. The mean and distribution of SCE and D+R frequencies were analysed among lymphocytes from mono- and di-zygotic twins and their parents. Rank correlation analyses were also done for these sub-groups in order to see the possible genetic factors affecting the responses. The analyses among these sub-populations having different genetic constitutions showed no consistent tendency in responses of lymphocyte to chemical- and radiation-exposure.

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