Turkish Journal of Medical Sciences

Turkish Journal

of

Medical Sciences

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The Effect of Glutathione S-transferase M1 Genotype on Benzo[a]pyrene-Induced Sister Chromatid Exchanges and Chromosomal Aberrations in Peripheral Blood Lymphocytes

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Abstract: Sister chromatid exchange (SCE) and chromosomal aberration (CA) in peripheral lymphocytes have been widely used in assessing exposure to mutagens and carcinogens. One of the extensively studied genotoxins is benzo[a]pyrene (BaP). The aim of the present study was to examine the ability of BaP to induce different individual cytogenetic response measured by SCE and CA frequency. The possible influence of genetic polymorphism was also taken into account, by including donors representing positive or null glutathione S-transferase M1 (GSTM1) genotypes. SCEs and CAs were analyzed from 72-h whole-blood lymphocyte cultures of 16 GSTM1 positive and 15 GSTM1 null donors after treatment with 5 µM BaP, which do not decrease cell viability. We found no influence of the GSTM1 genotype on SCE or CA frequency. The rates of chromatid and chromosome-type gaps and breaks induced in vitro by BaP were similar in all the groups. In the GSTM1 null genotype, however, chromatid-type breaks were seen more frequently than chromosome-type breaks after a 48 h treatment with BaP. These findings suggest that SCEs and CAs induced in vitro by BaP are not influenced by the genotype GSTM1.

Key Words: Sister chromatid exchanges, Chromosome aberrations, Benzo[a] pyrene, Glutathione S-transferase M1

Turk J Med Sci 2005; **35**(2): 79-84.
Full text: pdf
Other articles published in the same issue: Turk J Med Sci,vol.35,iss.2.