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BENZENE INDUCED CHROMOSOME ABERRATIONS AND THE ASSOCIATION WITH GENETIC POLYMORPHISM

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This study was done to examine the benzene induced chromosomal aberrations and also the influence of genetic polymorphism(GSTM1, GSTT1, GSTP1, NAT2, NQO1, CYP2E1 and CYP1A1) on the chromosomal aberrations.

In total, 82 benezene exposed workers and 76 matched controls were examined.

Benzene exposure was associated with significant increases in both monosomy and trisomy of chromosome 8 and 21. Translocations between chromosomes 8 and 21[t(8:21)] were observed and increased up to 8-fold in a higher-exposed group compared to the control group.

Multiple regression analysis indicated that the frequencies of chromosome aberrations were significantly associated with benzene exposure and genetic polymorphism of metabolic enzymes. GSTM1 and GSTT1 null genotypes are associated with the increase of the frequencies of aneuploidy induced by benzene exposure, but not with structural chromosome aberrations after adjustment of age, alcohol, and smoking. The slow acetylator of NAT2 is associated with the increase of the frequencies of trisomy for chromosome 8 by benzene exposure. The variant type of NQO1 genotype may contribute to the increased frequencies of translocation between chromosome 8 and chromosome 21.

An increased frequency of chromosome aberration was also found for the combined genotype of CYP2E1 Dra I and Rsa I. The combined genotype of CYP2E1 Rsa 1 variant type and NQO1 variant type increased the frequencies of aneuploidy and structural chromosome aberration. The combined genotype of CYP1A1 wild type and GSTP1 variant type increased the frequencies of aneuploidy and structural chromosome aberration.

In conclusion, the influence of genetic polymorphism of xenobiotic-metabolizing enzymes on the susceptibility of individuals to the induction of chromosomal aberration by benzene was suggested.

Keyword : benzene, aneuploidy, chromosome aberration, genetic polymorphism