Genotoxicity of motorcycle exhaust particulate in vivo and in vitro

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Abstract

The genotoxic potency of motorcycle exhaust particles (MEP) was investigated by use of a bacterial reversion assay, and chromosome aberration and micronucleus test in this study. In the bacterial reversion assay (Ames test), MEP concentration-dependently increased TA98, TA100, and TA102 revertants in the presence of metabolic activating enzymes. In the chromosome aberration test, MEP concentration -dependently increased abnormal structural chromosomes in CHO-K1 cells both with and without S-9. Pretreatment with antioxidants (a-tocopherol, ascorbate, catalase, and NAC) showed varying degrees of inhibitory effect on the MEP-induced mutagenic effect and chromosome structural abnormalities. In the in vivo micronucleus test, MEP dose-dependently induced micronucleus formation in peripheral red blood cells after 24 and 48 h of treatment. The increase of micronucleated reticulocytes induced by MEP can be inhibited by pretreatment with a-tocopherol and ascorbate. The fluorescence intensity of DCFH-DA loaded CHO-K1 cells were increased upon addition of MEP. Our data suggest that MEP can induce genotoxicity through a reactive oxygen species (ROS)-dependent pathway, which can be augmented by metabolic activation. a-Tocopherol, ascorbate, catalase, and NAC can inhibit MEP-induced genotoxicity, indicating that reactive oxygen species might be involved in this effect. Keywords: Motorcycle exhaust particles, Ames test, reactive oxygen species, chromosome aberration, micronucleus, genotoxicity.