

Evaluation of Environmental Mutagens-Complex Mixture in Diesel Exhaust Respirable Particulate Matter

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The International Agency for Research on Cancer (IARC, 1989) has classified whole diesel exhaust as probably carcinogenic to humans. Diesel exhaust particulate matter (DPM) adsorbs different chemical substances including PAHs and nitroarenes. DPM is emphasized because it is a major component of diesel exhaust, it is suspected of contributing to a health hazard. Diesel exhaust is a complex mixture of carbon particles and associated organics and inorganics, and it is not known what fraction or combination of fractions cause the health effects [cancer effects, noncancer effects (respiratory tract irritation/inflammation and changes in lung function)] that have been observed with exposure to diesel exhaust. In order to identify which chemical classes are responsible for the majority of the observed biological activities, we performed a particular biological/chemical analysis. Respirable particulate matter (PM_{2.5}: <2.5µm) was collected from diesel engine exhaust using a high-volume sampler equipped with a cascade impactor. Particulate organic matter was extracted by the dichloromethane/sonication method and the crude extract was fractionated according to EPA recommended procedure into seven fractions by acid-base partitioning and silica gel column chromatography. We examined genotoxic potentials of diesel exhaust particulate matter using novel genotoxicity tests, which are rapid, simple and sensitive methods for assessing DNA-damage at the DNA and chromosomal level (comet assay, *in vitro* MN test and Ames test). Higher genotoxic potency was observed in non polar fractions and several PAHs were detected by GC-MS, such as 1,2,5,6 dibenzanthracene, chrysene, 1,2-benzanthracene, phenanthrene and fluoranthene.