

Endocrine-Disrupting Activity of Chemicals in Diesel Exhaust and Diesel Exhaust Particles

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Diesel exhaust (DE) is known as the main cause of air pollution. DE is a complex mixture of particulate and vapor-phase compounds. The soluble organic fraction of the particulate materials in DE contains thousands of compounds including a variety of polycyclic aromatic hydrocarbons and heavy metals. To clarify the endocrine-disrupting activities of DE, we have reviewed the reports about the effects of DE on the reproductive and brain-nervous systems, and the endocrine-disrupting action of diesel exhaust particles (DEP). *In utero* exposure to low levels (0.1 mg DEP/m³) of DE from day 2 postcoitum (p.c.) until day 13 p.c. reduced the expression level of Ad4BP/SF-1 mRNA and thereby might affect the development of gonads. Low levels of DE also reduced the expression of several genes known to play key roles in gonadal development, including an enzyme necessary for testosterone synthesis. Mature male rats exposed to DE during the fetal period showed an irreversible decrease in daily sperm production due to an insufficient number of Sertoli cells. DE exposure during the fetal period influenced the brain tissue in newborn mice. In the 3 mg DEP/m³ exposure group at 10 weeks of age, a significant reduction in performance was observed in the passive avoidance learning test in both male and female mice. In addition, the fetal exposure of mice to DE affected the emotional behaviors associated with the serotonergic and dopaminergic systems in the mouse brain. In toluidine blue-stained specimens from the DE-exposed group, edema around the vessels where fluorescent granular perithelial (FGP) cells exist and degenerated granules within the FGP cytoplasm were observed; similar findings were obtained by electron microscopic examination. DEP contain many substances that stimulate Ah receptors, such as the polycyclic aromatic hydrocarbon containing benzo[*a*]pyrene. DEP also contain substances with estrogenic, antiestrogenic and antiandrogenic activities. The neutral substance fraction of DEP has the causal substance that reduces estrogen receptor mRNA expression. Evaluating the influence of these chemicals present in the environment on human health is an important task.

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