

POTENTIAL IMPACT OF ENVIRONMENTAL EXPOSURES TO POLYCYCLIC ORGANIC MATERIAL (POM) ON CHILDREN'S HEALTH.

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POM, a class of compounds including polycyclic aromatic hydrocarbons (PAHs) and derivatives, e.g. quinones and nitro-PAHs, is listed as a California Toxic Air Contaminant. Sources include various industrial, domestic, and mobile combustion processes. In support of the Children's Environmental Health Protection Act (California SB25), we reviewed POM and PAH toxicity to identify hazards to which infants and children might be especially sensitive. Health standards for POM are typically based on carcinogenicity. Many PAHs are animal carcinogens by various routes. PAH-containing mixtures, such as tobacco smoke, coke-oven fumes, and diesel exhaust, are known human carcinogens. Theoretically, (from both Armitage-Doll and Moolgavkar models) carcinogen exposures early in life lead to greater lifetime cancer risk than later exposures. Experiments have also shown that fetal and neonatal rodents are more sensitive to carcinogenesis by PAHs and PAH derivatives than adults. Studies on pregnant rodents have revealed less widely recognized effects of PAHs, including intrauterine growth retardation (IUGR), fetal mortality, and teratogenesis. Recent studies of populations exposed to industrial air pollution have confirmed the sensitivity of the human fetus to PAH-induced IUGR and dysmorphogenesis. PAHs are toxic to the immune, hematopoietic, and reproductive systems. The toxicity to adult rodents is often reversible and at high doses, but the fetus or neonate may show severe and lasting effects at lower doses. Both cancer and non-cancer toxicity of PAHs generally correlate with the formation of protein and (especially) DNA adducts by reaction with metabolically generated reactive intermediates. Adducts and metabolites have been used as biomarkers of PAH exposure and adverse effect in humans exposed to air pollution and environmental tobacco smoke. Apparently, children may be both more heavily exposed and also more sensitive to the toxic effects of POM.