Health Risk Assessment of Exposures to a High Molecular Weight Plasticizer Present in Automobile Interiors

Poster presentation at Society of Environmental Toxicology and Chemistry (SETAC), 37th Annual Meeting, Orlando, FL
November 6-10, 2016


Abstract: This study provides an exposure and risk assessment of diundecyl phthalate (DUP), a high molecular weight phthalate plasticizer present in automobile interiors. Total daily intake of DUP was calculated from DUP measured in wipe samples from vehicle seats from six automobiles. Isopropanol was used as the solvent for wiping the seats since DUP has negligible to low water solubility. Isopropanol has the ability to extract more of the DUP from the surface or sub-surface of the sample than dry wipes, or wipes with deionized water, saline, or artificial perspiration (IUCLID, 2006; USEPA, 2007). Four of the vehicles exhibited atypical visible surface residue on the seats. Two vehicles with no visible surface residue were sampled as a comparison. DUP was the predominant organic compound identified in each of the wipes from all seats. A risk assessment of DUP via oral, dermal, and inhalation routes resulting from contact with automobile seats was conducted. The mean, standard deviation, and maximum DUP concentrations on the seats with visible surface residue (n=27) were 6983 ± 7823 µg/100 cm² and 38300 µg/100 cm², respectively; the mean, standard deviation, and maximum DUP concentrations on the seats with no visible surface residue (n=12) were 1714 ± 603 µg/100 cm² and 2760 µg/100 cm², respectively. The mean and 95th percentile of the mean for daily cumulative dose of DUP for all exposure routes for the seats with no visible surface residue ranged from 7×10⁻⁴ to 4×10⁻³ mg/kg-day and from 8×10⁻⁴ to 5×10⁻³ mg/kg-day, respectively. For seats with visible surface residue, cumulative doses ranged from 2×10⁻³ to 2×10⁻² mg/kg-day and from 4×10⁻³ to 2×10⁻² mg/kg-day, respectively. In short, there was no statistically significant difference in the concentration of plasticizer in cars with a visible residue versus those without visible reside. The estimated daily intake (contact or absorbed dose) of DUP from automobile seats was far lower (at least 100 fold) than the NOAELs reported in and derived from animal studies, and are well below the reported Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) DNELs for the general population. Based on the data we collected for this brand of autos, using virtually any benchmark for evaluating safety, exposure to DUP via treated seat covers did not pose an increased health-risk (e.g., de mininis or less) in any population under any reasonably plausible exposure scenario.