Role of clothing in both accelerating and impeding dermal absorption of airborne SVOCs - DTU Orbit (08/11/2017)

Role of clothing in both accelerating and impeding dermal absorption of airborne SVOCs

To assess the influence of clothing on dermal uptake of semi-volatile organic compounds (SVOCs), we measured uptake of selected airborne phthalates for an individual wearing clean clothes or air-exposed clothes and compared these results with dermal uptake for bare-skinned individuals under otherwise identical experimental conditions. Using a breathing hood to isolate dermal from inhalation uptake, we measured urinary metabolites of diethylphthalate (DEP) and di-n-butylphthalate (DnBP) from an individual exposed to known concentrations of these compounds for 6 h in an experimental chamber. The individual wore either clean (fresh) cotton clothes or cotton clothes that had been exposed to the same chamber air concentrations for 9 days. For a 6-h exposure, the net amounts of DEP and DnBP absorbed when wearing fresh clothes were, respectively, 0.017 and 0.007 μg/kg/(μg/m^3); for exposed clothes the results were 0.178 and 0.261 μg/kg/(μg/m^3), respectively (values normalized by air concentration and body mass). When compared against the average results for bare-skinned participants, clean clothes were protective, whereas exposed clothes increased dermal uptake for DEP and DnBP by factors of 3.3 and 6.5, respectively. Even for non-occupational environments, wearing clothing that has adsorbed/absorbed indoor air pollutants can increase dermal uptake of SVOCs by substantial amounts relative to bare skin.Journal of Exposure Science and Environmental Epidemiology advance online publication, 10 June 2015; doi:10.1038/jes.2015.42.

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