Phthalate and PAH concentrations in dust collected from Danish homes and daycare centers - DTU Orbit (03/10/2019)

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As part of the Danish Indoor Environment and Children's Health (IECH) study, dust samples were collected from 500 bedrooms and 151 daycare centers of children (ages 3 to 5) living on the island of Fyn. The present paper reports results from the analyses of these samples for five phthalate esters (diethyl phthalate (DEP), di(n-butyl) phthalate (DnBP), di(isobutyl) phthalate (DiBP), butyl benzyl phthalate (BBzP), di(2-ethylhexyl) phthalate (DEHP)) and three PAHs (pyrene, benz[a]anthracene (B[a]A) and benzo[a]pyrene (B[a]P)). The three PAHs and DEHP were detected in dust samples from all sites, while DEP, DnBP, DiBP and BBzP were detected in more than 75% of the bedrooms and more than 90% of the daycare centers. The dust mass-fractions of both phthalates and PAHs were log-normally distributed. With the exception of DEP, the mass-fractions of phthalates in dust were higher in daycare centers than homes: PAH mass-fractions in dust were similar in the two locations. There was no correlation among the different phthalates in either homes or daycare centers. In contrast, the PAH were correlated with one another more strongly so in homes (R² = 0.80-0.90) than in daycare centers (R² = 0.28-0.45). The dust levels of several phthalates (BBzP, DnBP and DEHP) were substantially lower than those measured in a comparable study conducted 6-7 years earlier in Sweden. Although usage patterns in Denmark differ from those in Sweden, the current results may also reflect a change in the plasticizers that are used in common products including toys. PAH levels were roughly an order of magnitude lower than those measured in Berlin and Cape Cod residences, suggesting that the Danish sites are less impacted by motor vehicle emissions.

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