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Non-phthalate plasticizers in German daycare centers and human biomonitoring of DINCH metabolites in children attending the centers (LUPE 3)

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Abstract

Plasticizers have been widely used for decades as additives in diverse applications, including consumer and building products, toys, cables, and floorings. Due to toxicological concerns and restrictions of different dialkyl *ortho*-phthalates, other plasticizers have been increasingly used in recent years. Therefore, di-isononyl cyclohexane-1,2-dicarboxylate (DINCH), di(2-ethylhexyl) terephthalate (DEHT), di(2-ethylhexyl) adipate (DEHA), acetyl tri-*n*-butyl citrate (ATBC), and trioctyl trimellitate (TOTM) plasticizer levels in indoor air and dust samples from 63 daycare centers in Germany were measured. Moreover, the urine samples of 208 children who attend 27 of these facilities were analyzed for the presence of four DINCH metabolites. DINCH, DEHT, and DEHA were present in indoor air with median values of 108 ng/m³, 20 ng/m³, and 34 ng/m³, respectively. Median values of 302 mg/kg for DINCH, 49 mg/kg for DEHA, 40 mg/kg for DEHT, and 24 mg/kg ATBC were found in dust. In the urine samples, the three secondary metabolites of DINCH were observed with median values (95th percentiles) of 1.7 µg/l (10.0 µg/l) for OH-MINCH, 1.5 µg/l (8.0 µg/l) for oxo-MINCH, and 1.1 µg/l (6.1 µg/l) for cx-MINCH. Overall, these metabolite levels are orders of magnitude lower than the current HBM I values set by the German Human Biomonitoring Commission.