US TODDLERS EXPOSURE TO PBDE FLAME RETARDANTS: ASSOCIATIONS WITH HOUSE DUST, HAND WIPES, AND SOCIAL/ECONOMIC VARIABLES

Heather M. Stapleton, Sarah Eagle, Andreas Sjödin, Thomas F. Webster

Background and Aims

Polybrominated diphenyl ethers (PBDEs) are persistent and bioaccumulative flame retardants associated with adverse effects on thyroid regulation and neurodevelopment. Little is known about children's exposure and body burdens. The objectives of this study were to determine if PBDE body burdens were associated with the following: house dust and/or PBDE residues on hand wipes collected from the children; gender, age, race, and education level of the parents.

Methods

Blood samples, hand wipes and house dust were collected from children 12-36 months old residing in central North Carolina between 2009-2010. A short questionnaire was administered which collected information on the child's physical and behavioral characteristics, breast feeding, and the parents race and education levels.

Results

PBDEs were detected in every serum sample and the most abundant congeners were those associated with the PentaBDE mixture. Concentrations ranged from 5.2-745 ng/g lipid with a geometric mean value of 46.7 ng/g lipid. PBDE levels were significantly higher ($p < 0.05$) in the oldest age group (>24 months) relative to the youngest (~12-18 months). PBDE concentrations were significantly higher in African Americans relative to Caucasians; lower PBDE levels were observed with higher maternal education levels. Significant correlations were observed between the serum BDE47 levels and BDE47 measured on hand wipes ($r = 0.60$; $p<0.0001$) and BDE47 levels in house dust ($r=0.40$; $p<0.001$). No associations were observed between PBDE levels and duration of breast feeding as an infant.

Conclusions

These data suggest that children's exposure to PBDEs from house dust appears to be the leading exposure pathway in toddlers, and not diet or breast milk exposure. Minorities and families with lower educational levels are also at higher risk to exposure to this class of contaminants.