Neurobehavioral and Thyroid Evaluations of Rats Developmentally Exposed to Tris(1,3-dichloro-2-propyl)phosphate (TDCPP)
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TDCPP is an organophosphate flame retardant with widespread usage and documented human exposures through food, inhalation, dust ingestion, and breast milk. Findings of decreased neural proliferation in cell culture and abnormal development and altered thyroid hormones in larval zebrafish assays have raised concern for neurodevelopmental toxicity. We evaluated the potential for developmental neurotoxicity of TDCPP in a mammalian model. Pregnant Long-Evans rats (n=14/dose) were administered TDCPP (15, 50, or 150 mg/kg/d) or corn oil (vehicle) via oral gavage from gestational day 10 to weaning. Body weight and righting reflex development were monitored in all pups. A subset of offspring at culling and weaning, and dams at weaning, were sacrificed for serum collection (T3, T4) and organ (brain, thyroid, liver) weights; brain weights were also measured in a group of adult offspring. One male and one female from each litter were allocated for behavioral testing at several ages: standard locomotor activity (preweaning, postweaning, adults), activity including a lighting change mid-way (postweaning, adults), elevated zero maze (postweaning, adults), functional observational battery (FOB; postweaning, adults), and Morris water maze (place learning, working memory; adults).

There was no change in maternal body weight or serum T3/T4, but liver weight was increased at the high dose. In offspring, there was no effect on viability, litter size, or birth weight. However, from the time of culling to about two months of age, weight gain was lower in the high-dose offspring. Thyroid hormones and brain weights were not altered, but at the high dose liver weights (absolute, not relative to body weight) were decreased. There were no significant treatment-related effects on the ontogeny of righting reflex or motor activity, behavior in the elevated zero maze, or any measures of the FOB. The high-dose group showed a small difference in activity during the light transition and a transient difference in floating in the water maze, and activity habituation in the middle dose group was slightly altered at one age. Overall, these data do not support claims of TDCPP-induced thyrotoxicity or developmental neurotoxicity.

This is an abstract of a proposed presentation and does not reflect US EPA policy.