

Comment on: Berhan. Thirty Years of Prospective Nationwide Incidence of Childhood Type 1 Diabetes: The Accelerating Increase by Time Tends to Level Off in Sweden. *Diabetes* 2011;60:577–581

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Berhan et al. (1) report that the increasing incidence of type 1 diabetes in children has begun to level off in Sweden, beginning with children born around the year 2000. One possible explanation for these encouraging data is Sweden's voluntary phase out of brominated flame retardants (BFRs), including polybrominated diphenyl ethers (PBDEs), during the 1990s. The concentrations of various BFRs peaked in Swedish mothers' breast milk around 1995–2001 and have since declined or leveled off (2). Could the concurrence of these trends be more than a coincidence?

Serum concentrations of two out of six flame retardants, including PBDE-153, were associated with diabetes in a large cross-sectional sample of U.S. residents (3). When pregnant and lactating mice were exposed to PBDEs, the chemicals were not only transferred to the offspring during gestation and lactation but also affected the development of the immune system of the offspring (4). Although there are few studies on the ability of endocrine disrupting compounds such as PBDEs to influence the development of type 1 diabetes, it is biologically plausible that they could play a role in this autoimmune disease (5). PBDEs have also been found to affect the insulin sensitivity of rat adipocytes, implying that they may play a role in the development of obesity as well (6).

The Swedish type 1 diabetes data indicate that birth cohort is an important factor, implicating some environmental exposures that affect young children (1). In addition to exposures during fetal and infant development, children have higher levels of exposure to PBDEs than adults, even when living in the same household (7).

Including measurements of PBDEs and other environmental chemicals into studies of type 1 diabetes would help determine whether these chemicals contribute to type 1 diabetes. If Sweden's phase out of PBDEs is indeed found to contribute to the leveling off of type 1 diabetes incidence, the implications would be profound.

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REFERENCES

- Berhan Y, Waernbaum I, Lind T, Möllsten A, Dahlquist G; Swedish Childhood Diabetes Study Group. Thirty years of prospective nationwide incidence of childhood type 1 diabetes: the accelerating increase by time tends to level off in Sweden. *Diabetes* 2011;60:577–581
- Fängström B, Athanassiadis I, Odsjö T, Norén K, Bergman A. Temporal trends of polybrominated diphenyl ethers and hexabromocyclododecane in milk from Stockholm mothers, 1980–2004. *Mol Nutr Food Res* 2008;52:187–193
- Lim JS, Lee DH, Jacobs DR Jr. Association of brominated flame retardants with diabetes and metabolic syndrome in the U.S. population, 2003–2004. *Diabetes Care* 2008;31:1802–1807
- Hong SK, Sohn KH, Kim IY, et al. Polybrominated diphenyl ethers orally administration to mice were transferred to offspring during gestation and lactation with disruptions on the immune system. *Immune Netw* 2010;10:64–74
- Howard SG, Lee DH. What is the role of human contamination by environmental chemicals in the development of type 1 diabetes? *J Epidemiol Community Health*. 17 April 2011 [Epub ahead of print]
- Hoppe AA, Carey GB. Polybrominated diphenyl ethers as endocrine disruptors of adipocyte metabolism. *Obesity (Silver Spring)* 2007;15:2942–2950
- Lunder S, Hovander L, Athanassiadis I, Bergman A. Significantly higher polybrominated diphenyl ether levels in young U.S. children than in their mothers. *Environ Sci Technol* 2010;44:5256–5262

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