

NEW ITEMS IN THE NBMA RESOURCE LIBRARY

Exposure pathways

October 2011

TITLE: High Postnatal Exposures to Polybrominated Diphenyl Ethers (PBDEs) and Polychlorinated Biphenyls (PCBs) via Breast Milk in California: Does BDE-209 Transfer to Breast Milk?

Author: Park, J. J. She, A. Holden, M. Sharp, R. Gephart, G. Souders-Mason, V. Zhang, J. Chow, B. Leslie, and K. Hooper

Source: Environ. Sci. Tech. 2011 45:4579-4585.

Abstract: Breast milk samples collected during 2003–2005 from 82 first-time mothers in 24 communities located throughout California contained levels of polybrominated diphenyl ethers (Σ tri-hexa (8)PBDEs; median = 53.3 ng/g lw, range = 9.60–1291) and polychlorinated biphenyls (Σ 12PCBs; median = 73.4 ng/g lw, range = 22.2–433) that are among the highest in the world. PBDE levels varied 100-fold. BDE-47 was the dominant PBDE congener, with levels exceeding the U.S.EPA Reference Dose (RfD) for neurodevelopmental toxicity (100 ng/kg/day) in most (60%) breast milk samples. In some samples, BDE-209 (2/82) and/or BDE-153 (5/82) were the dominant congeners, suggesting that BDE-209 can transfer to breast milk and/or break down in the mother and transfer to the nursing infant as the lower-brominated PBDEs associated with adverse effects. PBDE levels in California breast milk are approaching those of PCBs, and the trend PBDEs > PCBs may continue as PBDEs migrate from products to the indoor and outdoor environments.

Document#: BIN.OR.PC.5.1

TITLE: Human exposure to bisphenol A (BPA)

Author: Vandenberg, L., R. Hauser, M. Marcus, N. Olea, W. Welshons

Source: Reproductive Toxicology. 2007 24:139-177

Abstract: The plastic monomer and plasticizer bisphenol A (BPA) is one of the highest volume chemicals produced worldwide. BPA is used in the production of polycarbonate plastics and epoxy resins used in many consumer products. Here, we have outlined studies that address the levels of BPA in human tissues and fluids. We have reviewed the few epidemiological studies available that explore biological markers of BPA exposure and human health outcomes. We have examined several studies of levels of BPA released from consumer products as well as the levels measured in wastewater, drinking water, air and dust. Lastly, we have reviewed acute metabolic studies and the information available about BPA metabolism in animal models. The reported levels of BPA in human fluids are higher than the BPA concentrations reported to stimulate molecular endpoints in vitro and appear to be within an order of magnitude of the levels needed to induce effects in animal models.

Document#: BIN.OR.SR.5.1

TITLE: Health ranking of ingested semi-volatile organic compounds in house dust: an application to France

Author: Bonvallot, N. C. Mandin, F. Mercier, B. LeBot, and P. Glorennec

Source: Indoor Air. 2010 20:458-472

Abstract: People spend most of their time indoors. Dust settled in the home may be contaminated by semi-volatile organic compounds (SVOCs). Exposure to these compounds is of great concern, in particular for infants. Their number is large so arose the question of which ones should be selected for dust ingestion exposure assessment. This work proposes a health ranking of SVOCs ingested through settled dust. This ranking is based on the toxicity and contamination of SVOCs in dust. Data on compounds and contamination was retrieved from a bibliographic review. Where possible, toxicity data was retrieved from databases, otherwise it was calculated from raw data. One hundred and fifty-six SVOCs were selected, 66 of which were prioritized. Forty-two could not be prioritized because contamination data was below the limit of detection, and 48 could not be prioritized because there was no contamination or toxicity data. The top-ranked compounds were phthalates, pesticides, short-chain chlorinated paraffins, PBDEs, PFCs, organotins, PCBs, and PAHs. As most of these have reprotoxic and neurotoxic properties, an integrated multi-pollutants approach to exposure is required and simultaneous measurement methods should be developed.

Document#: BIN.OR.SR.5.2

TITLE: Quantitation of Gas-Phase Perfluoroalkyl Surfactants and Fluorotelomer Alcohols Released from Nonstick Cookware and Microwave Popcorn Bags

Author: Sinclair, E. S. Kim, H. Akinleye, K. Kannan

To request information or documents, please contact Sally Brown via e-mail: slb@u.washington.edu or phone: (206) 616-1299.

Source: Environ. Sci. Tech. 2007 41:1180-1185

Abstract: Fluoropolymer dispersions are used for coating certain cookware products and food-contact packaging to impart oil and water repellency. Since salts of perfluorooctanoic acid (PFOA) are used as a processing aid in the manufacture of many fluoropolymers, it is necessary to determine if these compounds are still present as residuals after the process used to coat nonstick cookware or packaging, and could be released during typical cooking conditions. In this study, we identified and measured perfluoroalkyl carboxylates (PFCAs), particularly PFOA, and fluorotelomer alcohols (FTOHs; 6:2 FTOH and 8:2 FTOH), released from nonstick cookware into the gas phase under normal cooking temperatures (179 to 233 °C surface temperature). PFOA was released into the gas phase at 7–337 ng (11–503 pg/cm²) per pan from four brands of nonstick frying pans. 6:2 FTOH and 8:2 FTOH were found in the gas phase of four brands of frying pans, and the sources of FTOHs released from nonstick cookware are under investigation. We observed a significant decrease in gas-phase PFOA following repeated use of one brand of pan, whereas the other brand did not show a significant reduction in PFOA release following multiple uses. PFOA was found at >5 ng during the fourth use of both brands of pans. FTOHs were not found after the second use of either brand of pans. PFOA was found at 5–34 ng in the vapors produced from a prepacked microwave popcorn bag. PFOA was not found in the vapors produced from plain white corn kernels popped in a polypropylene container. 6:2 FTOH and 8:2 FTOH were measured in the vapors produced from one brand of prepacked microwave popcorn at 223 ± 37 ng and 258 ± 36 ng per bag, respectively, but not measured at >20 ng (LOQ) in the other two brands. On the packaging surface of one brand of microwave popcorn several PFCAs, including C5–C12, 6:2 FTOH, and 8:2 FTOH, were found at concentrations in the order of 0.5–6.0 ng/cm². This study suggests that residual PFOA is not completely removed during the fabrication process of the nonstick coating for cookware. They remain as residuals on the surface and may be off-gassed when heated at normal cooking temperatures.

Document#: BIN.PFCS.5.5

TITLE: Seabird Guano Is an Efficient Conveyer of Persistent Organic Pollutants (POPs) to Arctic Lake Ecosystems

Author: Evenset, A., J. Carroll, G. Christensen, R. Kallenborn, D. Gregor, G. Gabrielsen

Source: Environ. Sci. Tech 2007 41:1173-1179

Abstract: Migratory seabirds have been linked to localized “hot-spots” of contamination in remote Arctic lakes. One of these lakes is Lake Ellasjøen on Bjørnøya in the Barents Sea. Here we provide quantitative evidence demonstrating that even relatively small populations of certain seabird species can lead to major impacts for ecosystems. In the present example, seabird guano accounts for approximately 14% of the contaminant inventory of the Lake Ellasjøen catchment area, approximately 80% of the contaminant inventory of the lake itself, and is approximately thirty times more efficient as a contaminant transport pathway compared to atmospheric long-range transport. We have further shown that this biological transport mechanism is an important contaminant exposure route for ecosystems, responsible for POPs levels in freshwater fish that are an order of magnitude higher than those in Arctic top predators. Given the worldwide presence of seabird colonies in coastal marine areas where resources are also harvested by humans, this biological transport pathway may be a greater source of dietary contamination than is currently recognized with consequent risks for human health.

Document#: BIN.OR.SR.5.3