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Levels of Legacy and Emerging Persistent Organic Pollutants in Inuit Preschoolers of Northern Quebec, Canada

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Extended Abstract

Most persistent organic pollutants (POPs) can be transported long distances by air and water currents, and can affect plants, wildlife and people far from where they are generated and released. As a result, Arctic populations are exposed to substantial levels of hazardous environmental contaminants that can negatively affect their health and cause adverse effects on child development. The purpose of this study was to determine the exposure to legacy and emerging POPs of Inuit children attending childcare centres in Nunavik. Ten of the 14 Nunavik communities (northern Quebec, Canada) were visited at least once from 2006 to 2010 and a total of 245 Inuit children were recruited (mean age ± standard deviation: 24.7 ± 9.7 months). Blood samples were available for 114 to 181 of the children, depending on the contaminant examined. Blood samples were analyzed to determine concentrations of polychlorinated biphenyls (PCBs),

pesticides, brominated flame retardants (BFR) [e.g., polybrominated diphenyl ethers (PBDEs)] and perfluoroalkyl and polyfluoroalkyl substances [PFASs; e.g. perfluorooctanesulfonate (PFOS) and perfluorooctane (PFOA)]. As reported elsewhere (Turgeon O'Brien et al., 2012), PCBs, toxaphene, chlorinated pesticides, and BFR concentrations were measured in plasma samples by gas chromatography/mass spectrometry (GC/MS). Plasma PFAS determination was performed by high-performance liquid chromatography tandem mass spectrometry (HPLC-MS/MS). Statistical analyses were performed with SAS 9.4. A value equal to half the limit of detection of the analytical method was attributed to non detected contaminants in biological samples. The percent detection level and the geometric mean were calculated for each contaminant. PCB-153 [(GM) 20.6 ng/g of lipid), PFOS (GM 3101 ng/L), and PFOA (GM 1571 ng/L) were detected in all samples. BDE-47 (GM 28.8 ng/g of lipid) was detected in nearly all blood samples (98.3%). Oxychlordane and *trans*-nonachlor were detected in 93.4%, and 92.8% of children respectively. Levels of most legacy POPs obtained between 2006 and 2010 were lower than those observed between 2006 and 2008 (Turgeon O'Brien et al., 2012) and are in agreement with the downward trend reported in Nunavik and in the Arctic. On the contrary, PBDE levels were similar for both time periods. However, these levels are more elevated than the ones found in many children and adolescents worldwide. PBDEs have been used in many consumer and industrial products for more than 50 years. For example, pentaBDE has been used in upholstered furniture, carpet padding, draperies, automotive and aircraft interiors, and octaBDE has been added to television and computer casings and monitors. Although pentaBDE and octaBDE have been banned, exposure to these compounds will most likely continue as they remain in products fabricated before the ban and in new products built with recycled PBDE-containing material. Growing evidence suggests that PBDEs have adverse impacts on child neurobehavioral development and may cause thyroid hormone disruption. The continued assessment of blood contaminant levels in this population is essential, particularly for PBDEs.

Turgeon O'Brien, H., Blanchet, R., Gagné, D., Lauzière, J., Vézina, C., & Ayotte, P. (2012). Exposure to Toxic Metals and Persistent Organic Pollutants in Inuit Children Attending Childcare Centers in Nunavik, Canada. *Environmental Science & Technology*, 46, 4614-4623.