

## **Air pollution exposure in early pregnancy linked to infants' risk of developing allergies**

**HAMILTON, ON (20 December 2019)**

A mother's exposure to traffic-related air pollution during the first three months of pregnancy is associated with an increase in her child's risk of having allergic sensitization by age one, according to CHILD Cohort Study research published in the [\*Journal of Allergy and Clinical Immunology\*](#) in December.

“Early pregnancy is a critical period of development when a child's DNA is particularly vulnerable to environmental exposures, such as traffic-related air pollution (TRAP),” said senior author Dr. Stuart Turvey, the Aubrey J. Tingle Professor of Pediatric Immunology at The University of British Columbia (UBC) and Director of Clinical Research at BC Children's Hospital. Dr. Turvey is Co-Director of the CHILD Cohort Study and the Vancouver site lead.

“This finding supports mounting evidence that TRAP exposure *in utero* can be harmful and is linked to allergic sensitization, which is a risk factor for the development of asthma and allergies later in childhood.”

The researchers studied 145 mothers and their children participating in the CHILD Cohort Study and used geospatial models of air pollution to determine the level of TRAP the mothers were exposed to during pregnancy. At one year of age, the children underwent skin prick tests to check for allergic sensitization to common food and inhaled allergens.

The study is the first to provide evidence that a biological marker known as “epigenetic gestational age” can be used to understand how TRAP can change the molecular make-up of a cell to affect the activity of a baby's genes related to asthma and allergy. Epigenetic gestational age or eGA can be thought of as a biomarker of fetal development that represents biological age.

“We demonstrated that eGA is in the causal pathway linking air pollution to the risk of developing allergies,” explained Dr. Hind Sbihi, the study's lead author and a UBC postdoctoral fellow. “We used cells from the baby's umbilical cord to measure DNA methylation, which are biochemical marks on the DNA and its proteins. These marks allowed us to estimate the infant's eGA and compare it to the infant's actual chronological age; when there was a mismatch between the eGA and chronological age related to TRAP exposure, we found there was an increased risk for allergic sensitization.”

A statistical analysis estimated that about 30% of the association between air pollution and allergic sensitization was mediated by deviations between epigenetic and actual gestational age. The epigenetic work was carried out in the lab of co-author Dr. Michael Kobor, a Professor of Medical Genetics at UBC and a Tier 1 Canada Research Chair in Social Epigenetics.

“Although these proof-of-concept findings need to be studied further, this work is exciting for those of us working in the area of epigenetics,” said Dr. Kobor. “Our results show that the impact of exposure to air pollution can be detected through epigenetic patterns present at birth, and support individual-level and policy-level action to reduce exposure to traffic-related air pollution during pregnancy, hopefully with disease prevention in mind.”

**About the CHILD Cohort Study:** Launched in 2008 by CIHR and AllerGen NCE, the [CHILD Cohort Study \(CHILD\)](#) is tracking nearly 3,500 Canadian infants and their families to help determine the root causes of chronic diseases such as asthma, allergies and obesity. CHILD spans four provinces, involving over 140 multidisciplinary researchers, students and research staff. [Watch the CHILD Cohort Study videos.](#)

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