

## Makeup of fungi in baby's gut may influence allergies at age 5

HAMILTON, ON (7 June 2021)

The fungi in a baby's gut in the first year of life may be associated with allergies later on, according to new findings from the CHILD Cohort Study (CHILD).

The study, published in *mBIO*, found that the composition of an infant's gut fungi, combined with the presence of certain early-life factors, was associated with a higher risk of allergic sensitization to inhaled allergens such as house dust mites, weed or grass pollen, animal dander and moulds at age five.

"While the term 'microbiome' technically refers to bacteria, fungi, viruses, parasites, and other microorganisms found in the gut, the majority of studies have focused on the bacteria and how they influence asthma and allergies," explains the study's senior co-author Dr. Stuart Turvey, a professor in The University of British Columbia's department of pediatrics, investigator at BC Children's Hospital and co-director of CHILD.

"Relatively little is known about how the various fungi in the gut influence the development of a child's immune system and eventual allergy risk, so we're excited about these findings."

The researchers studied a subset of 343 Canadian infants participating in [CHILD](#) – a longitudinal research study that has been following the physical, social and cognitive development of nearly 3,500 Canadian children from before birth.

Using genetic sequencing, the team analyzed stool samples taken from the children at three and 12 months of age to identify the fungi present in the children's guts. At five years of age, the children received skin-prick allergy tests to food and environmental inhaled allergens and were evaluated for asthma.

"We are among the first to show that the composition of the gut fungi, collectively referred to as the gut *mycobiota*, changes dramatically over the course of the first year of life," says first author **Rozlyn Boutin**, an MD/PhD student in the Department of Microbiology and Immunology at UBC. "We also identified key early-life factors associated with variations in these fungal communities."

Using a machine-learning algorithm, the researchers combined fungal, environmental and clinical data to predict with an 81% accuracy – more reliably than ever before – whether or not an infant would develop inhalant allergies at age five.

"We found that antibiotic use, older siblings, breastfeeding status at one year, season and location of birth to be the most important factors for predicting which children would develop inhalant allergies down the line," adds Boutin. "These five factors, which we have shown are associated with differences in gut mycobiota composition, represent potentially modifiable environmental risk factors for allergies and thus have important implications for disease prevention."

Surprisingly, knowledge of a child's fungal community composition at three months of age alone was sufficient to predict inhalant atopy risk at age five years with an accuracy of 78%, according to the authors. However, the features of fungal communities associated with inhalant allergy risk and asthma at age five differed at three months and one year of age.

"Although many studies have suggested a 'critical window' within the first 100 days of life during which the gut microbiota has a unique ability to influence immune-mediated health outcomes, our

data suggests a more complex picture when fungi are considered,” comments senior co-author Dr. B. Brett Finlay, a professor at the Michael Smith Laboratories and in the departments of biochemistry and molecular biology and of microbiology and immunology at UBC.

“Our findings show that fungi are a crucial but overlooked piece of the puzzle linking disruptions in an infant’s gut microbiome to childhood asthma and allergies,” adds Dr. Finlay. “Going forward, this raises the exciting possibility of designing and implementing inexpensive interventions with the potential to influence gut microbiota community composition and long-term health.”

**About the CHILD Cohort Study:** Launched in 2008 by CIHR and AllerGen Inc. (a Networks of Centres of Excellence from 2004 to 2019), the [CHILD Cohort Study \(CHILD\)](#) is tracking nearly 3,500 Canadian infants and their families to determine the root causes of chronic diseases such as asthma, allergies and obesity. CHILD spans four provinces, and involves over 140 multidisciplinary researchers, students and research staff. [Watch the CHILD Cohort Study videos.](#)

- 30 -

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