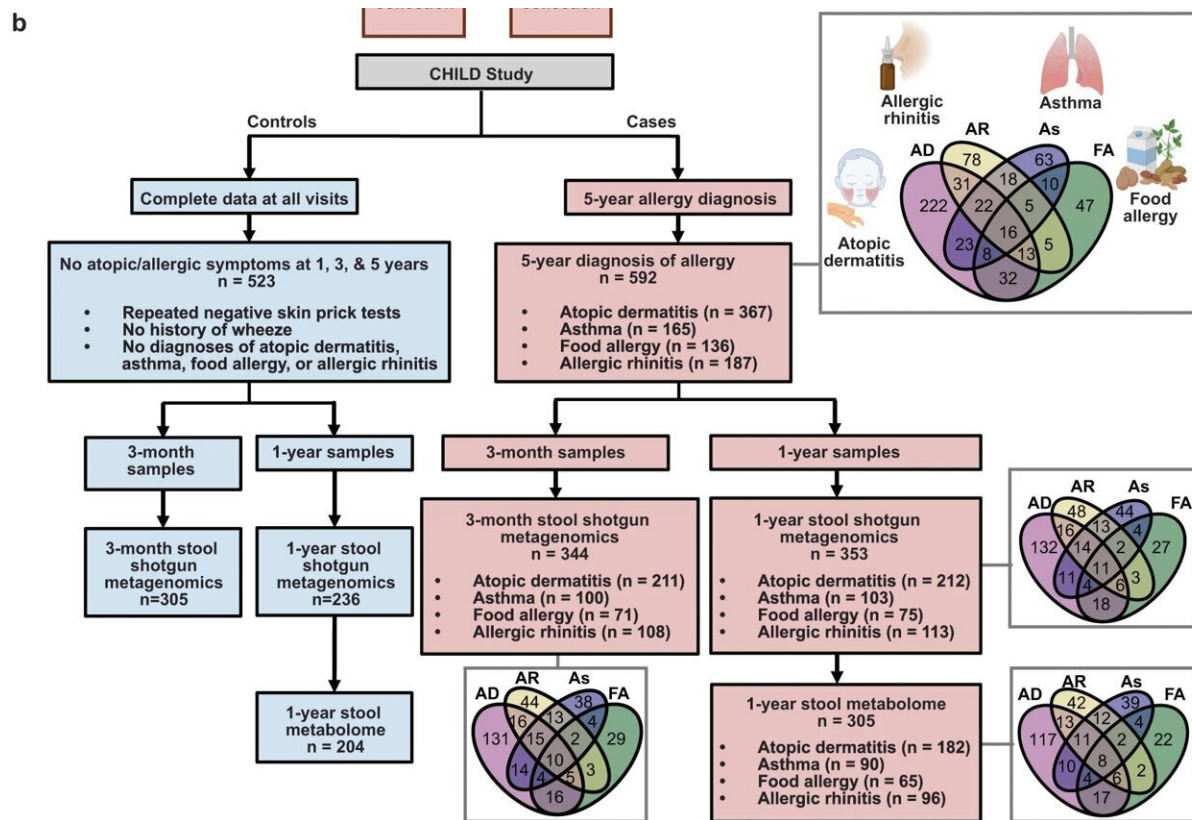


Researchers discover common origin behind major childhood allergies

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Clinical evaluation of CHILD participants and data collection from biological samples. **a** Timeline of CHILD enrollment and clinical evaluations from gestation through 5-year evaluations. **b** Consort diagram of CHILD participants and samples included in this study, including the composition of participant allergic diseases and their interrelated diagnoses. Created with Biorender.com. Credit: *Nature Communications* (2023). DOI: 10.1038/s41467-023-40336-4

Several major childhood allergies may all stem from the community of bacteria living in our gut, according to a new study led by researchers at the University of British Columbia and BC Children's Hospital.

The research, published in *Nature Communications*, identifies gut microbiome features and early life influences that are associated with children developing any of four common allergies—eczema, asthma, food [allergy](#) and/or hay fever. The findings could lead to methods of predicting whether a child will develop allergies, and ways to prevent them from developing at all.

"We're seeing more and more children and families seeking help at the [emergency department](#) due to allergies," said Dr. Stuart Turvey, professor in the department of pediatrics at UBC and an investigator at BC Children's Hospital Research Institute, and co-senior author on the study. "Hundreds of millions of children worldwide suffer from allergies, including one in three children in Canada, and it's important to understand why this is happening and how it can be prevented."

The study is one of the first to examine four distinct school-aged pediatric allergies at once. While these [allergic diseases](#) each have unique symptoms, the Turvey lab was curious whether they might have a [common origin](#) linked to the infant gut microbiota composition.

"These are technically different diagnoses, each with their own list of symptoms, so most researchers tend to study them individually," says Dr. Charisse Petersen, co-senior author on the paper and postdoctoral fellow in the Turvey lab. "But when you look at what is going wrong at a [cellular level](#), they actually have a lot in common."

For the study, researchers examined clinical assessments from 1,115 children who were tracked from birth to age five. Roughly half of the children (523) had no evidence of allergies at any time, while more than

half (592) were diagnosed with one or more allergic disorders by an expert physician. The researchers evaluated the children's microbiomes from stool samples collected at clinical visits at three months and one year of age.

The [stool samples](#) revealed a bacterial signature that was associated with the children developing any of the four allergies by five years of age. The bacterial signature is a hallmark of dysbiosis, or an imbalanced gut microbiota, that likely resulted in a compromised intestinal lining and an elevated inflammatory response within the gut.

"Typically, our bodies tolerate the millions of bacteria living in our guts because they do so many good things for our health. Some of the ways we tolerate them are by keeping a strong barrier between them and our [immune cells](#) and by limiting inflammatory signals that would call those immune cells into action," says Courtney Hoskinson, a Ph.D. candidate at UBC and first author on the paper. "We found a common breakdown in these mechanisms in babies prior to the development of allergies."

Many factors can shape the infant gut microbiota, including diet, how we are born, where we live, and our exposure to antibiotics. For example, antibiotics may wipe out sensitive bacteria, while breastfeeding tends to replenish and provide necessary food for bacteria in the infant gut. The researchers examined how these types of influences affected the balance of gut microbiota and the development of allergies.

"There are a lot of potential insights from this robust analysis," says Dr. Turvey. "From these data we can see that factors such as antibiotic usage in the first year of life are more likely to result in later allergic disorders, while breastfeeding for the first six months is protective. This was universal to all the allergic disorders we studied."

Now the researchers hope to leverage the findings to inform treatments

that correct an imbalanced gut microbiota and could potentially prevent allergies from developing.

"Developing therapies that change these interactions during infancy may therefore prevent the development of all sorts of allergic diseases in childhood, which often last a lifetime," says Dr. Turvey.

The research is part of the [Canadian Healthy Infant Longitudinal Development \(CHILD\) Cohort Study](#) that recruited families through BC Children's Hospital and BC Women's Hospital and Health Center and other pediatric hospitals across Canada.

Since launching in 2008, the team of Canadian researchers has tracked the health, growth and environments of kids from birth and made important discoveries about how asthma and allergies develop.

More information: Courtney Hoskinson et al, Delayed gut microbiota maturation in the first year of life is a hallmark of pediatric allergic disease, *Nature Communications* (2023). [DOI: 10.1038/s41467-023-40336-4](#)

Provided by University of British Columbia

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