Baby's first poop can help predict risk of developing allergies

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It may seem like an unusual place to go looking for answers, but the contents of a baby's first diaper can reveal a lot about a newborn's future health.

In a new study published today in *Cell Reports Medicine*, a team of University of British Columbia (UBC) researchers has shown that the composition of a baby's first poop—a thick, dark green substance known as meconium—is associated with whether or not a child will develop allergies within their first year of life.

"Our analysis revealed that newborns who developed allergic sensitization by one year of age had significantly less 'rich' meconium at birth, compared to those who didn't develop allergic sensitization," says the study's senior co-author Dr. Brett Finlay, a professor at the Michael Smith Laboratories and departments of biochemistry and molecular biology, and microbiology and immunology at UBC.

Meconium, which is typically passed within the first day of life, is made up of a variety of materials ingested and excreted during development, ranging from skin cells, amniotic fluid and various molecules known as metabolites.

"Meconium is like a time capsule, revealing what the infant was exposed to before it was born. It contains all sorts of molecules encountered and accumulated from the mother while in the womb, and it then becomes the initial food source for the earliest gut microbes," says the study's lead author Dr. Charisse Petersen, a research associate in UBC's department of pediatrics.

As part of the study, the researchers analyzed meconium samples from 100 infants enrolled in the CHILD Cohort Study (CHILD), a world-leading birth cohort study in maternal, newborn and child health research.

They discovered that the fewer different types of molecules a baby's meconium contained, the greater the child's risk of developing allergies by one year. They also found that a reduction in certain molecules was associated with changes to key bacterial groups. These bacteria groups play a critical role in the development and maturation of a vast ecosystem of gut microbes, known as the microbiota, which is a powerful player in health and disease.

"This work shows that the development of a healthy immune system and microbiota may actually start well before a child is born—and signals that the tiny molecules an infant is exposed to in the womb play a fundamental role in future health," says Dr. Petersen.

Using a machine-learning algorithm, the researchers combined meconium, microbe and clinical data to predict with a high degree of accuracy (76 percent), and more reliably than ever before, whether or not an infant would develop allergies by one year of age.

The study findings have important implications for

at-risk infants, say the researchers.

"We know that children with allergies are at the highest risk of also developing asthma. Now we have an opportunity to identify at-risk infants who could benefit from early interventions before they even begin to show signs and symptoms of allergies or asthma later in life," says the study's senior co-author Dr. Stuart Turvey, a professor in UBC's department of pediatrics, investigator at BC Children's Hospital and co-director of the CHILD Cohort Study.

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