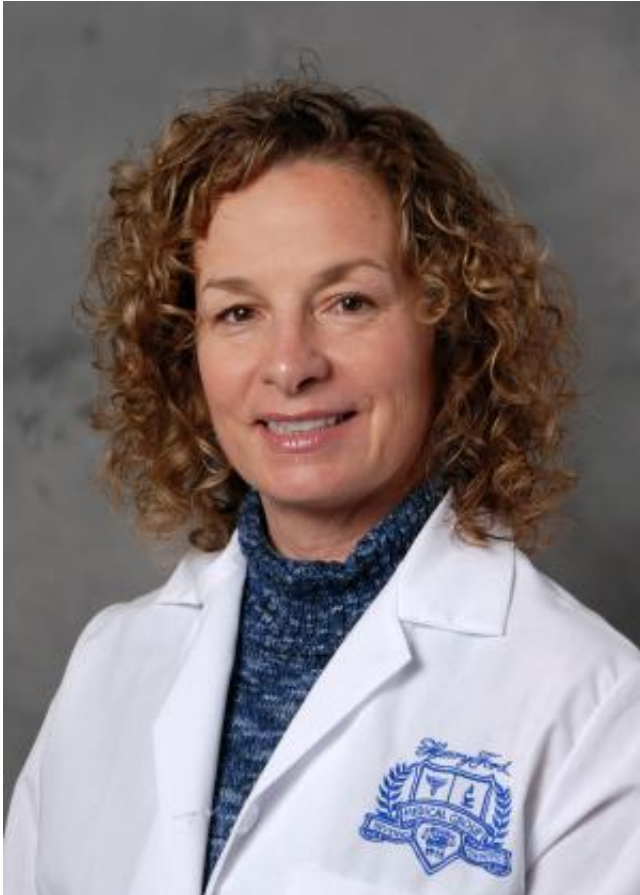


Breastfeeding, other factors help shape immune system early in life

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Christine Cole Johnson, Ph.D., M.P.H., is chair of Henry Ford Hospital's Department of Public Health Sciences and principal research investigator. Credit: Henry Ford Hospital

Henry Ford Hospital researchers say that breastfeeding and other factors influence a baby's immune system development and susceptibility to allergies and asthma by what's in their gut.

The striking findings from a series of studies further advance the so-called hygiene hypothesis theory that early childhood exposure to microorganisms affects the immune system's development and onset of allergies, says Christine Cole Johnson,

Ph.D., MPH, chair of Henry Ford's Department of Public Health Sciences and principal research investigator.

The [gut microbiome](#) is the collection of microorganisms in the gastrointestinal, or GI, tract, and the [human body](#) has billions of these microbes. The GI tract contains what scientists often call a bacterial ecosystem. The gut microbiome is known to play an important role in immune system development, and is thought to contribute to a host of diseases like obesity, autoimmune diseases, circulating disorders and pediatric allergies and infection.

"For years now, we've always thought that a sterile environment was not good for babies. Our research shows why. Exposure to these microorganisms, or bacteria, in the first few months after birth actually help stimulate the immune system," Dr. Johnson says.

"The immune system is designed to be exposed to bacteria on a grand scale. If you minimize those exposures, the immune system won't develop optimally."

The studies are being presented at the annual meeting of the American Academy of Allergy, Asthma & Immunology in Houston.

The findings come from Henry Ford's long-running Wayne County Health, Environment, Allergy and Asthma Longitudinal Study (WHEALS), funded by the National Institute of Allergy and Infectious Diseases, that is exploring the role of environmental factors and measuring biological markers to understand how allergies and asthma develop early in life.

In six separate studies, researchers sought to evaluate whether breastfeeding and maternal and birth factors had any effect on a baby's gut microbiome and allergic and asthma outcomes.

Using data collected from the WHEALS birth cohort, researchers analyzed stool samples from infants taken at one month and six months after birth. They also looked at whether the gut microbiome impacted the development of regulatory T-cells, or Treg, which are known to regulate the immune system. Highlights:

Provided by Henry Ford Health System

- Breastfed babies at one month and six months had distinct microbiome compositions compared to non-breastfed babies. These distinct compositions may influence immune system development.
- Breastfed babies at one month were at decreased risk of developing allergies to pets.
- Asthmatic children who had nighttime coughing or flare-ups had a distinct microbiome composition during the first year of life.
- For the first time, gut microbiome composition was shown to be associated with increasing Treg cells.

Researchers found that a baby's gut microbiome patterns vary by:

- A mother's race/ethnicity.
- A baby's gestational age at birth.
- Prenatal and postnatal exposure to tobacco smoke.
- Caesarean section versus vaginal delivery.
- Presence of pets in the home.

Dr. Johnson and her team, which includes researchers at George Regents University, University of California-San Francisco and University of Michigan, have been at the forefront of research investigating how allergies develop in early life and the role of environmental factors. Henry Ford's landmark 2002 study found exposure to dogs or cats in the first year of a baby's life reduced their risk for allergies.

"The research is telling us that exposure to a higher and more diverse burden of environmental bacteria and specific patterns of [gut](#) bacteria appear to boost the [immune system](#)'s protection against allergies and asthma," Dr. Johnson says.

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