Study Finds Food Allergy is Associated with Lower Risk of SARS-CoV-2 Infection

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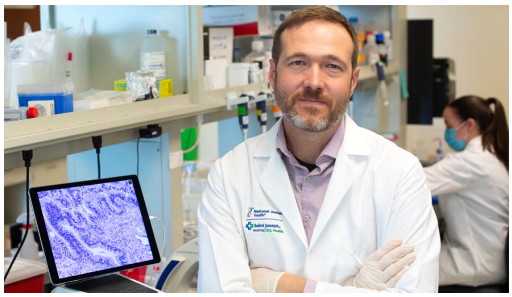
DENVER — People with food allergies are at lower risk for infection with SARS-CoV-2, the virus that causes COVID-19. In contrast, obesity and high body mass index are risk factors for infection, whereas those with asthma are not at increased infection risk.



Those are some of the findings from the Human Epidemiology and Response to SARS-CoV-2 (HEROS) study, co-led by National Jewish Health and Vanderbilt University researchers and funded by the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health. The study team just published these results in the *Journal of Allergy and Clinical Immunology*.

The study also found that children ages 12 years or younger are just as likely to become infected with the virus as teenagers and adults, but 75% of infections in children are asymptomatic. In addition, the study confirmed that SARS-CoV-2 transmission within households with children is high.

Max A. Seibold, Ph.D., was the lead National Jewish Health investigator and the study's first author. Dr. Seibold is director of computational biology, the Wohlberg and Lambert Endowed Chair of Pharmacogenomics, and a professor of pediatrics in the Center for Genes, Environment, and Health at National Jewish Health in Denver. Camille Moore, Ph.D., Assistant Professor of Biostatistics at the Center for Genes, Environment, and Health at National Jewish Health, was the lead statistician.

The study provides strong evidence that people with asthma, a risk group for poor outcomes from other viral respiratory infections, are not at increased risk for SARS-CoV-2 infection. Although obesity is an established risk factor for poor COVID-19 illness outcomes, the HEROS study found obesity and high BMI are also risk factors for infection itself. Study authors speculated that the systemic inflammation that often accompanies obesity may underlie the increased risk experienced by this group.

Unexpectedly, the researchers found SARS-CoV-2 infection risk was 50% lower for food allergic participants. The researchers speculate a different type of inflammation, caused by type 2 cytokines and common among food allergic individuals, may drive the decreased risk found in people with food allergies. Supporting this theory, Dr. Seibold has previously found allergic type 2 inflammation can reduce airway levels of the SARS-CoV-2 receptor gene, ACE2, leading him to speculate that food allergic patients may have lower ACE2 receptor levels, reducing the ability of the virus to infect cells in these individuals.

"Our findings that diseases characterized by different types of inflammation are associated with infection risk, suggest underlying inflammation is an important determinant of susceptibility to SARS-CoV-2 infection," says Dr. Seibold.

The HEROS study surveilled nearly 1,400 households for SARS-CoV-2 infections. Households included at least one person age 21 years or younger, and took place across 12 United States cities. Nasal swabs were self-collected by

families every two weeks, regardless of symptoms, and during the first respiratory illness reported by the household, then tested for the SARS-CoV-2 virus. Weekly symptom surveys were also completed by households. Participants were recruited from multiple NIH studies on asthma and allergic diseases. This design resulted in roughly half of study participants having physician-diagnosed, self-reported food allergy, asthma, eczema or allergic rhinitis, allowing robust analysis of whether these conditions were associated with infection risk.

The wide age distribution of the HEROS cohort also allowed the researchers to assess whether infection risk was dependent on age. They found children, teenagers, and adults all exhibited equivalent infection risk. However, they found 75% of infected children were asymptomatic, whereas only 59% of infected teenagers and 38% of infected adults were asymptomatic. The study also found once one household member became infected with SARS-CoV-2, the virus usually was transmitted to another family member. Although children were considerably more likely to be asymptomatic, they exhibited viral loads comparable to those of teenagers and adults.

“Given children are usually asymptomatic with infection, yet harbor high viral loads and require close caregiver contact, we speculate children may play an important role in household transmission events,” explained Dr. Seibold.

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