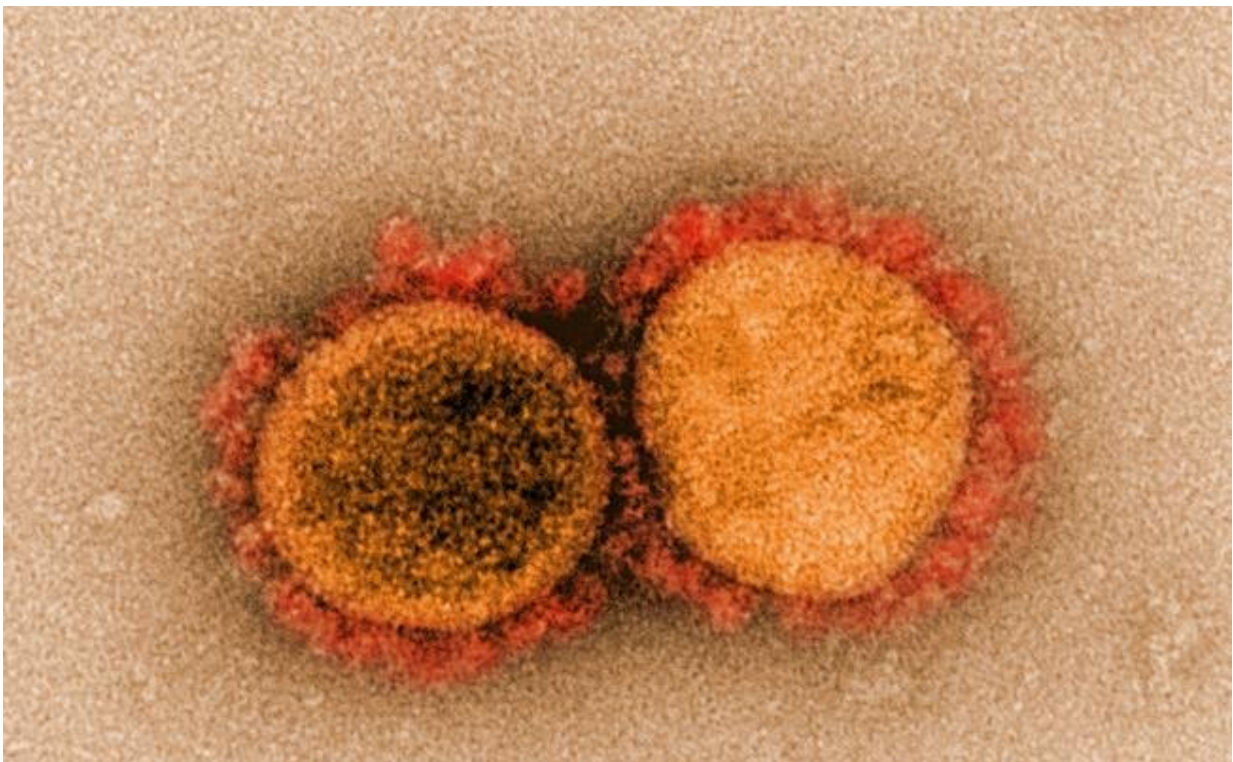


Study finds that children's antibody responses to COVID-19 are stronger than adults'

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Transmission electron micrograph of SARS-CoV-2 virus particles, isolated from a patient. Image captured and color-enhanced at the NIAID Integrated Research Facility (IRF) in Fort Detrick, Maryland. Credit: NIAID

Infants and toddlers who experienced community infection with SARS-

CoV-2, the coronavirus that causes COVID-19, had significantly higher levels of antibodies against the virus compared to adults, according to a study led by researchers at the Johns Hopkins Bloomberg School of Public Health in collaboration with the Centers for Disease Control and Prevention.

The new study suggests that children tend to have strong [antibody responses](#) after SARS-CoV-2 infection. Understanding antibody responses to SARS-CoV-2 at different ages can inform COVID-19 vaccine strategies and policies.

The findings will be published online March 22 in the journal *JCI Insight*.

This analysis is based on samples taken at enrollment from 682 children and adults in 175 Maryland households who participated in a household surveillance study of SARS-CoV-2 infection and had not yet received a COVID-19 vaccine. Participants ranged in age from 0 to 62 years, and enrollment samples were collected between November 2020 and March 2021.

The researchers found evidence of SARS-CoV-2 antibodies, indicating prior infection with the virus, in 56 people at the time of enrollment. Of these 56 people with antibody evidence of previous SARS-CoV-2 infection, 15 were children ages 0 to 4 years, with the youngest three months old; 13 were children ages 5-17 years; and 28 were adults ages 18 years or older. Antibodies to a key site on the virus's outer spike protein—the "receptor-binding domain" (RBD)—were present at much higher levels in children compared to adults: more than 13 times higher in children age 0-4, and nearly 9 times higher in children age 5-17. And levels of SARS-CoV-2 neutralizing antibodies, which may help to predict protection against severe COVID infection, were nearly twice as high in children ages 0-4 compared to adults.

In most households where both children and adults had antibody evidence of SARS-CoV-2 infection, children ages 0-4 years had the highest levels of SARS-CoV-2 RBD and neutralizing antibodies of all infected household members.

"This study demonstrates that even children in the first few years of life have the capacity to develop strong antibody responses to SARS-CoV-2 infection, which in some cases exceed adult responses," says Ruth Karron, MD, lead investigator and a professor in the Department of International Health and director of the Johns Hopkins Vaccine Initiative at the Bloomberg School.

Karron and colleagues set up their prospective household surveillance study, known as SARS-CoV-2 Epidemiology And Response in Children (SEARCh), to learn more about SARS-CoV-2 infection in children less than 5 years of age, a relatively understudied population. To be included in the study, each household had to have at least one child four years old or younger, and agree to approximately 8 months of follow-up for evidence of SARS-CoV-2 infection.

The analysis of these samples also found that:

- In the majority of households with SARS-CoV-2-positive children 0-4 years old and other affected household members, the children 0-4 years old had the highest levels of anti-RBD and neutralizing antibodies.
- 56 (8.2 percent) of the blood samples, from 22 households (12.6 percent) contained detectable antibodies against the SARS-CoV-2 (original Wuhan variant) spike protein RBD, indicating prior infection with the virus. Half of the 56 previously infected individuals were children.
- Only about half of those with RBD antibodies had been previously told by a health care provider that they may have

SARS-CoV-2 infection, indicating that many milder or asymptomatic SARS-CoV-2 infections in the community may not be recognized and counted as infection cases. None of the individuals in the study with previously suspected SARS-CoV-2 [infection](#) were hospitalized because of their infections.

"Very [young children](#) in our study developed high titers of antibody to the SARS-CoV-2 spike protein, which is the target antigen for COVID vaccines," Karron says. "These findings should provide some reassurance that with the appropriate vaccine doses we can effectively immunize very young children against SARS-CoV-2."

Few studies have looked at antibody responses to SARS-CoV-2 in both children and adults. A study of hospitalized patients found that adults mounted higher neutralizing antibody responses than children. In contrast, several community-based studies found that children mounted robust responses. Findings from this study expand on those from previous community-based studies.

Children ages 5-17 years are currently eligible for the Pfizer-BioNTech mRNA COVID-19 vaccine, and studies of the vaccine in younger [children](#) are ongoing.

Karron and colleagues are continuing to analyze follow-up specimens from these 56 individuals, as well as individuals infected during the SEARCH study, to learn more about the quality of their SARS-CoV-2 antibody responses and to see how durable their antibody responses are over time.

"Binding and Neutralizing Antibody Responses to SARS-CoV-2 in Very Young Children Exceed Those in Adults" was written by Ruth Karron, Maria Garcia Quesada, Elizabeth Schappell, Stephen Schmidt, Maria Deloria Knoll, Marissa Hetrich, Vic Veguilla, Nicole Doria-Rose,

Fatimah Dawood, and other members of the SEARCh Study Team.

More information: Binding and Neutralizing Antibody Responses to SARS-CoV-2 in Very Young Children Exceed Those in Adults, *JCI Insight* (2022).

Provided by Johns Hopkins University Bloomberg School of Public Health

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