Unvaccinated children mount COVID-19 immune response, but vaccination may be key to strengthening immunity

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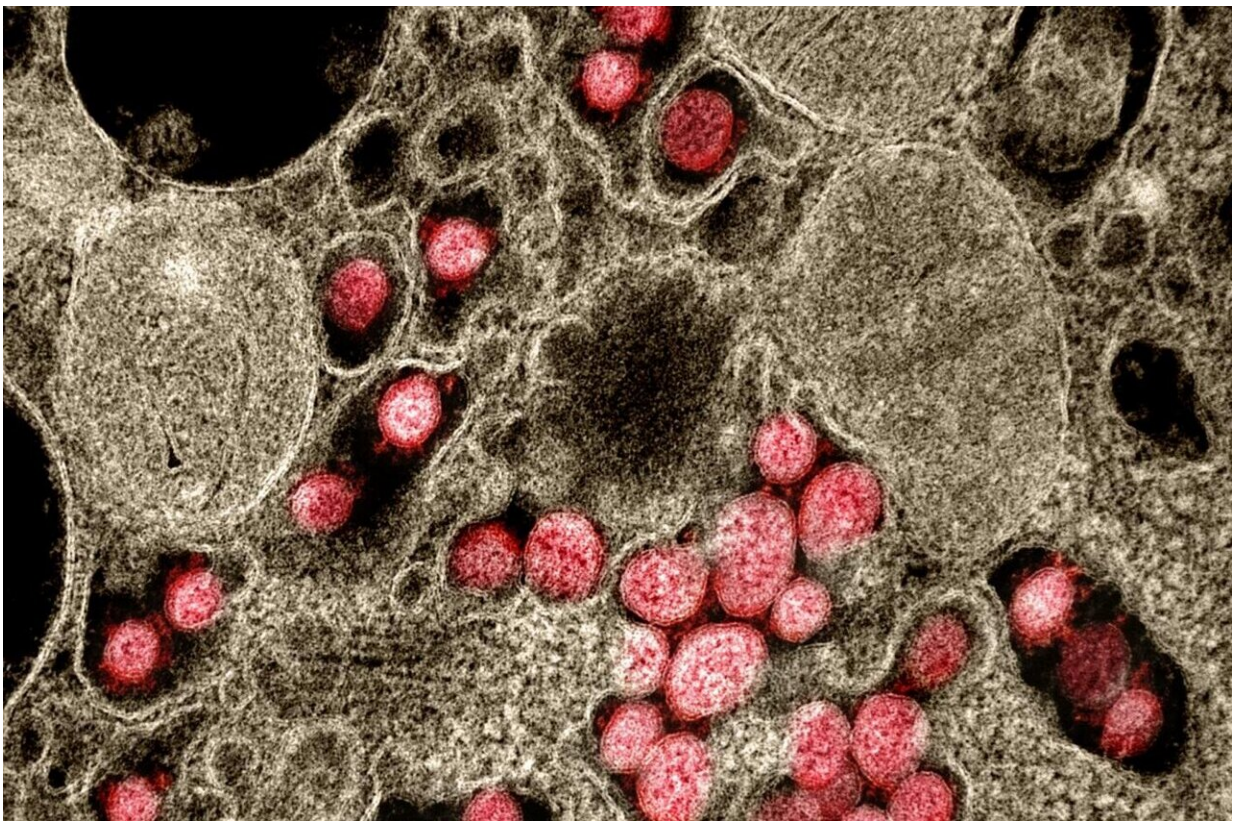

Transmission electron micrograph of SARS-CoV-2 virus particles isolated from a patient. Credit: NIAID

Unvaccinated children mount a rapid immune response to SARS-CoV-2

which may contribute to less severe symptoms, but which may also limit the development of an immune "memory" response to ward off future infections, a study led by the Peter Doherty Institute for Infection and Immunity (Doherty Institute) has found.

Published in *Immunity*, the study is among the first to analyze the immune response of children following infection with SARS-CoV-2, using new technologies and a group of more than 50 children from Melbourne and Los Angeles.

They found that unvaccinated children that developed antibodies against SARS-CoV-2 also produced memory killer T cells—the cells responsible for recognizing and fighting off subsequent infections, even against other variants of concern. However, these memory T cells were fewer in number in children when compared to adults.

Lead author University of Melbourne Dr. Louise Rowntree, a Research Fellow at the Doherty Institute said that children's limited ability to generate strong memory killer T cell responses following natural infection may leave them vulnerable to future infections.

"Memory killer T cells are essential for protection against severe disease in the future and while we observed these T cells in children, they were at a lower frequency compared to adults" Dr. Rowntree said.

"We also found that not all household contacts who were exposed to SARS-CoV-2 generated memory T cell responses" Dr. Rowntree said.

The team used specific research tools called tetramers to perform in-depth immune analyses of SARS-CoV-2-specific T cells in children, which allow them to decipher several aspects of memory killer T cell responses.

Study co-senior author University of Melbourne Dr. Carolien van de Sandt, a Research Fellow at the Doherty Institute, said that these killer T cells are especially important in protection against new SARS-CoV-2 variants, even those which are no longer recognized by antibodies.

"The killer T cells in our study target fragments of the virus that are highly stable and therefore provide protection against severe disease even when antibodies fail to recognize the variant" Dr. van de Sandt said.

Study senior author and University of Melbourne Professor Katherine Kedzierska, Laboratory Head at the Doherty Institute said that immunity to SARS-CoV-2 infection in children is greatly understudied.

"It is important to continue researching how children's immune system fights COVID-19, especially as worldwide vaccination rates in children fall far behind that of adults,"

"Our study makes a case for why vaccination of children should be considered a major advantage, as COVID-19 vaccines specifically aim to induce memory T cell and B cell responses. These are the key components of our immune system which protect us against subsequent SARS-CoV-2 exposures, even when new variants emerge." Professor Kedzierska said.

The study was conducted in collaboration with the Royal Melbourne Hospital, Murdoch Children's Research Institute, St Jude Children's Research Hospital (U.S.), Children's Hospital Los Angeles (U.S.) and Monash University.

More information: Louise C. Rowntree et al, SARS-CoV-2-specific T cell memory with common TCRαβ motifs is established in unvaccinated children who seroconvert after infection, *Immunity* (2022). DOI: 10.1016/j.immuni.2022.06.003

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