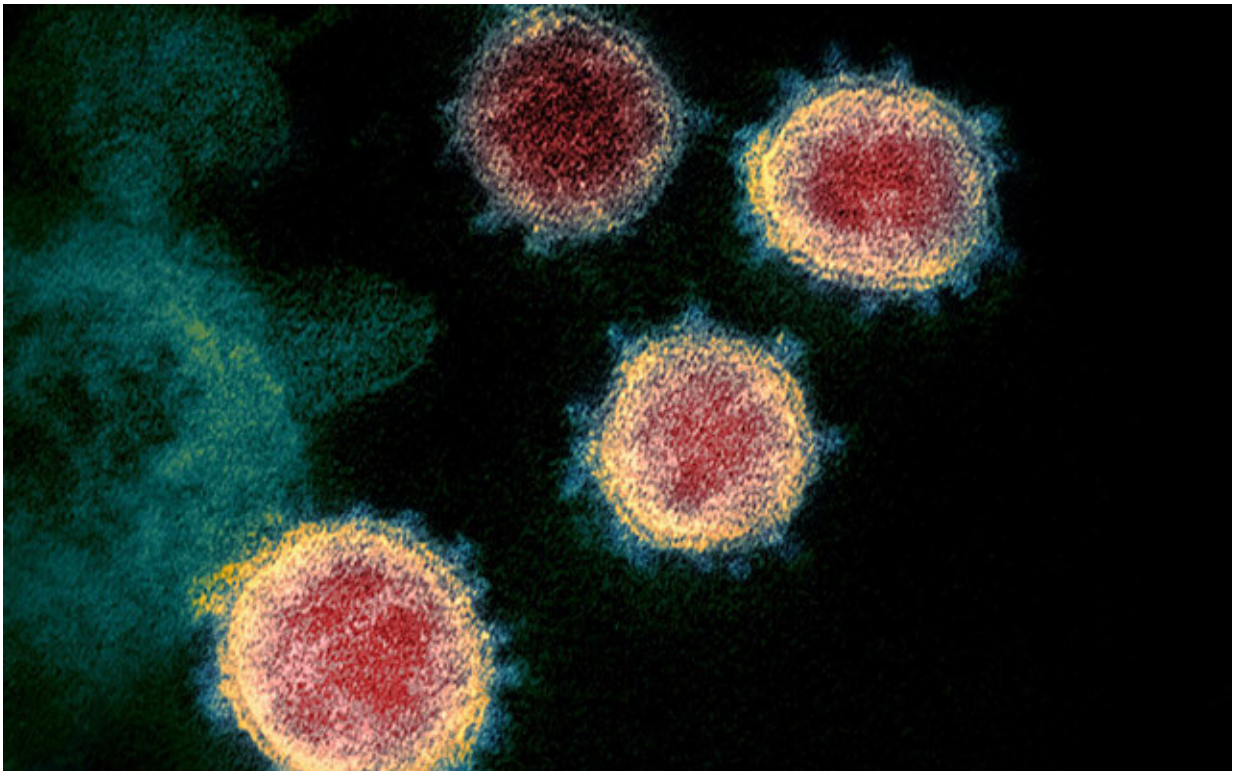


# T cells from common colds cross-protect against infection with SARS-CoV-2

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A colored scanning electron micrograph of the SARS-CoV-2 virus. Credit: NIAID

A new study, published in *Nature Communications* and led by Imperial College London researchers, provides the first evidence of a protective role for these T cells. While previous studies have shown that T cells

induced by other coronaviruses can recognize SARS-CoV-2, the new study examines for the first time how the presence of these T cells at the time of SARS-CoV-2 exposure influences whether someone becomes infected.

The researchers also say their findings provide a blueprint for a second-generation, [universal vaccine](#) that could prevent [infection](#) from current and future SARS-CoV-2 variants, including Omicron.

Dr. Rhia Kundu, first author of the study, from Imperial's National Heart & Lung Institute, says: "Being exposed to the SARS-CoV-2 virus doesn't always result in infection, and we've been keen to understand why. We found that high levels of pre-existing T [cells](#), created by the body when infected with other human coronaviruses like the common cold, can protect against COVID-19 infection.

"While this is an important discovery, it is only one form of protection, and I would stress that no one should rely on this alone. Instead, the best way to protect yourself against COVID-19 is to be fully vaccinated, including getting your booster dose."

The study began in September 2020 when most people in the UK had neither been infected nor vaccinated against SARS-CoV-2. It included 52 people who lived with someone with PCR-confirmed SARS-CoV-2 infection and who had therefore been exposed to the virus. The participants did PCR tests at the outset and 4 and 7 days later, to determine if they developed an infection.

Blood samples from the 52 participants were taken within 1-6 days of them being exposed to the virus. This enabled the researchers to analyze the levels of pre-existing T cells induced by previous common cold coronavirus infections that also cross-recognize proteins of the SARS-CoV-2 virus.

The researchers found that there were significantly higher levels of these cross-reactive T cells in the 26 people who did not become infected, compared to the 26 people who did become infected. These T cells targeted internal proteins within the SARS-CoV-2 virus, rather than the spike [protein](#) on the surface of the virus, to protect against infection.

Current vaccines do not induce an [immune response](#) to these internal proteins. The researchers say that—alongside our existing effective spike protein-targeting vaccines—these internal proteins offer a new vaccine target that could provide long-lasting protection because T cell responses persist longer than antibody responses which wane within a few months of vaccination.

Professor Ajit Lalvani, senior author of the study and Director of the NIHR Respiratory Infections Health Protection Research Unit at Imperial, says: "Our study provides the clearest evidence to date that T cells induced by common cold coronaviruses play a protective role against SARS-CoV-2 infection. These T cells provide protection by attacking proteins within the [virus](#), rather than the spike protein on its surface.

"The spike protein is under intense immune pressure from vaccine-induced antibody which drives evolution of [vaccine](#) escape mutants. In contrast, the internal proteins targeted by the protective T cells we identified mutate much less. Consequently, they are highly conserved between the various SARS-CoV-2 variants, including omicron. New vaccines that include these conserved, internal proteins would therefore induce broadly protective T cell responses that should protect against current and future SARS-CoV-2 variants."

The researchers note some limitations to their study, including that, because it is small and 88% of participants were of white European ethnicity, it is not possible for them to model demographic factors.

Provided by Imperial College London

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