

Exposure to harmless coronaviruses boosts SARS-CoV-2 immunity

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Colorized scanning electron micrograph of a cell (blue) heavily infected with SARS-CoV-2 virus particles (red), isolated from a patient sample. Image captured at the NIAID Integrated Research Facility (IRF) in Fort Detrick, Maryland. Credit: NIAID

The population's immunity to SARS-CoV-2, achieved either through infection or vaccination, is crucial to overcome the COVID-19 pandemic. A team of researchers led by the University of Zurich (UZH) has now discovered another component that contributes to SARS-CoV-2 immunity—previous antibody responses to other, harmless coronaviruses. "People who have had strong immune responses to other human coronaviruses also have some protection against SARS-CoV-2 infection," says Alexandra Trkola, head of the Institute of Medical Virology at UZH.

In their study, the researchers used a specially developed assay to analyze antibody levels against four other human [coronaviruses](#) in 825 serum samples taken before SARS-CoV-2 emerged. They also examined 389 samples from donors infected with SARS-CoV-2. Combining these analyses with computer-based models enabled the team to precisely predict how well the antibodies would bind to and neutralize invading viruses.

Cross-reactivity reduces severity of infection

The researchers were able to demonstrate that people who caught SARS-CoV-2 had lower levels of antibodies against coronaviruses that cause common colds compared to uninfected people. In addition, people with high levels of antibodies against harmless coronaviruses were less likely to have been hospitalized after catching SARS-CoV-2. "Our study shows that a strong antibody response to human coronaviruses increases the level of antibodies against SARS-CoV-2. So someone who has gained immunity to harmless coronaviruses is therefore also better protected against severe SARS-CoV-2 infections," says Trkola. This type of immune response is referred to as cross-reactivity, and it also occurs with T cell responses, the additional line of the immune system in the

defense against infections.

People are only fully protected against SARS-CoV-2 shortly after they have recovered from an infection or have received an effective vaccination. This is when antibody levels against the virus are still very high. As these levels drop over time, infection is no longer prevented, but the immunological memory quickly reactivates the body's defenses, the production of antibodies as well as the T cell defense. "Of course, immune responses targeting SARS-CoV-2 that are mounted by the memory cells are far more effective than cross-reactive responses. But even though the protection isn't absolute, cross-reactive [immune](#) responses shorten the infection and reduce its severity. And this is exactly what is also achieved through vaccination, just much, much more efficiently," says Trkola.

Towards comprehensive protection against coronaviruses

It is not yet known whether this cross-reactivity also works in the opposite direction. Whether immunity to SARS-CoV-2—achieved through vaccination, for example—also offers protection against other human coronaviruses still needs to be elucidated. "If SARS-CoV-2 immunity also offers some degree of protection from infection with other coronaviruses, we would be a significant step closer to achieving comprehensive protection against other coronaviruses, including any new variants," the virologist explains. This idea is also supported by the fact that cross-reactive protection is not only based on [antibodies](#), but very likely also on T cells.

More information: Irene A. Abela et al, Multifactorial seroprofiling dissects the contribution of pre-existing human coronaviruses responses to SARS-CoV-2 immunity, *Nature Communications* (2021). [DOI: 10.1038/s41467-021-27040-x](https://doi.org/10.1038/s41467-021-27040-x)

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