

In the immune arsenal, antibodies offer best long-term hope against COVID

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Credit: Michael S. Helfenbein

When it comes to long-lasting protection against COVID-19, antibodies are our biggest allies, a new Yale University study shows.

Since the emergence of the SARS-CoV-2 virus, the relative contributions of the different parts of our immune system

arsenal—particularly those of T [cells](#), which destroy infected cells from the inside, and B cells, which produce [antibodies](#) that clean up free-floating virus outside of cells—during and after infection has remained unclear.

To better understand, scientists in the lab of Yale's Akiko Iwasaki, the Waldemar Von Zedtwitz Professor of Immunobiology, conducted a series of experiments on mice to determine which immune system responses played the most important role at different stages of COVID-19 cases.

"While T cells play a role during [acute infections](#), our antibodies are crucial for long-term protection against re-infection," said Benjamin Goldman-Israelow, a postdoctoral researcher in Iwasaki's lab and lead author of the study.

The paper was published Sept. 2 in the journal *Science Immunology*.

During acute infections, both types of adaptive, or learned, immune responses play key roles in combatting infections. Mice that lack T cells but have antibody protection and those without antibodies but that have healthy T cells both combatted infection equally well, researchers found.

However, in mice lacking what are known as "memory" T cells—a kind of reserve cell that remains in the body after infection—antibodies alone provided more than adequate protection after mice were reinfected with SARS-CoV-2, the virus that causes COVID-19, or the highly immune evasive Beta variant. This antibody protection was also seen in mice which had received a vaccine.

Goldman-Israelow stressed that previous research has shown that people who received mRNA-based vaccines produce more antibodies than those who were naturally infected. And naturally infected people who then

receive a vaccination produce even more, perhaps providing greater protection against re-infection.

While this study found the key importance of circulating antibodies in protection, the newly emerged Delta variant appears to overcome this systemic immunity to cause more breakthrough infections, he said.

"Ultimately, generating robust mucosal immunity that involves both local antibodies and T cells will be key to preventing [infection](#) and disease," Iwasaki said.

More information: Benjamin Israelow et al, Adaptive immune determinants of viral clearance and protection in mouse models of SARS-CoV-2, *Science Immunology* (2021). [DOI: 10.1126/sciimmunol.abl4509](https://doi.org/10.1126/sciimmunol.abl4509)

Provided by Yale University

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