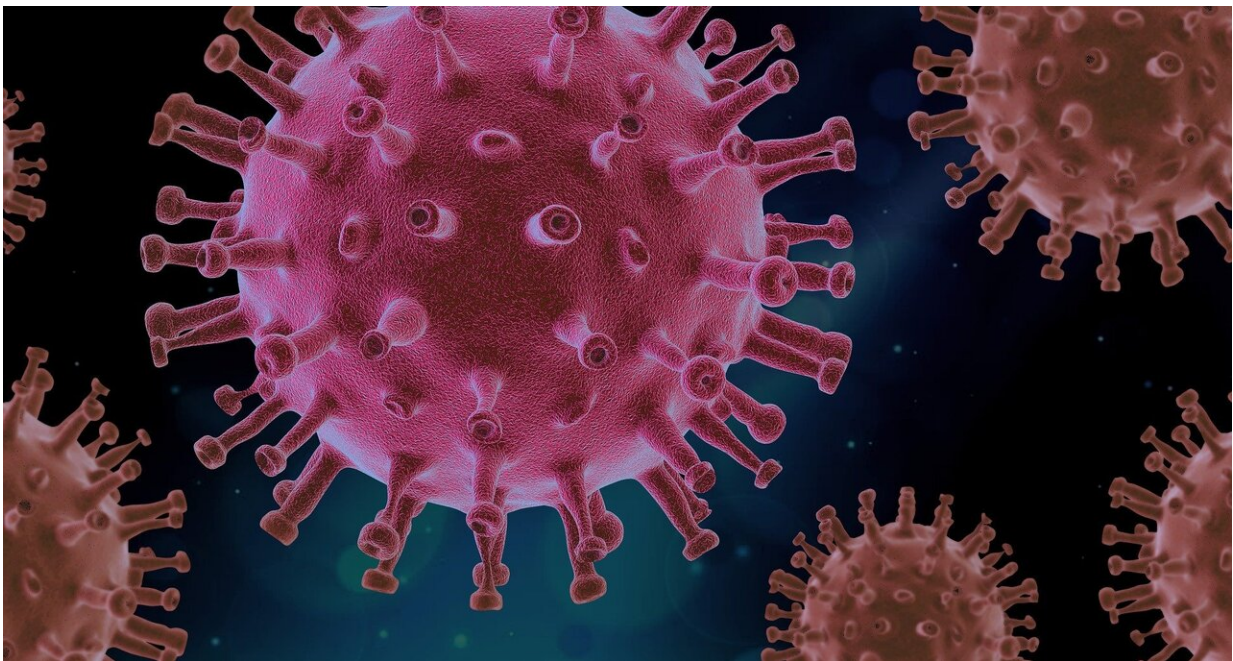


New study reveals insights into COVID-19 antibody response durability

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Researchers at the Institute of Human Virology (IHV) at the University of Maryland School of Medicine have [published](#) a new study in the *Journal of Infectious Diseases* investigating the antibody response

following SARS-CoV-2 infection.

Long-lived [plasma cells](#) are responsible for durable antibody responses that persist for decades after immunization or infection. For example, infection with measles, mumps, rubella, or immunization with vaccines against tetanus or diphtheria elicit antibody responses that can last for many decades. By contrast, other infections and vaccines elicit short-lived antibody responses that last only a few years at most. For example, vaccines against HIV elicit antibody responses that persist for less than a year.

Although the COVID-19 epidemic is less than five years old, it is known that infection or vaccination with SARS-CoV-2 elicits short-lived protective antibody responses, but the mechanism underlying this problem is unknown.

"We know long-lived plasma cells can produce antibodies against specific pathogens for decades, so we wanted to investigate their role in COVID-19 infection," said study co-author Mohammad Sajadi, MD, associate professor of Medicine, Division of Clinical Care and Research, Institute of Human Virology.

The study by the Sajadi and Lewis teams examined the contribution of long-lived plasma cells in the bone marrow to anti-spike antibodies after COVID-19 infection. The study studied 20 individuals with a history of COVID-19 infection but no vaccination. Bone marrow aspirates and plasma samples were analyzed to characterize antibody responses. The research found deficient generation of spike-specific long-lived plasma cells in the bone marrow, offering insight into the short duration of antibody responses observed in recovering COVID-19 patients.

"The rapid waning of spike-specific antibodies we observed indicates a lack of durable antibody production after natural infection," said study co-author George Lewis, Ph.D., director of the Division of Vaccine Research, Institute of Human Virology. "This appears to be due to insufficient generation of long-lived plasma cells that would sustain antibody levels, a phenomenon we've noted before with certain viruses."

Ten years ago, the researchers discussed the possible mechanisms for this problem with HIV in a peer-reviewed publication and have been working on it since. Their work on the poor persistence of antibody responses to the SARS-CoV-2 spike protein shows that the antibody persistence problem extends to COVID-19 as well and that it is likely due to lack of long-lived antibody-secreting cells in the bone marrow.

Shyam Kottlil, Ph.D., Interim IHV Director, added, "Sustained antibody responses to viral infections are critical for vaccine development and long-term immunity. The presence of long-lived plasma cells in [bone marrow](#) is a crucial component for the generation of prolonged effective antiviral immunity. This study by Drs. Sajadi and Lewis and colleagues provide vital information about protracted immunity to COVID-19, which is a breakthrough in our understanding of antiviral immunity due to COVID-19 and other viruses."

The researchers say the findings will help inform the development of vaccines and therapeutics that can induce robust long-term antibody production against SARS-CoV-2 and HIV. New studies have been designed in people to work out the cellular and molecular basis of this problem.

"This intriguing new study provides a possible explanation for why [antibody responses](#) to SARS-CoV-2 decay quickly," said Mark T. Gladwin, MD, who is the John Z. and Akiko K. Bowers Distinguished Professor and Dean of UMSOM, and Vice President for Medical Affairs

at University of Maryland, Baltimore. "Future studies will be key to further investigate the cellular and molecular basis of why SARS-CoV-2 does not elicit long lived antibody secreting cells specific for the SARS-CoV-2 spike protein with the ultimate goal of correcting this deficit in future vaccine designs."

The team aims to continue pursuing this critical area of vaccine research.

"We were fortunate to be able to study this problem in context of first exposure to a new human pathogen and disease," said Dr. Sajadi. "We are grateful to our volunteer participants and colleagues, especially co-first authors Drs. Zahra Rikhtegaran Tehrani and Parham Habibzadeh, as well as Robin Flinko, whose efforts made this impactful study possible."

More information: Zahra R Tehrani et al, Deficient Generation of Spike-Specific Long-Lived Plasma Cells in the Bone Marrow After Severe Acute Respiratory Syndrome Coronavirus 2 Infection, *The Journal of Infectious Diseases* (2024). [DOI: 10.1093/infdis/jiad603](https://doi.org/10.1093/infdis/jiad603)

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