# Sugar-coated COVID-19 test strip takes advantage of coronavirus' sweet tooth

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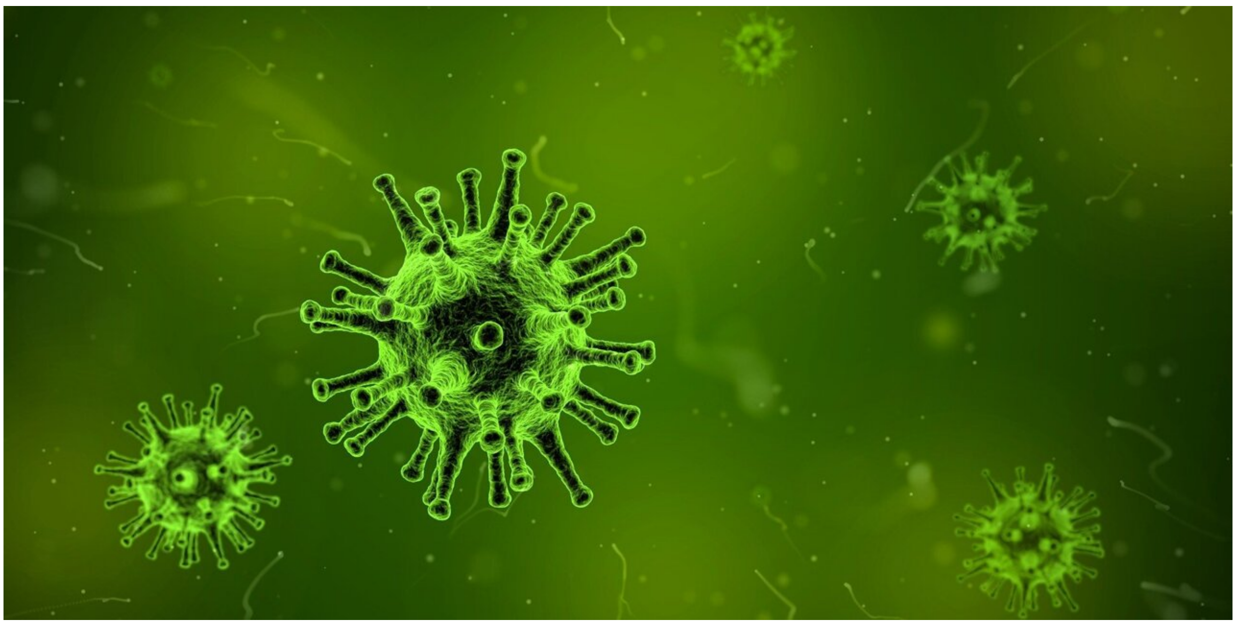

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Even those tracking each new discovery about the coronavirus and its variants may not be aware of the virus' sugar cravings.

Researchers at the University of North Carolina at Chapel Hill and University of California San Diego take advantage of the virus' sweet tooth in the design of a sugar-coated COVID-19 test strip that's been effective at detecting all known variants of the coronavirus, including

Delta.

In the next few weeks, researchers will determine if the self-test known as GlycoGrip can detect infections caused by the Omicron variant too, said Carolina researcher Ronit Freeman.

"We have turned the tables on the virus by using the same sugar coat it binds to infect cells—to capture it into our sensor," said Freeman who published the findings in *ACS Central Science*.

One of the greatest challenges of the ongoing COVID-19 pandemic has been responding to the virus' mutations and emerging variants. New tests must be developed for new tweaks in the virus' genetic code.

But GlycoGrip offers a solution for universal coronavirus testing.

"We are optimistic that GlycoGrip will capture future variants just as easily," Freeman said.

The test is inspired by the natural biology of epithelial cells—those that are targeted and infiltrated by SARS-CoV-2, the virus that causes COVID-19. These cells are coated with a dense matrix of sugars called the glycocalyx, and it's this sugar net that the virus exploits to cause infection.

The concept is intuitive: a droplet of biofluid containing the virus, such as saliva, is placed on one end of the strip and flows along the surface. When the fluid reaches a sugar-coated patch, the virus can't help but indulge its sweet tooth, becoming trapped on that specific area.

This capture is then signaled by antibodies treated with gold nanoparticles producing a visual color that indicates infection.

"We tapped into nature to reimagine viral diagnostics," said Freeman, co-corresponding author of the paper and associate professor of applied physical sciences and biomedical engineering in the UNC-Chapel Hill College of Arts & Sciences.

To better understand how these sugar polymers bind the virus, Freeman connected with Rommie Amaro, professor of chemistry and biochemistry at the University of California San Diego and co-corresponding study author.

Amaro and her team developed computationally intensive simulations that helped explain the mechanics behind how and why the cell-anchored sugars bind the viral spikes.

"By using atomic-level views of the spike protein, we were able to identify key binding sites for the glycocalyx sugar polymers and unlock how these sugars adapt to different spike conformations," said Amaro. "This is exciting, we essentially revealed another secret of how spike binds cells to facilitate infection."

A patent has been filed for this new technology, and looking beyond the current pandemic, the team envision a future in which GlycoGrip can offer cheap and reliable testing for a wide range of viruses.

The paper is titled "GlycoGrip: Cell Surface-inspired Universal Sensor for Betacoronaviruses." The full author list includes: Sanghoon Kim, Fiona Kearns, Mia Rosenfeld, Lorenzo Casalino, Micah J. Papanikolas, Carlos Simmerling, Rommie E. Amaro, and Ronit Freeman.

**More information:** "GlycoGrip: Cell Surface-inspired Universal Sensor for Betacoronaviruses," *ACS Central Science* (2021). DOI: 10.1021/acscentsci.1c01080

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