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NOTE: Press passes are available for verified journalists who wish to attend the virtual 2021 M&M Life Science Plenary Session, featuring Dr. Kizzmekia Corbett and Dr. Jason McLellan.

What's next for the COVID-19 vaccine researchers?

Kizzmekia Corbett and Jason McLellan to speak on future work at August conference

RESTON, Va. — Kizzmekia Corbett and Jason McLellan, two of the leading researchers behind the COVID-19 vaccines, will speak about their recent work and what they will do next on Aug. 2 at the [2021 Microscopy and Microanalysis Life Science Plenary Session](#). The conference is co-sponsored by the [Microscopy Society of America](#) and the [Microanalysis Society](#).

“Coronaviruses have been giving us hints over and over in history, with SARS and MERS most recently,” Corbett said. “We knew that coronaviruses, as a viral family, had pandemic potential, so we prepared for it.”

In 2013, McLellan was part of the team who revealed the structure of the spike-like fusion protein on respiratory syncytial virus (RSV), one of the last major viruses to which children are highly susceptible, but for which a vaccine does not exist yet. The protein, which covers the virus surface, is literally spiky, helping it perforate host cells.

“We were able to confirm that the prefusion protein, before it enters a host cells, elicits 10-times more neutralizing antibodies than the protein after it invades a cell,” McLellan said. The team not only solved the structure of the protein, but also developed methods to lock the protein’s structure, making it a stable protein for antibody production. “MERS emerged around the same time. Could we apply what we learned about prefusion proteins to this virus that is killing about 35% of those it infected?”

The pair and their collaborators did just that, [publishing](#) a close-to-universal method for stabilizing spike proteins on coronaviruses in 2017.

“We were really prepared for the end of 2019,” McLellan said.

At 6 a.m. on Dec. 31, 2019, Corbett and McLellan received an email from Barney Graham, the deputy director of the Vaccine Research Center at the National Institutes of Health. Graham mentored both Corbett and McLellan and worked with them on the vaccine development. There were concerning reports out of China, and they were keeping an eye on what might be causing clusters of pneumonia-like illnesses. A week later, they were called to action. A coronavirus was at the root of what would become the worst pandemic in a century.

Corbett, now an assistant professor at the Harvard T.H. Chan School of Public Health, and McLellan, an associate professor at the University of Texas at Austin, received the genomic sequence of SARS-CoV-2, a novel coronavirus, on Jan. 10, 2020. The next day, McLellan and his team had designed a stable version of the virus's spike protein. By Jan. 13, Corbett had produced the blueprints to help cells teach the immune system to knock out the spike protein at first sight. In March, they published their results in [Science](#). The same month, the first COVID-19 vaccine went into pre-clinical trials. In early 2021, they both received two doses of the vaccine, which is 94% effective in protecting the vaccinated from developing COVID-19.

“There’s a lot of vaccine inquisitiveness from populations, especially communities of color who haven’t been listened to before, with an overarching fear about side effects in the long term,” Corbett said, explaining the speed with which the vaccine appeared. “The general public is seeing a year of vaccine development, but the underlying technology was here long before COVID-19 was even a thing.”

Corbett spent six years as a fellow at the Vaccine Research Center and started her own lab in June, focused on 24 viral families with the potential to cause this type of pandemic.

“We can do things to help transform the science around each of those viral families, because we’ve done it before,” Corbett said. “My lab will study fundamental viral immunology and, hopefully, inform vaccine development in those fields. If there is ever another pandemic, we will be one of the laboratories that helps the world prepare for it.”

McLellan, who established his lab in 2013, has engineered an even more stable spike protein that has been incorporated into another vaccine that can be grown in common chicken eggs — making it a more efficient and effective tool for vaccine development in developing countries. The same engineered protein, which he developed with two other labs at UT Austin, was just used by an Australian team to develop a [transdermal patch](#) to deliver the vaccine, removing the need for health care worker administration and much of the refrigeration required for current vaccines. If they prove effective, they will be the latest in a series of vaccines against COVID-19 resulting, in part, from the work McLellan, Corbett and their colleagues have done.

“These are probably some of the best vaccines ever created, with extremely high efficacy,” McLellan said. “And the science underlying them is being applied to other viruses, to the development of universal vaccines and more. It’s working, and it’s going to continue to benefit us all for years to come.”