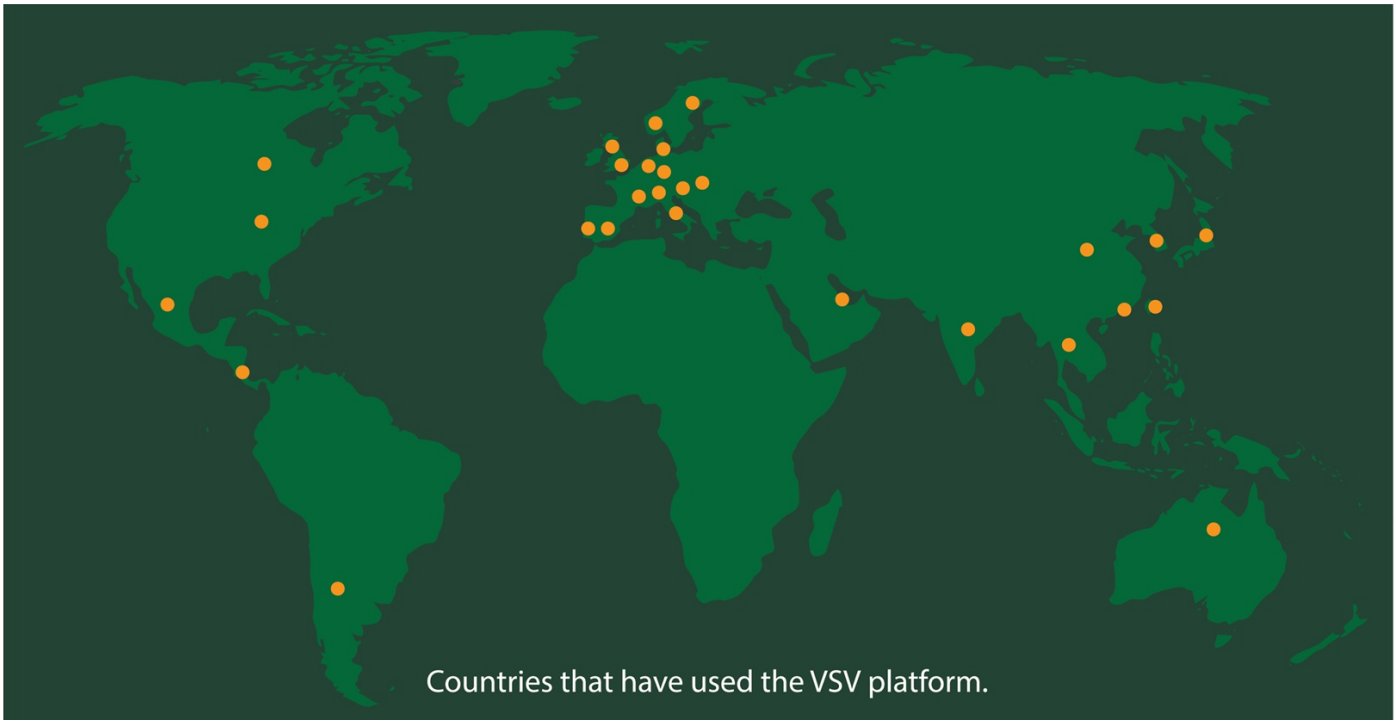
System For Generating Pseudotyped Viruses Aids In COVID-19 Vaccine Development



In the mid-1990s, Dr. Michael Whitt from the University of Tennessee Health Science Center in Memphis, TN, developed and patented a reverse genetics system that uses vesicular stomatitis virus (VSV) to allow researchers to study highly pathogenic viruses under standard biosafety level 2 containment. At the time, Whitt's VSV platform was primarily used to study virus assembly and was later used to develop ways to infect and kill cancerous cells without harming healthy cells.

However, when the pandemic hit, the research pivoted.

Recognizing that such systems allow companies developing vaccines or conducting research on viruses like SARS-CoV to reduce risks to its workers, Whitt and members of his lab began adapting his unique pseudotyping technology to aid in vaccine development. The system results in the assembly of the SARS-CoV-2 spike (S) protein into a modified VSV, allowing researchers to work at a lower biosafety level than they would when working with the live SARS-CoV-2 virus.

"We were contacted very early during the start of the pandemic by several different companies looking for a way to quickly assay whether their vaccines were going to be efficacious against this novel pathogen when it became clear that COVID-19 was going to impact a huge proportion of the population," Whitt said. "They apparently were aware of the system we had developed and recognized that it could be used to speed the development of a vaccine."

Both Moderna and Pfizer are among the companies using the VSV platform to test the inhibitory effects of the

antibodies generated after a COVID vaccination.

The ability of VSV to readily assemble the surface proteins of other viruses, such as the S-protein in COVID-19 results in the production of a surrogate virus that binds and enters cells like SARS-CoV-2, but once inside, it does not release more infectious virus, and instead produces a reporter protein that can be easily analyzed. When antibodies from a vaccinated individual are mixed with this surrogate virus containing the SARS-CoV-2 S-protein and there is a reduction in the amount of reporter protein produced, that indicates the individual has generated antibodies that can inhibit SARS-CoV-2 infection.

The University of Tennessee Research Foundation has facilitated access to Whitt's technology by entering into agreements with multiple companies for transfer of the VSV pseudotypes through licensing and material transfer agreements and building distribution partnerships to provide the VSV platform globally. More than 170 companies and universities in over 30 different countries have used these materials during the pandemic.

The technology also received NIH funding.

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