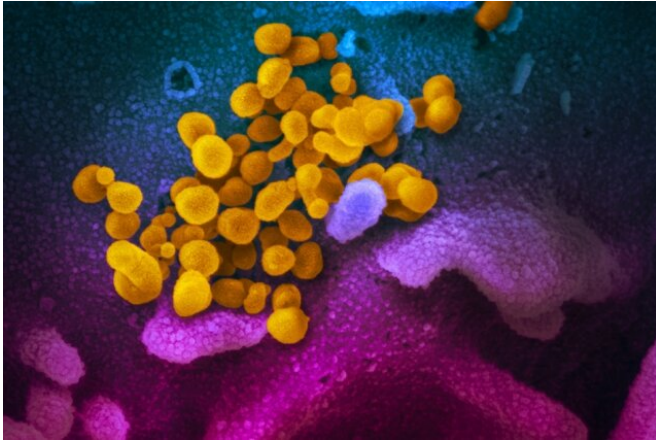


Inhaled COVID-19 vaccine prevents disease and transmission in animals

8 July 2021, by Jennifer Brown



This scanning electron microscope image shows SARS-CoV-2 (yellow)—also known as 2019-nCoV, the virus that causes COVID-19—isolated from a patient, emerging from the surface of cells (blue/pink) cultured in the lab. Credit: NIAID-RML

In a new study assessing the potential of a single-dose, intranasal COVID-19 vaccine, a team from the University of Iowa and the University of Georgia found that the vaccine fully protects mice against lethal COVID-19 infection. The vaccine also blocks animal-to-animal transmission of the virus. The findings were published July 2 in the journal *Science Advances*.

"The currently available vaccines against COVID-19 are very successful, but the majority of the world's population is still unvaccinated and there is a critical need for more vaccines that are easy to use and effective at stopping [disease](#) and transmission," says Paul McCray, MD, professor of pediatrics-pulmonary medicine, and microbiology and immunology at the UI Carver College of Medicine, and co-leader of the study. "If this new COVID-19 vaccine proves effective in people, it may help block SARS-CoV-2 transmission and help control the COVID-19 pandemic."

Unlike traditional vaccines that require an injection, this vaccine is administered through a nasal spray similar to those commonly used to vaccinate against influenza. The vaccine used in the study only requires a single dose and it may be stored at normal refrigerator temperatures for up to at least three months. Because it is given intranasally, the vaccine may also be easier to administer, especially for those who have a fear of needles.

"We have been developing this vaccine platform for more than 20 years, and we began working on new vaccine formulations to combat COVID-19 during the early days of the pandemic," says Biao He, Ph.D., a professor in the University of Georgia's Department of Infectious Diseases in the College of Veterinary Medicine and co-leader of the study. "Our preclinical data show that this vaccine not only protects against infection, but also significantly reduces the chances of transmission."

The experimental vaccine uses a harmless parainfluenza virus 5 (PIV5) to deliver the SARS-CoV-2 spike protein into cells where it prompts an [immune response](#) that protects against COVID-19 infection. PIV5 is related to common cold viruses and easily infects different mammals, including humans, without causing significant disease. The research team has previously shown that this vaccine platform can completely protect experimental animals from another dangerous coronavirus disease called Middle Eastern Respiratory Syndrome (MERS).

The inhaled PIV5 vaccine developed by the team targets mucosal cells that line the nasal passages and airways. These cells are the main entry point for most SARS-CoV-2 infections and the site of early virus replication. Virus produced in these cells can invade deeper into the lungs and other organs in the body, which can lead to more severe disease. In addition, [virus](#) made in these cells can be easily shed through exhalation allowing transmission from one infected person to others.

The study showed that the vaccine produced a localized immune response, involving antibodies and cellular immunity, that completely protected mice from fatal doses of SARS-CoV-2. The [vaccine](#) also prevented infection and disease in ferrets and, importantly, appeared to block [transmission](#) of COVID-19 from infected ferrets to their unprotected and uninfected cage-mates.

More information: Dong An et al, Protection of K18-hACE2 mice and ferrets against SARS-CoV-2 challenge by a single-dose mucosal immunization with a parainfluenza virus 5–based COVID-19 vaccine, *Science Advances* (2021). [DOI: 10.1126/sciadv.abi5246](#)

Provided by University of Iowa

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