Scientists developing COVID-19 vaccine nasal spray

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Lancaster University researchers have successfully engineered a COVID-19 vaccine which can be administered through the nose.

The researchers administered two doses of the vaccine via a nasal spray in animal trials which are the first stage in vaccine development.

This elicited robust antibodies and T cell responses which were enough to be able to neutralize SARS-CoV-2. There was also a significant reduction in lung pathology, inflammation and clinical disease in the rodents who received the vaccine.

The vaccine is based on a common poultry virus called the Newcastle Disease Virus (NDV), which can replicate in humans but is harmless. The scientists engineered NDV to produce the spike proteins of the SARS-CoV-2 virus which causes COVID-19, tricking the body into mounting an immune response against SARS-CoV-2.

Virologist Dr. Muhammad Munir and immunologists Dr. John Worthington and Dr. Lucy Jackson-Jones from Lancaster University collaborated with researchers at the Biomedical Research Institute in Texas to investigate how effective their NDV-based vaccine was against SARS-CoV-2.

Dr. Munir said: "We found that administering this vaccine through a nasal spray completely protected the animals from shedding the virus which causes transmission of the virus. This means the immunization of the upper respiratory tract through a nasal spray can prevent individuals from spreading the virus and developing infections elsewhere in the body".

"Though the vaccine showed promising safety and efficacy in this animal model, human trials are still required to determine its applicability and to obtain regulatory approvals."

A vaccine nasal spray offers several advantages over conventional approaches including non-invasive administration, the induction of local immunity as well as being an alternative for people afraid of needles or with blood clotting co-morbidities.

There is currently an intranasal influenza vaccine registered for human use so administering a vaccine in this way has already been proven to be effective.

This vaccine could also provide a low-cost alternative for the developing world, as it can be scaled up using the existing global infrastructure currently in use for influenza virus vaccines, offering the most economical vaccine supply worldwide.

Dr. Mohammed Rohaim of Lancaster University said: "The scalability and economical production make this vaccine candidate suitable for low and middle income countries."

The Lancaster University team, led by Dr. Muhammad Munir, has world leading experience in the "reverse genetics" of NDV, a process to convert DNA into safe and infectious viruses.

"This method has provided us with a way to insert the genes of other viruses into the NDV to make a vaccine against literally any pathogen."

More information: Immunogenicity and Protective Efficacy of an Intranasal Live-attenuated Vaccine Against SARS-CoV-2 in *Preclinical Animal Models*. doi: doi.org/10.1101/2021.01.08.425974

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