

University of Waterloo Formulates DNA-based COVID-19 Vaccine Deliverable by Nasal Spray

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Researchers from the University of Waterloo in Canada are developing a DNA-based vaccine candidate for COVID-19 that can be applied via nasal route.

Researchers at the [University of Waterloo](#) are developing a DNA-based vaccine that can be delivered through a nasal spray. The vaccine will work by using engineered bacteriophage, a process that will allow the vaccine to stimulate an immune response in the nasal cavity and target tissues in the lower respiratory tract.

“When complete, our DNA-based vaccine will be administered non-invasively as a nasal spray that delivers nanomedicine engineered to immunize and decrease COVID-19 infections,” explains Roderick Slavcev, a professor in the School of Pharmacy who specializes in designing vaccines, pharmaceuticals and gene-therapy treatments. “This research combines the expertise of many and leverages existing technology developed by my team, which we’re reconfiguring for a COVID-19 application.”

When completed, the researchers aim to have the DNA-based vaccine enter cells in targeted tissues and cause them to produce a virus-like particle (VLP) that will stimulate an immune response in people.

The VLP will look similar to the structure of SARS-CoV-2 (the virus which causes COVID-19), but is harmless. This similarity will activate the body’s natural immune response to protect against viral infections comparable to the VLP, including SARS-CoV-2. It will also bind to receptors that SARS-CoV-2 would bind to, limiting the possible sites for transmission. By causing these changes in the body, the vaccine will build immunity against COVID-19 and decrease the severity of infections in progress – serving as both a therapeutic and a vaccine.

Every detail of the vaccine, from ensuring the bacteriophage target specific cells in the respiratory tract to creating a minimal VLP to impersonate SARS-CoV-2, is specifically engineered by the researchers and requires testing.

To achieve the design of such a complex project, Slavcev is teaming up with Emmanuel Ho, another professor at the School of Pharmacy, and Marc Aucoin, professor of chemical engineering. Ho's team is designing the nanomedication that will be delivered by the nasal spray, which is currently being tested. Aucoin's lab is constructing and purifying the VLP and boosting immunity following the initial administration of the therapeutic vaccine.

"It is the collaborative effort of our talented teams that makes this multidisciplinary project so feasible and necessarily efficient as a potential universal vaccine solution against SARS-CoV infections," says Slavcev. "To practice science with such urgency alongside such talented colleagues and their students is not only immensely educational, it is extremely rewarding."

Slavcev's team has completed design of the bacteriophage delivery system and is currently modifying this system to apply to COVID-19. Additional design of components and further testing will take place later this year. Components of the research are supported by a grant from the Natural Sciences and Engineering Research Council of [Canada](#).

Read the [original article](#) on University of Waterloo.