

---

## Corona-phobic AND Needle-phobic? Check Out This Inhalable Nanoparticle-based Vaccine!



2020-05-16

Researchers are proposing a possible COVID-19 vaccine that could be good news for resisting current and future pandemics, as well as for the needle-phobic: inhalable vaccines.

Scott Medina, [Penn State](#) assistant professor of biomedical engineering, is working on a DNA-based, nanoparticle aerosol vaccine for SARS-CoV-2, the virus that causes COVID-19 illnesses. However, DNA-based vaccines have not been widely used as of yet due to multiple issues, such as rapid degradation of the vaccines by tissue enzymes and limited uptake into cells.

Medina said the solution to these problems is engineering a more effective synthetic nanoparticle.

“We seek to develop a nanoparticle that can improve the delivery of DNA-based inhalable vaccines,” Medina said. “Once deposited in the lung, the nanoparticles target, and are internalized by, respiratory immune cells. The immune cells then process the DNA and convert it into a viral protein, which in turn stimulates the immune cells to recognize and kill the virus if the patient were to be infected.”

If successful, this could potentially mean faster development of urgently needed vaccines.

[Nanotechnology in Battle Against Coronavirus ...](#)

“By utilizing DNA encoding viral proteins, instead of the inactive virus itself for vaccines, we

could rapidly screen and develop therapeutic candidates,” Medina said. “This could allow us to create, test and then clinically deploy vaccines much faster than traditional development methods, which is urgently needed for quickly spreading diseases like COVID-19.”

Medina will prepare and optimize the DNA-loaded particles and validate their ability to stimulate viral protein production in immune cells. They will then reach out to collaborators for animal testing. The work fits well with Medina’s lab research, which interfaces chemical biology and nanotechnology to develop new diagnostic and therapeutic tools for cancer and infectious diseases.

“Recently, we have been working to develop particles that target lung immune cells to develop universal flu vaccines with Angela Pannier at the University of Nebraska, and we will now pivot this technology toward COVID-19,” Medina said.

Medina views the ways in which he and other researchers have moved their work to pandemic response as part of the collective effort of health care workers, laborers, food supply employees and others to combat COVID-19.

“As engineers, we thrive on the ability to develop new solutions to challenging problems,” Medina said. “It is easy to feel helpless in situations like these, and being able to utilize our skill set to potentially make a difference inspires us to continue moving forward.”

Read the [original article](#) on Penn State University.