

Dengue fever vaccine delivered with nanotechnology targets all four virus serotypes

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The latest in a series of studies led by the Aravinda de Silva Lab at the UNC School of Medicine shows continued promise in a dengue virus

vaccine delivered using nanoparticle technology.

Each year, an estimated 25,000 people die from dengue infections and millions more are infected. Scientists have been trying to create a [dengue vaccine](#) for many years, but creating an effective [vaccine](#) is challenging due to the four different serotypes of the virus. For a person to be fully protected against dengue, they need to be vaccinated against all four serotypes at once – something current vaccines do not achieve. In their paper published in *PLOS Neglected Tropical Diseases*, Aravinda de Silva, Ph.D., professor of microbiology and immunology, and UNC research associate Stefan Metz, Ph.D., detail how their nanoparticle delivery platform is producing a more balanced immune [response](#) versus other vaccine delivery platforms.

To deliver the vaccine, the de Silva lab is using a nanoparticle platform produced with PRINT (Particle Replication in Non-wetting Templates) technology, which was developed by Joseph DeSimone, Ph.D., the Chancellor's Eminent Professor of Chemistry at UNC-Chapel Hill, with an appointment in the department of pharmacology. Rather than using a killed or attenuated virus to develop a vaccine for [dengue](#), researchers are focusing on expressing the E protein and attaching it to [nanoparticles](#) to induce good immune responses. In previous studies of monovalent vaccines, they have shown that the platform can induce protective immune response in individual serotypes. Their latest study of a tetravalent vaccine shows the response in all four serotypes at the same time.

"We are also seeing a more balanced immune response for each of the serotypes, which means the quality of neutralizing antibodies created is leading to a better overall protective reaction for the patient," said Metz, the paper's lead author.

The de Silva lab performed the experiments on their Dengue vaccine in

close collaboration with co-author Shaomin Tian, Ph.D., research assistant professor in the department of microbiology and immunology. The proteins used in the experiments were produced by the UNC Protein Expression and Purification (PEP) core.

The de Silva lab's next steps include optimizing the technique they use to attach the E protein to the nanoparticle. This work will be extremely important when trying to create a vaccine that induces consistently strong protective immune responses.

More information: Stefan W. Metz et al. Nanoparticle delivery of a tetravalent E protein subunit vaccine induces balanced, type-specific neutralizing antibodies to each dengue virus serotype, *PLOS Neglected Tropical Diseases* (2018). [DOI: 10.1371/journal.pntd.0006793](https://doi.org/10.1371/journal.pntd.0006793)

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