

Shots for other viruses offer clues in race for Zika vaccine

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Scientists are racing to create a Zika vaccine, and while they're starting from scratch against a poorly understood disease, copying shots for similar viruses offers a head start.

A variety of potential candidates are being pursued: Simple DNA vaccines, made with only a few genes from the virus; some made from killed or inactivated virus, much like a standard flu shot; others made with live but weakened virus.

"We believe we can get a vaccine," Dr. Anthony Fauci, of the National Institutes of Health, said. He's optimistic that the first small safety tests of at least one kind could begin by early fall.

But that doesn't mean a vaccine could come in time to help with the outbreak now rapidly spreading through Latin America. Here are some questions and answers about Zika vaccine research:

Q: Why the optimism?

A: It's technologically feasible, since vaccines against other viruses in the same family as Zika, including yellow fever, Japanese encephalitis and dengue, already exist. Also, the NIH created an experimental vaccine for West Nile virus that showed promise during safety testing.

Q: Why is the Zika research only now getting underway?

A: Zika hadn't been considered enough of a problem to warrant a vaccine until Brazil reported an apparent link to babies born with unusually small heads, which can signal underlying brain damage.

Q: What vaccines are first in line?

A: It's too early to know. But a DNA vaccine could be the fastest to develop, said Dr. Barney Graham, of the Vaccine Research Center at the NIH's National Institute of Allergy and Infectious Diseases, who is leading work to do just that by essentially swapping Zika into the NIH's experimental West Nile vaccine.

For that approach, researchers insert viral genes into a "plasmid," a ring of DNA that, when injected, can prompt a cell to produce what looks like the virus' outer shell. That puts the immune system on guard without any risk of infection. DNA vaccines are being studied for a variety of illnesses, some promising and others that haven't triggered a strong enough immune response, but Graham said the technique is safe enough that potential candidates for Zika could be tested quickly.

Q: What about longer-term prospects?

A: Because birth defects appear to be Zika's biggest threat, the ultimate goal is a vaccine given in childhood that's strong enough to persist through the childbearing years, Graham said. After all, scientists fought rubella's devastating birth defects by creating a [childhood vaccine](#) made of live but weakened virus that triggers a long-lasting immune response—one option being researched for Zika.

But multiple options are needed, because live vaccines aren't recommended for pregnant women, Graham noted.

Q: Who's doing the research?

A: The World Health Organization estimates that more than a dozen research institutes and companies are doing some initial work. The biggest company is vaccine giant Sanofi Pasteur, which is exploring whether its live attenuated [dengue vaccine](#) that recently won approval in Brazil offers a good model for Zika, as well as other options. At Brazil's Butantan Institute, director Jorge Kalil says researchers are prioritizing an inactivated vaccine, a kind pregnant women could use.

Q: How would scientists know if an [experimental vaccine](#) works?

A: Fauci's goal of an initial safety test starting in the fall is only one step. An early clue to a candidate's effectiveness may come from a human challenge study, which the NIH is planning with Johns Hopkins University. A small number of volunteers would agree to be given a dose of the virus after vaccination, while hospitalized in case of problems, to see whether they're protected.

Ultimately, learning whether any candidate shot really protects requires large studies, and how fast those could be done depends in part on whether Zika still is spreading widely in 2017. After all, the 2014 Ebola epidemic in West Africa had begun to ebb by the time major studies of potential vaccines got underway, making it difficult to tell whether those shots worked.

Q: Can vaccine development ever get ahead of the next infectious threat?

A: The NIH has paused research into other needed vaccines to focus on Zika, the latest in a series of emerging infections in recent years. While there's no way to tell what bug will strike next, better investment in [vaccine](#) technologies "could allow us to be more prepared so that it's not quite such a big scramble when these kinds of things happen," Graham said.

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