

UCF professor's vaccine could be lethal weapon against malaria, cholera

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Henry Daniell of University of Central Florida works developing "green vaccines." Credit: Jacque Brund/UCF

Mankind may finally have a weapon to fight two of the world's deadliest diseases.

A University of Central Florida biomedical researcher has developed what promises to be the first low-cost dual [vaccine](#) against malaria and cholera.

There is no FDA approved vaccine to prevent malaria, a mosquito-borne illness that kills more than 1 million people annually. Only one vaccine exists to fight cholera, a diarrheal illness that is common in developing countries and can be fatal. The lone vaccine is too expensive to prevent outbreaks in developing countries after floods, and children lose

immunity within three years of getting the current vaccine.

"I'm very encouraged because our technique works well and provides an affordable way to get vaccines to people who need them most and can least afford them," said lead scientist Henry Daniell.

Daniell's team genetically engineered tobacco and lettuce plants to produce the vaccine. Researchers gave mice freeze-dried plant cells (orally or by injection) containing the vaccine. They then challenged the mice with either the [cholera toxin](#) or malarial parasite. The malaria parasite studies were completed in fellow UCF professor Debopam Chakrabarti's lab.

Untreated rodents contracted diseases quickly, but the mice who received the plant-grown vaccines showed long-lasting immunity for more than 300 days (equivalent to 50 human years).

Results from the National Institutes of Health-funded research are published in this month's *Plant Biotechnology*, the top-ranked journal in the field.

Clinical trials are needed, and Daniell is hopeful that the results with mice will translate to humans. It could be yet another example of plants delivering life-saving medicines.

The dual vaccine follows a string of other "green" vaccines developed in Daniell's lab. He's created vaccines against anthrax and black plague that generated a congratulatory call from the top U.S. homeland security official and was featured on the Discovery Channel. He's also successfully grown insulin in plants to find what could be a long-lasting cure for diabetes. Daniell's team continues to research these vaccines and is looking for investors to help fund clinical trials.

Producing vaccines in plants is less expensive than traditional methods because it requires less labor and technology, Daniell said.

"We're talking about producing mass quantities for pennies on the dollar," he said. "And distribution to mass populations would be easy because it could be made into a simple pill, like a vitamin, which many people routinely take now. There is no need for expensive purification, cold storage, transportation or sterile delivery via injections."

For Daniell, his research is more than his day job. His passion to find vaccines for the world's top 10 diseases as defined by the World Health Organization comes from growing up in India. He watched many of his childhood friends contract [malaria](#), [cholera](#) and other diseases.

Daniell, a father of two, joined UCF's Burnett School of Biomedical Sciences in the College of Medicine in 1998. His research led to the formation of the university's first biotechnology company. Daniell also became only the 14th American in the last 222 years to be elected the Italian National Academy of Sciences. In 2007 he was named a Fellow of the American Association for the Advancement of Sciences.

"I'm not done yet," he said. "I still have more diseases to attack."

Provided by University of Central Florida

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