BIG WIN
NEW COUNTERMEASURES TO ELIMINATE PANDEMIC RISK

The first scalable vaccine to successfully induce immune response against the highly pathogenic Lassa virus in rodents

PREEMPT PREVENTING VIRAL SPILLOVER POTENTIAL
The majority of emerging infectious diseases and viruses with pandemic potential spillover into human and domestic animal populations from wildlife. Wildlife have been identified as the source of many recent zoonotic disease outbreaks, including Ebola and Lassa Fever in Africa, and Severe Acute Respiratory Syndrome (SARS) and the Coronavirus Disease 2019 (COVID-19) pandemic. Despite this knowledge, preventing spillover remains a fundamental challenge to our planet’s health security, as strategies and tools for preventing virus spillover from wildlife, such as culling and conventional vaccination are cost prohibitive and largely ineffective.

In recognition of this fundamental technology gap, the UC Davis-led PREEMPT project is building an innovative new countermeasure designed to preemptively eliminate highly pathogenic zoonotic viruses in their wildlife hosts, while balancing conservation goals to assure wildlife well-being and health. We are creating the world’s first prototype of a self-disseminating vaccine designed to induce a high level of herd immunity (wildlife population level protection) against Lassa virus (LASV) and Ebola, two high consequence viral pathogens that cause severe health, conservation, and economic damage in sub-Saharan Africa and that represent threats to global health security. Through safe self-dissemination, this vaccine tool would effectively protect people from spillover of Lassa and Ebola without the need for human vaccination or for inoculation of individual animals and with minimal health impact on wildlife hosts.

To establish proof-of-concept of this new technology, we designed a self-disseminating vaccine using the benign and species-specific herpesvirus, cytomegalovirus (CMV) and tested the vaccine’s ability to induce immunity against LASV in laboratory mice, as LASV spills over into people from mice and other rodents that live near villages, fields, and homes in West Africa.

In March 2020, our consortium partners at the University of Western Australia successfully demonstrated that a prototype mouse CMV-based vaccine induced specific immune responses (T cell immunity) against LASV in vaccinated mice. This is the first time that any herpesvirus-based vaccine has induced immunity against LASV and represents a major step forward for this technology as a potential countermeasure for pandemic threats.

Our PREEMPT consortium is now moving forward with additional research to establish a reliable and safe method of control on this technology, effectively designing and testing an “off-switch” to impose a ‘life-span’ on the vaccine within each inoculated animal. Long-term, we will design versions of this vaccine using the specific type of CMV found in rodent species in Sierra Leone and the West Africa region that are most frequently involved in human LASV transmission, and we will test the vaccine’s ability to induce immune response and ultimately decrease LASV shedding; all critical steps for eliminating this constant and endemic health threat.

Learn more about our work to predict and prevent spillover of Lassa virus and to develop effective countermeasures through self-spreading vaccine technology at www.preemptproject.org

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