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Ebola vaccine promising in chimps but may never be used

Ebola poses a threat to fragmenting populations of gorillas and other apes
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By **Debora MacKenzie**

A new oral Ebola vaccine seems to works in apes – but that doesn't mean Africa's great apes are now safe from the virus, which poses a grave threat to endangered gorillas, bonobos and chimpanzees.

It may, however, never be used, unless researchers, conservationists and officials can agree on vaccination strategies and how to test the vaccines.

Researchers had started testing the vaccines and wanted to carry on, but a change to the US Endangered Species Act prohibiting invasive research on chimps kicked in in September 2015, while they were still in the process.

Wild animals become more vulnerable to the impacts of disease as their populations get smaller and more fragmented.

"As great apes continue to suffer habitat loss and poaching, infectious disease is increasingly likely to tip that last domino toward extinction," says Steve Osofsky at Cornell University in Ithaca, New York.

Ebola is endemic to the animals' natural range in Africa, and outbreaks have killed possibly a third of gorillas and thousands of chimpanzees since 1990.

Apes can also die from purely human diseases. "Risk is increasing with more human contact, and we fear bigger outbreaks," says Chris Whittier at Tufts University in Massachusetts.

Peter Walsh at the University of Cambridge tested an oral vaccine for Ebola in 10 captive chimps at an animal facility in Louisiana. It was made of the live, weakened rabies virus used in oral vaccines for animals, with an added gene for the main surface glycoprotein from the Ebola virus.

After this, levels of antibodies effective against the rabies and Ebola viruses rapidly increased in the chimps. By four weeks, they had the same levels that monkeys produced in earlier tests with the same vaccine.

The monkeys had developed even higher levels of antibodies after eight weeks, which protected them from deliberate exposure to Ebola. The chimps' antibody levels were rising just as fast, and Walsh thinks they would have developed similar, protective levels.

Law change

But he couldn't take the blood samples at eight weeks to find out because the change to US law prohibiting invasive research on apes kicked in before then. The law does allow research that benefits chimps for those that apply for an exemption. But after widespread campaigns against any

chimp research, no US animal colonies applied for this, says Walsh.

Although he wants to continue testing, there are now no countries that allow invasive tests such as blood samples in captive chimps. Zoos that have apes want no association with testing or Ebola.

Using rescued chimps in sanctuaries might be an option, but in December the Pan African Sanctuary Alliance banned vaccines with live, replicating viruses. "We don't want to risk even the slightest chance of a replicating vaccine virus mutating and become virulent," says PASA director Gregg Tully.

Matthias Schnell at Thomas Jefferson University in Philadelphia, Pennsylvania, who developed Walsh's vaccine, argues that the virus is so weak that it doesn't cause rabies even when injected into mouse brains, and the Ebola gene weakens it further. Hundreds of millions of doses of the virus have been scattered in oral baits for foxes and raccoons across Europe and North America.

A live-virus Ebola vaccine is needed, says Walsh, because it can be eaten, and the tiny dose absorbed then replicates to elicit immunity. Some wild animals can be darted with injected, killed-virus vaccines, he says, but apes live in dense forests and flee humans.

Walsh envisages a dispenser from which apes could get sweet vaccine-laced treats, with a camera recording those that took some. The effectiveness of the vaccine could then be tested by measuring antibodies in the apes' excretions.

Nevertheless, wildlife disease experts warn that no such work should be carried out until virologists, conservationists and governments have discussed the risks and benefits and agreed a plan.

"You need stakeholder buy-in," says Osofsky. "If someone vaccinated apes now without broad consensus and there was some problem, even unrelated to the vaccine, it could doom any future effort."

He cites the emergency rabies vaccination of endangered African wild dogs in Tanzania in the 1980s. Months later, an unknown disease wiped them out and the vaccination was blamed, even though it was unrelated. The controversy delayed and even derailed efforts to vaccinate wildlife in the region for years.

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