

Man's best friend: Common canine virus may lead to new vaccines for deadly human diseases

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Researchers at the University of Georgia have discovered that a virus commonly found in dogs may serve as the foundation for the next great breakthrough in human vaccine development.

Although harmless in humans, parainfluenza virus 5, or PIV5, is thought to contribute to [upper respiratory infections](#) in dogs, and it is a common target for canine vaccines designed to prevent kennel cough. In a paper published recently in [PLOS ONE](#), researchers describe how this virus could be used in humans to protect against diseases that have eluded vaccine efforts for decades.

"We can use this virus as a vector for all kinds of pathogens that are difficult to vaccinate against," said Biao He, the study's principal investigator and professor of [infectious diseases](#) in UGA's College of Veterinary Medicine. "We have developed a very strong H5N1 [flu vaccine](#) with this technique, but we are also working on vaccines for HIV, tuberculosis and malaria."

PIV5 does not cause disease in humans, as our [immune system](#) is able to recognize and destroy it. By placing antigens from other viruses or parasites inside PIV5, it effectively becomes a [delivery vehicle](#) that exposes the [human immune system](#) to important pathogens and allows it to create the antibodies that will protect against future infection.

This approach not only ensures full exposure to the vaccine but also is much safer because it does not require the use of attenuated, or weakened, pathogens. For example, an [HIV vaccine](#) delivered by PIV5 would contain only those parts of the [HIV virus](#) necessary to create immunity, making it impossible to contract the disease from the vaccine.

"Safety is always our number one concern," said He, who is also a Georgia Research Alliance distinguished investigator and member of the Faculty of Infectious Diseases. "PIV5 makes it much easier to vaccinate without having to use live pathogens."

Using viruses as a delivery mechanism for vaccines is not a new technique, but previous efforts have been fraught with difficulty. If humans or animals already possess a strong immunity to the virus used for delivery, the vaccine is unlikely to work, as it will be destroyed by the immune system too quickly.

"Pre-existing immunity to viruses is the main reason most of these vaccines fail," He said.

But in this latest study, He and his colleagues demonstrate that immunity to PIV5 does not limit its effectiveness as a vaccine delivery mechanism, even though many animals—including humans—already carry antibodies against it.

In their experiments, the researchers found that a single dose inoculation using PIV5 protected mice from the influenza strain that causes seasonal flu. Another single dose experimental vaccine also protected mice from the highly pathogenic and deadly H5N1 virus commonly known as bird flu.

This recent work is a culmination of more than fifteen years of research and experimentation with the PIV5 virus, and He has confidence that it

will serve as an excellent foundation for vaccines to treat diseases in both animals and humans.

"I believe we have the best H5N1 vaccine candidate in existence," He said. "But we have also opened up a big field for a host of new vaccines."

Provided by University of Georgia

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