Researchers reveal new way to potentially fight Ebola

March 6 2018

More than 11,000 people died during the Ebola outbreak in West Africa from 2013-16, demonstrating both the deadly nature of the virus and the limitations of the medication used to fight it.

Now, University of Guelph researchers have shown that an innovative antibody delivery method could offer an effective way to prevent and treat Ebola infection.

"Our goal is to make an antibody-based therapy that can protect against all strains of Ebola, and potentially Marburg virus, as well," says Prof. Sarah Wootton, Department of Pathobiology, who, along with PhD student Laura van Lieshout, found a new way to fight Ebola. "It would be used to stop the spread of the virus in outbreak situations."

Wootton says monoclonal antibody therapies (mAbs) hold promise for the treatment of Ebola virus infections. But mAbs are costly to produce and provide only short-term immunity.

That could change, thanks to a recent discovery by Wootton and van Lieshout. Their findings were published in the *Journal of Infectious Diseases*.

The approach delivers a monoclonal antibody gene through a viral vector, something that has been done before, most notably with human immunodeficiency virus. The process bypasses the need for the host to generate a natural immune response, which can take several weeks to

occur, and often too late for Ebola victims.

The U of G researchers found that using adeno-associated virus (AAV) to deliver antibodies was remarkably effective at keeping Ebola virus infection at bay in mice. Other researchers have used AAV extensively to treat a variety of genetic disorders. The United States Food and Drug Administration has recently approved an AAV gene therapy to treat a rare retinal disorder.

"If you use an AAV gene therapy vector to deliver the DNA blueprint to a cell, that cell will produce a protective antibody against Ebola virus, which is then secreted into the bloodstream and protects mice from infection," says Wootton.

The approach provided 100-per-cent protection against Ebola infection in mice using two different types of mAb, and 83-per-cent protection with a third. A "cocktail" of two antibodies provided sustained protection against Ebola for up to five months.

Once the antibody gene is delivered, antibodies will be continually produced in the bloodstream, Wootton says. Mice in the laboratory expressed the antibody for more than 300 days.

"We are hoping to use this technology in a post-exposure scenario. Let's say someone has been exposed to Ebola. The idea would be to give them this AAV vector to start producing the antibodies that prevent death."

Her Ebola research was sponsored by the Canadian Institutes of Health Research (CIHR) and was done in collaboration with renowned microbiologists Xiangguo Qiu and Gary Kobinger at Winnipeg's National Microbiology Lab, Public Health Agency of Canada.

"Developing pan-Ebola or pan-filovirus vaccines and therapeutics has

been a goal for all the scientists in the field," said Qiu. "Our preliminary data is really encouraging and we will move forward to develop pan-Ebola/pan-filovirus cocktails."

Wootton is now seeking research funding for human clinical trials from the Coalition for Epidemic Preparedness Innovations, formed after the Ebola outbreak in West Africa.

Provided by University of Guelph