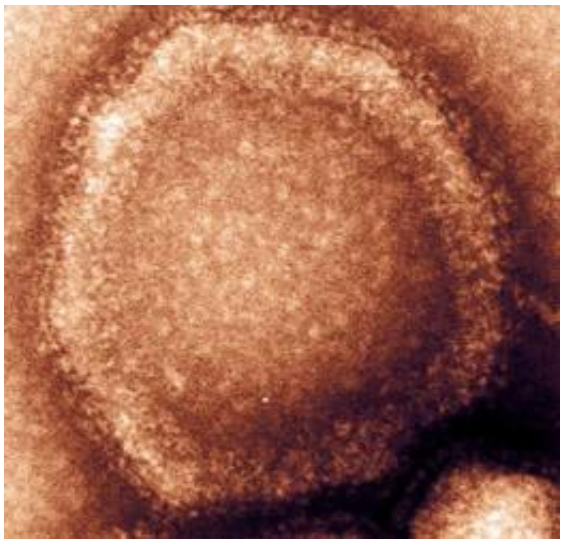
Major advance in the treatment of Hendra virus reported

19 October 2011



This is the Hendra virus. Credit: Courtesy Dr. Alex Hyatt, AAHL

A collaborative research team from Boston University School of Medicine (BUSM), the Uniformed Services University of the Health Sciences (USU), the University of Texas Medical Branch (UTMB) and Galveston National Laboratory (GNL), the National Institute of Allergy and Infectious Diseases (NIAID), National Institutes of Health (NIH), Rocky Mountain Laboratories (RML), and the National Cancer Institute (NCI), reports a breakthrough in the development of an effective therapy against a deadly virus, Hendra virus. The results of their research appear in *Science Translational Medicine* today.

Hendra virus and the closely related Nipah virus are emerging viruses capable of causing severe illness and death in humans and a variety of domestic animals. As both viruses have an animal reservoir in nature, eradication is not possible and outbreaks of severe disease will continue to occur.

In experiments carried out at the RML in Hamilton, MT, where there is a high-level safety and security facility for working with live Hendra virus, the team of researchers demonstrated that giving an anti-virus human monoclonal antibody therapy after exposure to Hendra virus protected animals from lethal disease.

"These findings are really quite promising and appear to offer a real potential treatment for Hendra virus infection in people," said Christopher C. Broder, PhD, professor of microbiology at USU and study corresponding author.

Earlier work at NCI and USU carried out under the direction of study coauthors Dimiter S. Dimitrov, PhD, ScD, senior investigator at NCI, and Christopher C. Broder, PhD, professor of microbiology at USU, resulted in the discovery and development of a human monoclonal antibody, m102.4, which could attack a critical component of both Hendra virus and Nipah virus, research supported by the NIAID, NIH. Antibodies - proteins found in blood or other bodily fluids of vertebrates - are used by the immune system to identify and neutralize viruses and bacteria.

Katharine Bossart, PhD, a USU alumna, now an assistant professor in the department of microbiology at BUSM, led a collaborative study while in Australia that provided the first evidence of the antibody's effectiveness in preventing Nipah virus mediated disease in vivo. "We were very fortunate when the Jack Brockhoff foundation, a philanthropic organization based in Melbourne, Australia provided funding to pilot m102.4 as a Nipah therapeutic in vivo. These studies generated significant preliminary data to justify modeling the therapeutic benefit of m102.4 in a second animal model."

Study coauthor Barry Rockx, PhD, of the laboratory of virology at the RML, and now assistant professor in the department of pathology, UTMB, had recently used the nonhuman primate model of Hendra

pathogenesis to test the therapeutic benefit of ribavirin following Hendra virus infection. Unlike the ribavirin studies where there was no therapeutic benefit, here, when m102.4 antibody was given as late as 3 days following infection by Hendra virus, nonhuman primates were saved from lethal disease.

According to study coauthor Thomas W. Geisbert, PhD, professor in the department of microbiology & immunology at UTMB and the GNL, "We now have good evidence that this antibody could save human lives. The success of the antibody therapy against Hendra virus disease in a nonhuman primate model is a major step forward."

"These data provide crucial justification for the pre-clinical development of the antibody as a therapy against both Hendra and Nipah virus infection of humans," added Bossart.

Study corresponding author Broder noted "Because of recent emergency compassionate use requests for the m102.4 antibody in 2009 and 2010 in Queensland, we transferred the materials needed for producing it to Queensland Health officials so larger amounts of m102.4 could be prepared using proper manufacturing guidelines. This will make the antibody readily available for use should it be needed in any future outbreak of Hendra virus in Australia."

Hendra virus has re-emerged every year in eastern Australia since 2004. In 2010, a single appearance of Hendra virus infection of a horse resulted in a significant risk of exposure to two people. Because no other therapeutic measures against Hendra virus infection exist, a decision to administer the m102.4 monoclonal antibody was made by Australian health officials. Both these individuals remain healthy today.

In 2011, Hendra virus emergence in Australia has been unprecedented, and since late June, there have been 18 separate occurrences of Hendra virus infection of horses in Queensland and New South Wales which has resulted in the death of more than 20 animals. Hendra infection was also reported in a dog, but fortunately, no cases of human infection have been seen this year.

"Over the last 10 years, our collaborative team has worked together to unravel the mysteries of Hendra virus and Nipah virus and develop novel anti-virals that can protect the host" said Bossart. "We have been fortunate to have so many outstanding individuals working on these projects."

Provided by Boston University Medical Center

APA citation: Major advance in the treatment of Hendra virus reported (2011, October 19) retrieved 20 June 2019 from https://medicalxpress.com/news/2011-10-major-advance-treatment-hendra-virus.html

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