Scientists Report Major Advance in Human Antibody Therapy against the Deadly Hendra Virus

Bethesda, MD -- A team of Federal and university scientists reports a breakthrough in the development of an effective therapy against a deadly virus, Hendra virus. The results of their study, "A Neutralizing Human Monoclonal Antibody Protects African Green Monkeys from Hendra Virus Challenge," will appear in *Science Translational Medicine* online. The full study will be available following the release of the embargo at 2 p.m. October 19, 2011.

The collaborative research team members are from the Uniformed Services University of the Health Sciences (USU), the University of Texas Medical Branch (UTMB) and Galveston National Laboratory (GNL), the National Institutes of Health (NIH)’s National Institute of Allergy and Infectious Diseases (NIAID) and Rocky Mountain Laboratories (RML), the National Emerging Infectious Diseases Laboratories Institute (NEIDL) at Boston University School of Medicine, and the National Cancer Institute (NCI), NIH.

Hendra virus and the closely related Nipah virus are found in Pteropid fruit bats (flying foxes) and are emerging viruses capable of causing severe illness and death in a variety of domestic animals and humans.

In experiments carried out in African green monkeys at the RML in Hamilton, Montana, where there is a high-level safety and security facility for working with live Hendra virus, the team of researchers, under the direction of Heinz Feldmann, M.D., Ph.D., chief of the RML, Laboratory of Virology, demonstrated that giving an antiviral human monoclonal antibody therapy after exposure to Hendra virus protected the animals from 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, Ph.D., professor of Microbiology at USU and study corresponding author.

Earlier work at USU and NCI, supported by NIAID conducted under the direction of Dr. Broder and study co-author Dimitr S. Dimitrov, Ph.D., Sc.D., senior investigator at NCI, resulted in the discovery and development of a human monoclonal antibody, m102.4, in work carried out by Zhongyu Zhu, Ph.D. The m102.4 antibody attacks a critical component of Hendra virus and Nipah viruses and prevents their infection of cells. Antibodies – proteins found in blood or other bodily fluids of vertebrates – are used by the immune system to identify and neutralize viruses and bacteria.

According to study co-author Thomas W. Geisbert, Ph.D., professor in the Department of Microbiology and 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 in developing it for future therapeutic use in people.”

Previous work by study coauthor Barry Rockx, Ph.D., formerly of the Laboratory of Virology at the RML and now assistant professor in the Department of Pathology at UTMB, described the Hendra virus nonhuman primate model used in this study which now demonstrates that the m102.4 antibody given as late as 3 days following infection by Hendra virus, could still save the animals from lethal disease. Major support for the current study came from the NIAID, NIH, including grant U01-AI082121 awarded to Dr. Geisbert.

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Katharine Bossart, Ph.D., a USU alumna, now an assistant professor in the Department of Microbiology, Boston University School of Medicine, led a collaborative study in Australia that provided the first evidence of the antibody’s effectiveness in preventing Nipah virus mediated disease in an animal model. “This new evidence that m102.4 is highly effective against Hendra virus in a second animal model provides crucial new data justifying further pre-clinical development of the antibody as a therapy against both Hendra and Nipah virus infection of humans.”

“There are no other known or effective therapeutic options for Hendra virus infection,” according to Dr. Broder. Indeed, because of the recent emergency compassionate use of the antibody in two individuals last year in Queensland, Australia, who were exposed to Hendra virus from an ill horse, we transferred the materials needed for producing it to Queensland Health officials, at their request. This allows larger amounts of m102.4 to be prepared locally using proper manufacturing guidelines and will make the antibody available for compassionate use in Australia should it be needed in any future outbreak.”

Hendra virus and Nipah virus, members of the paramyxovirus family, are highly infectious agents that emerged from flying foxes in the 1990s to cause serious disease outbreaks in humans and livestock in Australia, Malaysia, Singapore, Bangladesh and India. Recent Nipah outbreaks have resulted in acute respiratory distress syndrome and encephalitis, person-to-person transmission, and greater than 75 percent case fatality rates among humans. Additionally, these properties make these viruses a concern to both human and livestock health.

The present findings indicate that m102.4 could potentially be used as a post-exposure drug, diagnostic probe or research reagent. Hendra virus has re-emerged every year in eastern Australia since 2004. In 2009, Hendra virus caused the death of several horses and one person in Australia. 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.

The 2011 Hendra virus outbreak in Australia has been unprecedented. Since late June, there have been 18 separate outbreaks of Hendra virus infection of horses in Queensland and New South Wales resulting in the deaths of numerous animals. Hendra infection was also reported in a dog, but fortunately, no cases of human infection have been seen this year. The most recent appearance of Hendra virus was on October 11, 2011, with health officials declaring it endemic in New South Wales in addition to Queensland.

“There are currently no licensed and approved vaccines or therapeutics for prevention and treatment of disease caused by these viruses for humans or livestock,” said Dr. Broder. “This human monoclonal antibody is the first effective antiviral drug against Hendra virus and Nipah virus that has a real potential for human therapeutic applications.”

The human monoclonal antibody, m102.4 is protected under issued and pending patents in many countries around the world.

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The Uniformed Services University of the Health Sciences is the nation’s federal health sciences university. USU students are primarily active-duty uniformed officers in the Army, Navy, Air Force and Public Health Service who receive specialized education in tropical and infectious diseases, preventive medicine, the neurosciences (to include TBI and PTSD), disaster response and humanitarian assistance, and acute trauma care. A large percentage of the university’s more than 4,700 physician and 500 advanced practice nursing alumni are supporting operations in Iraq, Afghanistan and elsewhere, offering their leadership and expertise. The University also has graduate programs in biomedical sciences and public health, open to civilian and military applicants, committed to excellence in research which have awarded more than 375 doctoral and 800 masters degrees to date. For more information, visit

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