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Scientists Report Major Advance in Modeling Human Disease Caused by Deadly Nipah Virus

Bethesda, Md -- A collaborative research team from the Uniformed Services University of the Health Sciences (USU), the National Emerging Infectious Diseases Laboratories Institute and the Department of Microbiology, Boston University School of Medicine (NEIDL), and the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), reports a major step forward in the development of a new animal model which accurately reflects the human disease caused by the deadly Nipah virus and the related Hendra virus. The results of this finding appear May 18, 2010 in the open access journal PLoS One. The full study will be available following the release of the embargo at:  http://dx.plos.org/10.1371/journal.pone.0010690

Nipah virus and Hendra virus are found in Pteropid fruit bats (flying foxes) and have only recently been recognized as important emerging infectious agents capable of causing illness and death in both domestic animals and humans.

In experiments carried out at USAMRIID, where there is a high-level safety and security facility for working with live Nipah virus, the team of researchers demonstrated that upon exposure to Nipah virus, African Green Monkeys exhibited Nipah virus induced disease signs that were essentially identical to those observed in people when infected by this deadly virus.

“These findings are extremely important and now provide the critical framework needed to test and evaluate potential vaccines and therapeutic countermeasures needed to treat people,” said Thomas Geisbert, Ph.D., a lead author of the study.

Study corresponding author Christopher C. Broder, Ph.D., professor of microbiology at USU along with Dr. Geisbert, associate director of the NEIDL, long advocated the testing and development of a non-human primate model of Nipah virus infection, which would be critical for developing Nipah virus vaccines or therapeutics approved for use in humans. “We also expect this model system to work for the deadly and closely related Hendra virus, and we are testing this possibility now,” said Dr. Broder. The experiments were supported by the National Institute of Allergy and Infectious Diseases, part of the National Institutes of Health (NIH).

According to study coauthor Katharine Bossart, Ph.D., a USU alumna, now an assistant professor in the Department of Microbiology, Boston University School of Medicine and an investigator at the NEIDL, “We have recently reported evidence that a human monoclonal antibody therapy against Nipah virus could be given following lethal infection in a ferret model of Nipah virus

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disease, and have demonstrated that a protein component of the virus can also serve as a successful vaccine. With this new animal model in place we will be able to move these therapies forward by testing their likely success in a non-human primate model of Nipah virus infection.”

Hendra virus and Nipah virus, members of the henipavirus family, are highly pathogenic agents that emerged from flying foxes in the mid- and late-1990’s, respectively. Each can cause serious disease outbreaks in humans and livestock, with Hendra virus being restricted to eastern Australia and typically infecting horses, which then serve as a source for human infections; while Nipah virus was first recognized in Malaysia and Singapore among farmed pigs, resulting in numerous human cases. Nipah virus now repeatedly causes cases of human infection in Bangladesh and India. These recent outbreaks have resulted in acute respiratory distress syndrome and encephalitis, person-to-person transmission, and up to 75 percent case fatality rates among humans. The characteristics of these viruses could allow them to be used as bioterror weapons targeting humans or livestock.

“There are currently no licensed and approved vaccines or therapeutics for prevention and treatment of disease caused by these viruses,” said Dr. Broder. “The development of this new model system will help facilitate the testing and approval of future therapeutics against these viruses for people.”

Located on the grounds of Bethesda’s National Naval Medical Center and across from the NIH, USU is the nation’s federal school of medicine and graduate school of nursing. The University educates health care professionals dedicated to career service in the Department of Defense and the U.S. Public Health Service. Medical students are active-duty uniformed officers in the Army, Navy, Air Force and Public Health Service who are being educated to deal with wartime casualties, natural disasters, emerging infectious diseases, and other public health emergencies. Of the University’s nearly 4,400 physician alumni and more than 400 advanced practice nurses, the vast majority serve on active duty and are supporting operations in Iraq, Afghanistan, and elsewhere, offering their leadership and expertise. The University also has graduate programs open to civilian and military applicants in biomedical sciences and public health committed to excellence in the didactic and research training which have awarded more than 300 Ph.D. and 100 M.S. degrees to date.

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