



# NEWS RELEASE

U.S. Army Medical Research Institute of Infectious Diseases  
Fort Detrick, Maryland

FOR RELEASE  
December 9, 2003

CONTACT: Caree Vander Linden  
(301) 619-2285  
Caree.Vander-Linden@amedd.army.mil

## EBOLA VIRUS-LIKE PARTICLES PROTECT MICE FROM LETHAL EBOLA VIRUS INFECTION

Scientists have successfully immunized mice against Ebola virus using hollow virus-like particles, or VLPs, which are non-infectious but capable of provoking a robust immune response. These Ebola VLPs conferred complete protection to mice exposed to lethal doses of the virus.

The work could serve as a basis for development of vaccines and other countermeasures to Ebola, which causes hemorrhagic fever with case fatality rates as high as 80 percent in humans. The virus, which is infectious by aerosol, is of concern both as a global health threat and a potential agent of biological warfare or terrorism. Currently there are no available vaccines or therapies.

In a study published in this week's online edition of *Proceedings of the National Academy of Sciences*, Sina Bavari and colleagues at the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) describe creating VLPs from two Ebola virus proteins, glycoprotein (GP) and matrix protein (VP40). These VLPs resemble a shell of infectious viral particles but lack the genetic material necessary for reproduction.

When the VLPs were injected into mice, they activated both arms of the immune response. Specifically, they induced cell-mediated immunity via T cells and humoral immunity via B cells. Both are necessary for complete protection against the Ebola virus.

Having shown that the VLPs evoked a robust immune response, the team next examined whether this response could protect mice from lethal challenge with Ebola virus. Mice were vaccinated with VLPs three times at three-week intervals and challenged with the virus six weeks after the last vaccination. The result was 100 percent protection with no signs of illness in the immunized mice.

"This is astonishing work," said Colonel Erik A. Henchal, commander of USAMRIID. "The ability to produce self-assembling particles that resemble whole virus will give us a new tool to evaluate the combination of variables required to produce a protective immune response to Ebola virus."

According to Bavari, VLPs have already been tested and found efficacious as vaccines for several other viruses, including papillomavirus, HIV, parvovirus, and rotavirus. His team hopes to build upon its work by evaluating the efficacy of VLPs for both Ebola and Marburg, a related virus, in nonhuman primates.

“The beauty of this approach is that VLPs are not a traditional vaccine platform, so you don’t have to worry about the recipient building up an immunity to that platform,” Bavari explained. “It looks like a virus, so you have the protective immune response, but it’s basically an empty shell.”

VLPs also have potential application beyond vaccine development—for example, they could be used to develop diagnostic reagents for identifying Ebola-infected samples. In addition, generating VLPs containing additional structural proteins will be useful in determining the mechanisms of the immune responses to Ebola virus infection.

Study collaborators were Kelly L. Warfield, Catharine M. Bosio, Brent C. Welcher, Emily M. Deal, Alan Schmaljohn, and M. Javad Aman, all of USAMRIID, and Mansour Mohamadzadeh of the Department of Medicine at Tulane University.

USAMRIID, located at Fort Detrick, Maryland, is the lead laboratory for the Medical Biological Defense Research Program, and plays a key role in national defense and in infectious disease research. The Institute’s mission is to conduct basic and applied research on biological threats resulting in medical solutions (such as vaccines, drugs and diagnostics) to protect the warfighter. USAMRIID is a subordinate laboratory of the U.S. Army Medical Research and Materiel Command.

###