



NEWS RELEASE

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

FOR RELEASE
October 23, 2003

Contact: Caree Vander Linden
(301) 619-2285

Caree.Vander-Linden@amedd.army.mil

Experimental Hantavirus Vaccine Elicits Strong Antibody Response in Primates

For the first time, scientists have demonstrated that an experimental vaccine to hantavirus pulmonary syndrome (HPS), a highly lethal disease, elicits a strong neutralizing antibody response in laboratory animals—a response that is key to preventing the virus from causing infection.

In addition, the antibodies, produced in nonhuman primates that received the vaccine, protected hamsters from disease even when administered 5 days after exposure.

These findings provide proof of concept in nonhuman primates for a vaccine against HPS, as well as for post exposure prophylactic treatment of HPS and a related disease known as hemorrhagic fever with renal syndrome (HFRS).

In an article published in last month's *Journal of Virology*, investigators at the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) describe using a naked DNA approach to develop a hantavirus vaccine. The technique involves vaccination with plasmid DNA that encodes a specific hantavirus gene. When the plasmid DNA is introduced into the cells of a vaccine recipient, using a harmless device called a "gene gun," the cloned gene is expressed and presented to the immune system.

According to senior author Jay W. Hooper, Ph.D., the USAMRIID team constructed an expression plasmid containing the full-length M genome segment of Andes virus, a South American hantavirus. Vaccination with the plasmid elicited a potent neutralizing antibody response in rhesus macaques that were vaccinated a total of four times at three-week intervals.

To look at the duration of that response, the team collected serum samples for about six months. The monkeys who received the Andes vaccine displayed robust antibody levels as long as 25 weeks after the last vaccination.

Hantaviruses are carried by rodents and have caused epidemics in Europe, Asia, and the Americas. Some cause HPS, while others are responsible for the more common HFRS. The viruses are pathogens of known military importance in endemic areas.

Currently there are no vaccines or antiviral drugs to protect against or treat HPS. The disease affects previously healthy individuals in all age groups, disease progression is rapid, and the case fatality rate is one of the highest for any acute viral disease known. In addition, there have been reports of person-to-person transmission of Andes virus in southern Argentina and Chile.

Having successfully vaccinated rhesus macaques with a hantavirus vaccine candidate, the USAMRIID scientists next asked whether the neutralizing antibody response elicited by the vaccine could protect hamsters from lethal hantavirus infection. The team had already developed a lethal-disease model of Andes virus in Syrian hamsters. To further explore this question, they tested serum from a monkey that had received the Andes vaccine for protective efficacy when administered to hamsters following challenge with the virus.

In these post-challenge experiments, 15 of 16 animals that received the antibody on day 3, 4, or 5 after challenge survived. The level of protection dropped significantly when the antibody was administered on day 6 or later. While all but one of the post-challenge survivors were infected with Andes virus, no deaths were observed.

“Aside from the immunogenicity of the vaccine in nonhuman primates, the most exciting thing about this was the indication that post-exposure prophylaxis might work—even five days out from exposure,” Hooper commented. “When we administered antibody after challenge, we got nearly complete protection.”

While the immediate need is for a vaccine against HFRS, the USAMRIID team believes the DNA vaccine approach could one day be used to develop a multivalent vaccine for hantaviruses that would be broadly protective against HPS and other forms of the disease.

"This work is an example of the many medical products that USAMRIID offers the Nation and the Department of Defense," said Colonel Erik A. Henchal, Ph.D., commander of the Institute. "This success is the product of years of dedicated basic and applied research by USAMRIID scientists."

Hooper's co-authors were David M. Custer, Elizabeth G. Thompson, and Connie S. Schmaljohn, Ph.D., of USAMRIID, and Thomas G. Ksiazek, D.V.M., Ph.D., of the Centers for Disease Control and Prevention.

USAMRIID, located at Fort Detrick, Maryland, is the lead medical research laboratory for the U.S. 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.

###