

Hantavirus Information Paper

UNITED STATES ARMY MEDICAL RESEARCH
AND MATERIEL COMMAND



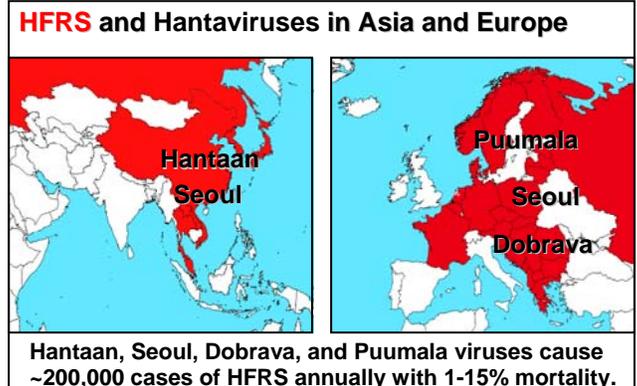
Description. Hantaviruses are carried by persistently infected rodents and are usually transmitted to humans in aerosols of rodent excreta. Four distinct hantaviruses cause hemorrhagic fever with renal syndrome (HFRS) in the eastern hemisphere and numerous distinct hantaviruses cause hantavirus pulmonary syndrome (HPS) in the western hemisphere. The mortality rate associated with HFRS ranges from ~1% for Puumala virus infections to 10-15% for Hantaan virus infections. The mortality rate for HPS is approximately 40%. One hantavirus, Andes virus, found in S. America has been found to be transmissible from person-to-person.

Symptoms. Both HFRS and HPS patients initially display fever and flu-like symptoms such as severe muscle pains, nausea, vomiting, and abdominal pain. Acute HFRS can result in rash, shock and kidney failure. HPS is characterized by the abrupt onset of respiratory distress and shock.

Occurrence. In Asia, Hantaan virus, carried by field mice, and Seoul virus, carried by rats, cause tens of thousands of cases of HFRS each year. In Europe and Scandinavia, Seoul virus and two other hantaviruses cause HFRS. Dobrava virus, carried predominantly by yellow-necked mice, is most prevalent in the Balkan countries from Slovenia to Greece and is also found in Western Russia. Puumala virus, carried by bank voles, causes thousands of cases of HFRS each year in Scandinavia and Western Europe and has been responsible for large epidemics in Western Russia.

HPS was first discovered in 1993 in the Southwestern US. Since then almost 400 cases of HPS have been reported in 31 states and in three Canadian provinces. The most prevalent virus causing HPS in N. America is Sin Nombre virus, carried by deer mice. More than 1200 cases of HPS have been reported in Argentina, Chile, and Brazil, Paraguay, Uruguay, Panama, Bolivia, and Venezuela.

Impact on Military Operations. Because hantaviruses are found in wild rodents that might be encountered by soldiers in the field, HFRS has long been considered to be a military threat. This threat first became apparent during the Korean war when more than 3,000 cases of HFRS occurred in United Nations Forces. Since then, numerous cases of HFRS have occurred in Korean and American troops stationed in Korea. In addition, periodic clusters of cases of HFRS have occurred during training exercises. For example, during the 1986 Operation Bear Hunt exercises in Uncheon, Kyonggi-Do, 14 cases of HFRS, with 2 fatalities, occurred among 3,754 Marines participating in the exercise. The attack rate was 5/1,000 with one company having a rate of 50/1,000. Of the cases, 13/14 occurred in one base camp that was bivouacked in a



cleared brush area. Serosurveys revealed that there were no asymptomatic cases among 2,053 sera examined. Rodent surveys revealed from 0% to 50% of animals trapped in various areas where the exercise was conducted had antibodies to a hantavirus.

Prevention. Vaccines are not currently available in the US for prevention of either HFRS or HPS. Avoidance of the virus-carrying rodent species and maintenance of living space hygiene eliminates the urine and feces that transmits the disease. This is not always feasible or practical in military operations.



Hantaan virus causes HFRS and is carried by field mice (*Apodemus agrarius*)



Sin Nombre virus causes HPS and is carried by deer mice (*Peromyscus leucopus*)

Current Research Efforts.

The DoD is developing multi-agent vaccines using DNA vaccine methods and other cutting edge technologies that promise to protect soldiers from hantavirus infections. An HFRS vaccine candidate is nearly ready for initial clinical testing.

More Information. Contact COL David W. Vaughn, M.D., M.P.H. at Fort Detrick, Maryland, (301) 619-7567, email: david.vaughn@us.army.mil