HANTAVIRUS INFECTION: Notes about the Disease

Those familiar with the history of the Korean War (1950-53) may recall that some of the American combatants of that war contracted a disease called "Korean hemorrhagic fever" or "**hemorrhagic fever with renal syndrome**" (HFRS), caused by the Hantaan virus. This virus was the prototype for a group of over 25 distinct viral species collectively known as hantaviruses. They are all acquired from exposure to aerosolized excreta of rodents. However, with one exception, HFRS has not reared its head in the western hemisphere. The exception is the Seoul virus, which has been isolated from urban rats in the United States and has caused three confirmed cases of HFRS in Maryland.[1]

A May-June1993 outbreak of unexplained adult respiratory distress syndrome in the "Four Corners" area of the American southwest (the point where Utah, Colorado, Arizona, and New Mexico converge) resulted in 13 deaths. A joint investigation by the involved state health departments and CDC determined the cause of this outbreak to be a previously unrecognized hantavirus that was eventually named the Sin Nombre virus (SNV); the disease was named **hantavirus pulmonary syndrome** (HPS).[2] The deer mouse (*Peromyscus maniculatus*) was shown to be the primary vector there.

As often happens with the identification of a "new" infectious agent, cases of HPS prior to 1993 began to be retrospectively identified. Also, by the turn of the millennium, a number of additional HPS cases were reported from different states, the majority being located west of the Mississippi River. Several additional hantaviruses, each with a different primary rodent vector, were identified mostly east of the Mississippi. One of these is the Monongahela virus, first detected in deer mice in West Virginia and first documented as a cause of fatal HPS in Pennsylvania.[3] This virus is now classified as a subspecies of the SNV.

The first and only case of HPS documented in North Carolina occurred in a diabetic Jackson County woman in 1995. Trapping around her home yielded a variety of rodents, including deer mice and white-footed mice (*Peromyscus leucopus*). Tests of these rodents for hantaviruses at CDC were all negative, but this testing was performed several months after the patient's illness. Testing of her serum specimens documented a Monongahela virus infection, predating the Pennsylvania cases by two years.[3] Prior to this case, NC State University researchers had identified a *Peromyscus* sp. rodent seropositive for SNV in Henderson County.[4]

NC's HPS case-patient survived her illness, quite likely due to the prompt institution of appropriate supportive treatment by her physician. With its high case-fatality ratio (approximately 50%), it behooves those concerned with the clinical management of patients who present with a febrile prodrome of nonspecific and often non-pulmonary complaints, followed by the rapid development of noncardiogenic pulmonary edema, to consider HPS in their differential diagnosis.

Excellent information on the prevention and control of hantaviral infections is available on the CDC website (http://www.cdc.gov/ncidod/dvrd/spb/mnpages/teach.htm).

1. GE Glass, et al., "Domestic Cases of Hemorrhagic Fever with Renal Syndrome in the United States," *Nephron* 68 (1994): 48-51.
2. JS Duchin, FT Koster, and CJ Peters, "Hantavirus Pulmonary Syndrome: A Clinical Description of 17 Patients with a Newly Recognized Disease," *New Eng J Med* 330 (1994): 949-55, content.nejm.org/cgi/content/full/330/14/949.
3. LV Rhodes, et al., "Hantavirus Pulmonary Syndrome Associated with Monongahela Virus, Pennsylvania," *Emerg Infect Dis* 6 (2000): 616-21, www.cdc.gov/ncidod/eid/vol6no6/rhodes.htm.
4. BJ Weigler, et al., "Serological Evidence for Zoonotic Hantaviruses in North Carolina Rodents," *J Wildl Dis* 32 (1996): 354-7, www.jwildlifedis.org/cgi/reprint/32/2/354.