

# TerranearPMC Safety Share

## Week of October 5, 2015 – Hantavirus

Anyone who has ever attended an OSHA HAZWOPER course; either the initial 40-hour or 24-hour course, the 8-hour supervisor course, or merely the 8-hour refresher, has been introduced to the disease known as Hantavirus. Hantaviruses are a relatively newly discovered genus of viruses, which, caused an outbreak of what was then known as Korean hemorrhagic fever, affecting American and Korean soldiers during the Korean War (1950–1953). More than 3000 troops became ill with symptoms that included renal failure, internal hemorrhage, and shock. It had a 10 percent mortality rate. This outbreak sparked a 25-year search for the etiologic agent. Finally, in 1976, scientists isolated the Hantaan virus from the lungs of striped field mice. The name, Hantavirus comes from the location where this disease was first observed; that is, the Hantaan River.

In 1993, an outbreak of Hantavirus pulmonary syndrome occurred in the Four Corners region in the southwestern United States. The viral cause of the disease was found only weeks later and was called the Sin Nombre virus or SNV (Spanish, "*virus sin nombre*", meaning "nameless virus"). The host was first identified as the deer mouse (*Peromyscus maniculatus*) by Terry Yates, a professor at the University of New Mexico.

As it turns out, hantavirus has been around a lot longer than the Korean War. Historians and scientists have theorized that Hantavirus caused the epidemic illness in 15<sup>th</sup> century England, where records indicate a mysterious sweating sickness just before the Battle of Bosworth Field (1485, considered to be the decisive battle of England's Wars of the Roses, where Richard III lost and was immortalized in William Shakespeare's Play *Richard III* – "A horse, a horse, my kingdom for a horse!").

Early symptoms include fatigue, fever and muscle aches, especially in the large muscle groups; thighs, hips, back, and sometimes shoulders. These symptoms are universal. There may also be headaches, dizziness, chills, and abdominal problems, such as nausea, vomiting, diarrhea, and abdominal pain. About half of all patients experience these initial symptoms. From 4 to 10 days after the initial phase of illness, the late symptoms appear. These include coughing and shortness of breath, with the sensation of, as one survivor put it, a "...tight band around my chest and a pillow over my face" as the lungs fill with fluid. Medical statistics indicate the disease has a mortality rate of 38%.

Hantaviruses are single-stranded, enveloped, negative sense RNA viruses in the Bunyaviridae family and normally infect rodents. While the rodent-hosts are not affected by the Hantaviruses within them, humans may become infected through contact with rodent urine, saliva, or feces which contain the Hantavirus. While some diseases, most notably, the bubonic plague, involve insects such as fleas as the primary host which then use rodents as carriers for which humans are affected through flea bites, this is not the case for Hantaviruses.

Once intake of the Hantavirus occurs (i.e. inhalation), the virus then engages in intracellular interactions. They enter into the new (human) host cells by attaching to cellular receptors and being "engulfed" into the cell (i.e. endocytosis). Any virus, once inside a cell becomes a small parasite that cannot reproduce by itself. However, in the case of Hantaviruses (being a strand of RNA) it can direct the cell to produce more viruses.

The rodents identified as hantavirus carriers are: the deer mouse, the cotton rat, rice rat and the white-footed mouse. The deer mouse (2-3 inches long with an addition 2-3 inches for the tail) is found



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throughout North America, preferring woodlands, but also appears in desert areas. The cotton rat is found in the southeastern US and down into Central and South America. It has a bigger body than the deer mouse. The head and body measure approximately 5 - 7 inches with another 3 - 4 inches for the tail. The Rice Rat is slightly smaller than the cotton rat, with a 5 - 6 inch head and a very long 4 - 7 inch tail. It prefers marshy areas and is semi-aquatic. It is found in the southeastern US and Central America. The White-footed mouse closely resembles the deer mouse. Head and body together measure approximately four inches with the tail being shorter than the body, typically 2 - 4 inches. It is found throughout southern New England and the Mid-Atlantic and southern states, the mid-western and western states, and Mexico. It prefers wooded and brushy areas, although it will sometimes inhabit more open ground.

Initially it was thought that human infection of the Hantavirus could only happen through contact with rodent excrement or fluids; however, there have been significant observations that show a link due to human-to-human transmission.

There is no known antiviral treatment, but natural recovery from the virus is possible with supportive treatment. Patients with suspected Hantavirus are usually admitted to the hospital and given oxygen and mechanical ventilation support to help them breathe during the acute pulmonary stage.

Because Hantavirus transmission occurs via contact with rodent excreta, liquids and bites, control of rats and mice in areas frequented by humans is key for disease prevention. Barns, sheds, homes, or buildings easily entered by rodents are potential places for Hantavirus. Therefore, prevention can be accomplished by disposing of rodent nests while sealing any cracks and holes in homes where mice or rats could get in, and setting up traps, laying down poisons or using natural predators such as cats in the home. Rural areas that have forests and fields that can support a large rodent population are locations of increased risk. Those who work in areas that may be a shelter for rodents (for example, crawl spaces, vacated buildings, construction sites) may also have increased risk of Hantavirus-related disease.

Only people trained to perform disposal of rodent remains should perform such tasks. Using dry methods, such as vacuuming or a broom to remove rodent urine or feces will only increase the risk of Hantavirus by generating an aerosol and thus becoming an exposure to humans via inhalation. The risk of Hantavirus can be reduced by inactivating these viruses in the environment by using a household detergent and dilute solution (1-to-10) bleach and water, which should be wiped or sprayed at the potentially infected area. Physical contact needs to be minimized while cleanup functions should be performed with appropriate gloves (nitrile or similar) and respiratory protection (1/2 -face respirator with type-100 filter/cartridge). Similar precautions should be practiced when rodents are caught in traps.

Currently, there are no vaccines available to protect against any Hantavirus types. The CDC recommends elimination or reduction of contact with any rodents (for example, at home, worksites, campsites, barns, sheds, ect.) by reducing rodent access. Sealing up gaps and holes, placing traps, and keeping areas as clean and food free as possible will help.

**I was going to have cosmetic surgery until I noticed that the doctor's office was full of portraits by Picasso.** - Rita Rudner

