

Human Diseases and Wildlife: Implications for Nebraska

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Serious diseases having a wildlife connection, Lyme disease, hantavirus, and West Nile virus are more and more frequently in the news. What is the current status of these diseases in Nebraska? Wayne Kramer is Nebraska's lead investigator of these vector-borne diseases.

This article discusses how these diseases may potentially impact Nebraskans.

Lyme Disease: Lyme disease is the most reported vector-borne disease in the U.S. It is caused by a bacteria, *Borrelia burgdorferi*, and was first identified in Lyme, Connecticut in 1982, although it likely has been present in the U.S. since the 1800's. It is a chronic debilitating disease, but rarely fatal. More than 16,000 cases of Lyme disease were reported in the U.S. in both 1998 and 1999, and the greatest number of cases continues to occur in northeastern, mid-Atlantic, and northcentral states (Minnesota and Wisconsin). A distinctive, expanding circular rash is the best early symptom of the disease and occurs in 60 to 80 percent of all cases. Lyme disease is maintained in nature in a cycle involving *Ixodes scapularis*, the deer tick, and associated reservoir hosts (white-footed mice and white-tailed deer).

In 1996, a related bacteria, *Borrelia lonestari*, was isolated from the lone star tick, *Amblyomma americanum*, which has a distribution in the southern U.S. including Nebraska. This fact may help us better understand the current status of Lyme disease in Nebraska. A relatively small number of cases of Lyme disease have been reported in Nebraska (84 for the period of 1990 to 1999) despite the fact that the only known competent vector of *Borrelia burgdorferi*, the deer tick (*I. scapularis*), has not been found here. The majority of the Lyme disease-like illnesses that are being reported and counted as classic Lyme disease in Nebraska may, in fact, be caused by *B. lonestari*. Also, most cases of the Lyme-like disease were contracted in the southeastern part of the state which

overlaps the lone star tick geographical distribution—good epidemiological evidence this tick may be the vector.

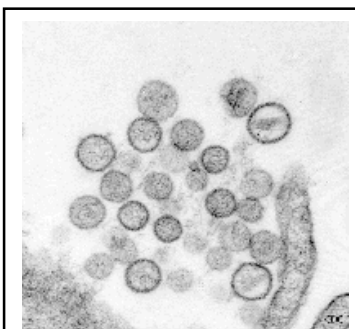
There is a human vaccine currently being marketed for Lyme disease but it is not recommended for Nebraska residents. Because the risk of



White-tailed Deer

Lyme disease is very low in Nebraska and because vaccines have a high degree of specificity, it is thought the vaccine would not protect persons against *B. lonestari*.

Ehrlichiosis: The lone star tick is also known to transmit another bacterial agent, *Ehrlichia chaffeensis*, which causes human monocytic ehrlichiosis (HME). This bacteria was first described in 1986, and one case has been reported in Nebraska. The spectrum of human disease ranges from an illness that is very mild to a severe, life threatening, or fatal disease. The disease may be confused clinically with Rocky Mountain spotted fever. The wildlife reservoir for this disease is also the white-tailed deer.



Sin Nombre Virus or Hantavirus
Image courtesy Cynthia Goldsmith, Sherif Zaki, and Luanne Elliott, Infectious Disease Pathology Activity, DVRD, NCID, CDC.

Personnel at the Lancaster County Extension Office, have the expertise to identify tick species. During the summer of 2000, we were surprised to identify several deer ticks. However, each of these ticks were brought back to Nebraska by folks traveling in the eastern part of the U.S. So, if you are vacationing in areas where deer ticks occur, check yourselves carefully for the presence of ticks. If the populations are very high, consider using the repellent DEET or the insecti-

cide permethrin on your clothing.

Hantavirus Pulmonary Syndrome (HPS): HPS is a deadly respiratory condition caused by a virus named the Sin Nombre virus. It is carried by a rodent, primarily the deer mouse (genus *Peromyscus*). HPS was first identified in 1993 in the Four Corners region of the southwest after several individuals died, but the disease has been documented as far back as 1959. It is a rare disease—as of February 2001, 279 cases were confirmed in 31 states. Cases are concentrated in western states, although cases have been documented as far east as Rhode Island and New York. Only one case of HPS has been documented in Nebraska (1999), even though surveys of rodent populations show that the Sin Nombre virus is endemic in deer mice populations throughout Nebraska. In a number of surveys, between four and 20 percent of collected rodents carried the Sin Nombre virus.

There is no insect vector for hantavirus. The risk associated with this disease is solely dependent on factors that promote rodent populations and the frequency of human activities in infested areas. Rodents are completely unaffected by the disease and do not get sick or die, but serve as a reservoir and can infect other rodents. The virus is shed by rodents in the urine and feces and may remain viable in the environment for some period of time.

The risk to humans occurs when individuals inhale infectious virus particles. Many human exposures have come from contaminated buildings, occupying previously vacant cabins, cleaning barns and other outbuildings, but other sources of exposure have been associated with agricultural activities, such as planting and harvesting field crops. Hikers and campers may also encounter the virus.

Because there is always a risk, even though it is small, precautions should be taken to prevent exposure to the virus. Wearing a properly fitted respirator with a HEPA filter will provide protection by effectively filtering out the tiny virus particles which may be airborne. Paper dust masks do not provide effective protection. When dealing with rodent-infested areas, one must first

reduce rodent populations, ventilate the area before cleaning, and then use wet cleaning techniques (see *Cleaning up After Rodents* page 3). These steps will reduce the risk from inhaling infectious virus particles.

West Nile Virus: West Nile encephalitis, thought to be first introduced into New York City in 1999, was found in four states by the end of 1999. In 2000, it expanded further outward from the New York City metro area to 12 states. The virus circulates in nature in a mosquito-bird cycle and clinical disease is known in humans and horses. Although, most bird species are not affected by the virus, a small number of bird species are debilitated by this disease; the most susceptible birds belong to the family Corvidae (crows, ravens, jays). The observation of dead crows (Corvids) which later tested positive for West Nile virus has been a useful

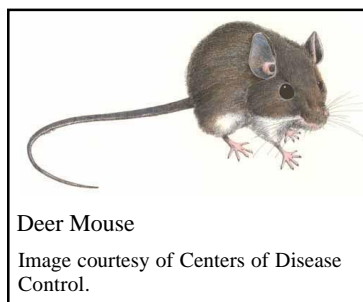
surveillance tool to monitor the expanding range of this virus on the east coast. The dead crows are more likely to be single

crows, rather than a large flock, which is more likely to indicate mortality from a toxic substance, like a pesticide.

Most people who are infected with the West Nile virus have no symptoms or experience a mild illness (fever, headache, body aches) and fully recover. For some individuals, particularly the elderly, West Nile virus can cause encephalitis and cause permanent neurological damage to the brain and can be fatal. Symptoms include a severe headache, muscle weakness, high fever, stiff neck, confusion, and loss of consciousness (coma).

What is the likelihood that the West Nile virus will get to Nebraska? Based on the expansion of the disease from 1999 to 2000, a good guess is that the disease could reach Nebraska in two to five years. Predictions are complicated because each geographical area has its own complement of mosquito species that may or may not be good vectors.

If you find dead crows, you are urged to call Wayne Kramer (402) 471-0506. To be useful for analysis, the crows must be



Deer Mouse
Image courtesy of Centers of Disease Control.

In this issue...

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-  Horticulture —page 2
-  Environmental Focus —page 3
-  Farm Views —page 4
-  Acreage Insights —page 5
-  Food & Fitness —page 6
-  Family Living —page 7
-  4-H & Youth —pages 8-9
-  Community Focus —page 10

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