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## **Health Threats from Rodent Infestation**

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Rodent infestation may cause several problems, including contamination of food, damage to property and disease transmission. Rats can produce twelve to sixteen milliliters of urine and up to fifty fecal droppings in a twenty-four hour period. Gnawing of electrical cables is but one example of property damage that might result from the presence of rodents in buildings. Contamination of stored food with rodent feces or urine can transmit diseases to both humans and pets and can increase spoilage and render foods inedible. Rodent lice, mites and fleas can also infest other animals and, occasionally, people.

Worldwide, many rodent-transmitted diseases cause varying degrees of morbidity and mortality. The Centers for Disease Control and Prevention (CDC) lists several rodent-transmitted diseases important in the United States.

Hantavirus Pulmonary Syndrome is an often deadly disease transmitted by rodents through urine, feces, or saliva. There are more than twenty-five antigenically different viral species of hantavirus, each associated with a single rodent species. The cotton rat (*Sigmodon hispidus*) and the rice rat (*Oryzomys palustris*) have been the rodents implicated in cases in Louisiana and the southeastern United States. Humans can contract the disease after inhalation of dried, aerosolized secretions. Although a rare disease (Since 1959 less than 400 cases have been reported in the U.S. and Canada) the severity of the condition underscores reason for concern. The mortality rate for Hantavirus Pulmonary Syndrome is thirty-eight percent. The best prevention of exposure is rodent control in and around the home.

Murine typhus, a rickettsial infection caused by *Rickettsia typhi*, is a disease that occurs worldwide and is transmitted to humans by rat fleas. In some areas peridomestic cycles involving cats, dogs, opossums and their fleas may exist. The disease is more common in summer months, but in warmer climates the condition can occur year round. In the United States, most cases have been reported from California, Hawaii, southern Texas and the Gulf Coast. Symptoms of the disease often include headache, myalgia and rash and seldom last longer than two weeks. The disease is often mild, but untreated severe cases can be fatal. Rat infested buildings and homes, especially in port cities or in riverine environments, often serve as havens for rats harboring fleas.

Rat-bite fever is a systemic bacterial illness that is most often transmitted to humans through a bite or scratch. One might also acquire the disease through ingestion of food or water contaminated with rat feces. The etiologic agents are *Streptobacillus moniliformis* and *Spirillum minus*. Possible symptoms include fever, chills, muscle pain, vomiting, headache, rash and adenopathy. In approximately fifty percent of patients, the disease progresses to a non-suppurative polyarthritis or arthralgia. Occasionally solid organ abscesses, pneumonia, endocarditis, myocarditis, or meningitis occur. The case fatality rate of rat-bite fever in untreated cases is approximately seven to ten percent.

Leptospirosis is a disease caused by *Leptospira* bacteria transmitted in the urine of infected rodents. Both pathogenic and non-pathogenic leptospires exist. Infection can be asymptomatic or can cause a range of symptoms. Mild cases exhibit headache, fever, abdominal pain, diarrhea and/or rash. More severe cases may experience kidney damage, meningitis, liver failure, or respiratory distress. These infections are rarely fatal. Many wild and domestic animal species in addition to rodents act as reservoirs and may transmit the disease.

Eosinophilic meningitis sometimes results from infection of the brain with larval stages of the rat lung-worm, *Angiostrongylus cantonensis*. The intermediate hosts of these rat parasites are terrestrial and aquatic snails and slugs. Examples of paratenic hosts, (hosts in which no development occurs but in which infectious stages of the parasite can be accumulated), are fish, amphibians, reptiles, crustaceans and land planarians. Vegetables may also accumulate infectious larva. Persons may become infected by ingesting snails, raw or improperly cooked paratenic hosts, or foods (especially salad greens) contaminated by slugs or snails. Some infections are asymptomatic; some victims experience mild symptoms of fairly short duration, but occasionally a fulminate eosinophilic meningitis, with headache, nuchal rigidity, paresthesia, low-grade fever, nausea and vomiting results. In some cases these symptoms may persist for weeks or months.

Several bacterial infections have been transmitted by rodents to humans through consumption of contaminated food or water. Usually these infections do not cause severe consequences, although infection can be characterized by diarrhea, abdominal cramps, vomiting, and nausea. However, in persons with reduced immunity, including the elderly and the very young, some infections may be fatal. *Salmonella enterica* serovar *Typhimurium* is an example of one such bacterium. Listeriosis may also be transmitted by a number of rodent species.

Rodents have also been implicated in the transmission of several other helminths and scores of bacterial, rickettsial, protozoal and viral infections around the globe. Control of rodents and elimination of infestations should reduce the chance of exposure to the above diseases and minimize risk of infection with the aforementioned agents.