

hantavirus Any of several enveloped RNA viruses in the family Bunyaviridae which chronically infect rodents and other small mammals and which are capable of causing severe human disease transmitted by aerosolized excreta.

The viral hemorrhagic fevers are characterized by prominent alterations in hemostasis, of a degree that otherwise is found rarely and only in severe cases of viral infection. Hemorrhagic fevers occur chiefly in the tropics. Yellow fever, Lassa fever, and dengue fever are the best known of about a dozen so far described. Each of the hemorrhagic fevers is caused by a different virus, and the viruses belong to four different families.

Diseases identified as hemorrhagic fever with renal syndrome (first described in eastern Russia in 1913), epidemic hemorrhagic fever (in China), nephropathia epidemica (in Scandinavia), and Korean hemorrhagic fever (among U.N. troops in Korea) had been reported by 1959. The etiologic agent of Korean hemorrhagic fever was isolated from the lungs of field mice in 1976 and was later named Hantaan virus after a river in the region. The mice proved impossible to colonize, but the virus was successfully grown in cell culture in 1981 and its genome was analyzed in 1983. Closely related viruses, each of which is associated with a single rodent species, cause the similar diseases seen elsewhere.

Comparison of the antigenic and genetic properties of the Hantaan virus and related viruses led to the proposed assignment of all of them to a new *Hantavirus* genus in 1985. Antibodies to hantaviruses were found in "peridomestic" rodents in many places, including areas where human diseases had either not been described or were limited to animal laboratory environments. Considering it unlikely that human exposure to the rodent hosts could be vastly different in different regions, Nobel laureate D. Carleton Gajdusek suggested in 1987 that different strains of hantavirus might produce atypical diseases.

In May 1993 such a disease appeared on a Navajo reservation in the Four Corners area of northwestern New Mexico. It took the form of an adult respiratory distress syndrome affecting previously healthy people, about half of whom died. In some of these people, serologic evidence of recent hantavirus infection was found, or the virus genome was documented in autopsy specimens by PCR amplification, or both. The responsible virus has not been propagated but is a previously unknown agent by the evidence of partial nucleotide sequences analyzed at the CDC.

Historically the incidence of hantavirus disease has been found to vary with the seasons, peaking along with the rodent population. At the Four Corners, Navajo medicine men said the number of deer mice was unusually high because piñon trees had borne nuts year-round for only the third time in this century. Captured mice also showed evidence of hantavirus infection, not necessarily with the same virus that caused the human disease.

KNOWN AND PROPOSED HANTAVIRUSES

VIRUS	RODENT	LOCATION
Hantaan	Field mouse	Asia
Puumala	Bank vole	Scandinavia
Seoul	Norway rat	Worldwide
Prospect Hill	Meadow vole	U.S.
Muerto Canyon	Deer mouse	U.S.
Thailand 749	Bandicoot	Thailand
Thottapalayam	Shrew	India

Hantaan, Puumala, and Seoul viruses cause hemorrhagic fever with renal syndrome.

Deer mice are found throughout the United States except along the Gulf Coast. Hantavirus antibodies were isolated from two people in the Gulf Coast region who died during June, one of whom had renal as well as pulmonary disease. The CDC began to investigate earlier deaths from adult respiratory distress syndrome to see whether some might be linked to hantavirus infection.

Hemorrhagic fever with renal syndrome has never been described in the United States, but the Seoul virus has been isolated from rats in this country, and hantavirus infection has been associated with hypertensive renal disease in a Baltimore population.



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Peromyscus maniculatus, the deer mouse.

REFERENCES

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