

# Hantaviruses: Unveiling the Pandemic Threat

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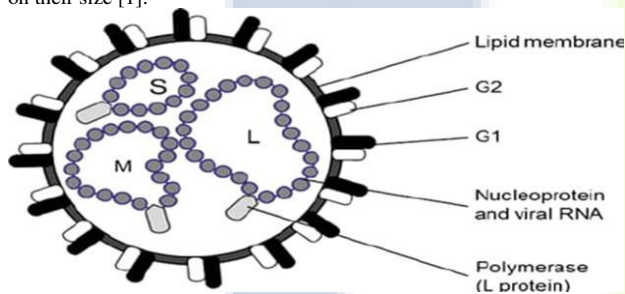
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## ABSTRACT

Hantaviruses are zoonotic viruses primarily transmitted to humans through contact with infected rodents or their excreta. Different species of hantaviruses exist globally, causing variations in disease presentation and severity. While outbreaks have occurred in various regions, person-to-person transmission is rare. Unlike viruses like influenza or SARS-CoV-2, hantaviruses do not possess the characteristics necessary for rapid global transmission and sustained outbreaks. Vigilance, surveillance, research, and public health interventions are crucial in mitigating the risks associated with hantavirus infections. Although hantaviruses pose a significant public health concern, they are not currently considered the next global pandemic. Proper preventive measures, such as avoiding contact with rodents, repairing gaps, using protective equipment, and disinfecting contaminated areas, are essential in halting the spread of hantaviruses. Continued monitoring and understanding of hantaviruses are necessary to prevent future outbreaks and protect public health.

### Morphology

Hantavirus virions are spherical in appearance and differ in size from 80 to 120 nm. Its genome is divided into three single-stranded negative sense RNA segments i.e., small (S), medium (M), and large (L) based on their size [1].



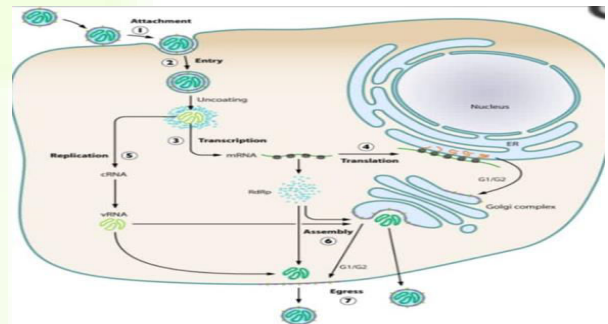
**Fig. 1: Spherical morphology of Hanta Viruses**

### Causative agents:

Hantavirus infections in humans are primarily caused by several species of hantaviruses, which belong to the family Hantaviridae. These viruses are typically transmitted to humans through contact with infected rodents or their urine, droppings, or saliva. While hantaviruses are carried by rodents worldwide, different species of rodents may carry different strains of hantaviruses, leading to variations in the disease presentation and severity. The most common hantaviruses that cause human infections include the Sin Nombre virus in North America, the Hantaan virus in Asia, and the Andes virus in South America. Each of these viruses is associated with specific rodent hosts, such as deer mice and cotton rats for the Sin Nombre virus, and the striped field mouse for the Hantaan virus. Human hantavirus infections typically occur when people come into contact with contaminated materials, such as rodent droppings or nesting materials, or through inhalation of airborne particles contaminated with the virus. It is important to note that human-to-human transmission of hantaviruses is rare and typically occurs only in exceptional circumstances, such as certain healthcare settings [2].

### Life cycle:

The superfamily Hantavirus is a complex group containing above 300 viruses that may infect wildlife, vegetation, human being and invertebrates. Due to the global distribution of its rodent reservoirs and type of illness in human, hantaviruses are commonly referred as Old World and New World hantaviruses. The Old and New World hantaviruses reveal similar aspects of their life cycles and demonstrate high homology in the structuring of their genomic sequences, despite of the disparities in locations and pathologies. The deer mouse act as the final host for Sin Nombre virus which is prevalent in western and central US and Canada. Hantavirus-related haemophilia is a common condition that can affect people who have contact with rodents. If exposed to the pathogen, healthy people can also acquire HPS [3].



**Fig. 2: Virus cycle inside the host**

### Epidemiology & Transmission:

Hantaviruses have a global distribution and are found on every inhabited continent. However, the specific species of hantaviruses and their associated diseases vary in different regions of the world. The epidemiology of hantaviruses is influenced by factors such as the rodent species involved, the prevalence of infection in rodent populations, and human behavior.

In North America, the Sin Nombre virus is the primary cause of hantavirus infections, transmitted by the deer mouse. Outbreaks of hantavirus pulmonary syndrome (HPS) have been reported in various states, particularly in rural and semi-rural areas. In Asia, the Hantaan virus is responsible for hemorrhagic fever with renal syndrome (HFRS). It is transmitted by the striped field mouse and occurs predominantly in rural agricultural regions. Other hantaviruses, such as Seoul virus and Dobrava-Belgrade virus, are also found in Asia and can cause HFRS. In South America, the Andes virus is associated with HPS and is transmitted by the long-tailed pygmy rice rat. Outbreaks have occurred in several countries, including Argentina, Chile, Brazil, and Uruguay. The epidemiology of hantaviruses is closely tied to rodent populations and their interactions with humans. Environmental factors, such as land use changes and climatic conditions, can influence rodent populations and, consequently, the risk of hantavirus transmission. Surveillance, prevention measures, and public health interventions are essential for understanding and controlling hantavirus infections worldwide. The main route of hantavirus transmission is the contaminated air with virus-containing particles from rodent urine, droppings or saliva. It is critical to avoid activities that generate dust, such as sweeping or vacuuming. Human usually get infected when they breathe in virus particles (Jonsson et al. 2010).

### Prevention & Treatment:

There is no medical intervention or vaccine is available for hantavirus infection, so preventive strategies are the only way to stop the spread of viral infection. However, if the infection is detected in early phase, then

it is recommended to shift the patient in Intensive Care Unit (ICU) for proper medication. Some of the preventive strategies are enlisted below;

- Avoid or reduce contact with rodents in your home, workplace, or camping site.
- Repair any holes or gaps in your home or garage.
- Put on rubber or plastic gloves, a respirator, and goggles with no vents.
- Disinfect the rodent urine and droppings with a disinfectant.
- Use a cleaning solution to Hoover or syphon the area [4].

#### **Understanding the pandemic potential:**

Hantavirus has been the cause of concern in the past, but it is important to note that it is not considered the next pandemic at the moment. Hantaviruses are zoonotic viruses that primarily infect rodents and occasionally spill over to humans, causing diseases such as hantavirus pulmonary syndrome (HPS) and hemorrhagic fever with renal syndrome (HFRS). While these infections can be severe and even fatal, person-to-person transmission of hantaviruses is rare, with limited evidence of sustained human-to-human spread. Unlike viruses like influenza or coronaviruses such as SARS-CoV-2, hantaviruses do not possess the same characteristics that facilitate rapid global transmission and sustained outbreaks. Hantavirus infections are typically localized to specific geographic regions and are associated with specific rodent hosts. It is crucial to remain vigilant about emerging infectious diseases, including hantaviruses, and to continue monitoring their prevalence and potential for transmission. However, based on current scientific understanding and available data, hantaviruses do not pose the same level of global pandemic threat as certain other viruses. Ongoing surveillance, research, and public health measures are essential to mitigate the risks associated with hantavirus infections and prevent future outbreaks [5].

#### **Conclusion:**

In conclusion, hantaviruses represent a significant public health concern, causing diseases such as hantavirus pulmonary syndrome (HPS) and hemorrhagic fever with renal syndrome (HFRS). While these infections can be severe, hantaviruses are not currently considered the next global pandemic. Their transmission is primarily associated with contact with infected rodents and their excreta, and person-to-person transmission is rare.

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