Viruses causing hemorrhagic fever

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17 พฤศจิกายน 2568

VAT
SD Avenue

Viruses causing hemorrhagic fever

- *Flaviviridae* : Yellow fever, dengue, Omsk, Kyasanur Forest disease virus
- *Filoviridae* : Ebola, Marburg virus
- *Arenaviridae* : Junin, Machupo, Guanarito virus, Lassa fever
- *Hantaviridae* : Hantaan virus, Seoul virus
- *Nairoviridae* : Crimean-Congo virus
- *Phenoiviridae* : Rift Valley fever, Dabie bandavirus

Severe fever with thrombocytopenia syndrome virus

Taxonomic Classification:

Order: *Bunyavirales*

Family: *Phenuiviridae*

Genus: Bandavirus

Species: Dabie bandavirus (formerly SFTSV)

Signs and symptoms of VHF

- The initial signs and symptoms of VHF are nonspecific, such as high fever, fatigue, loss of strength, muscle, bone or joint aches, nausea, vomiting, diarrhoea.
- Specific signs and symptoms can vary by type of VHF, but difficult to provide differential diagnosis. Worse symptoms include bleeding, liver, kidney, and respiratory failure, nervous system issues, coma and death,

National Healthcare Group

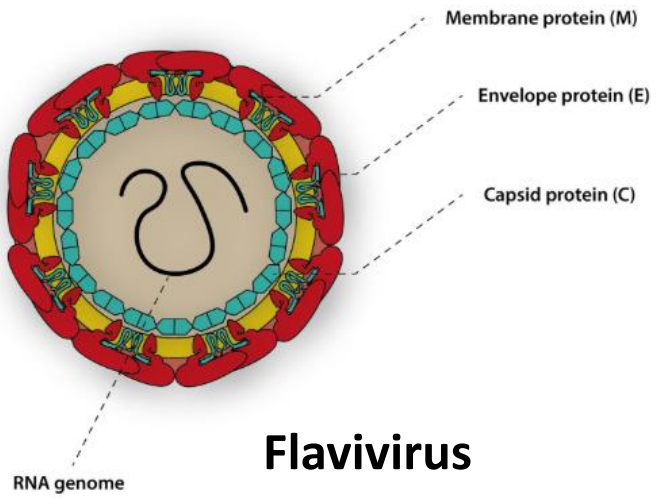
Kalayanaruj. Trop Med Hlth 2011

Pathogenic mechnisms of VHF

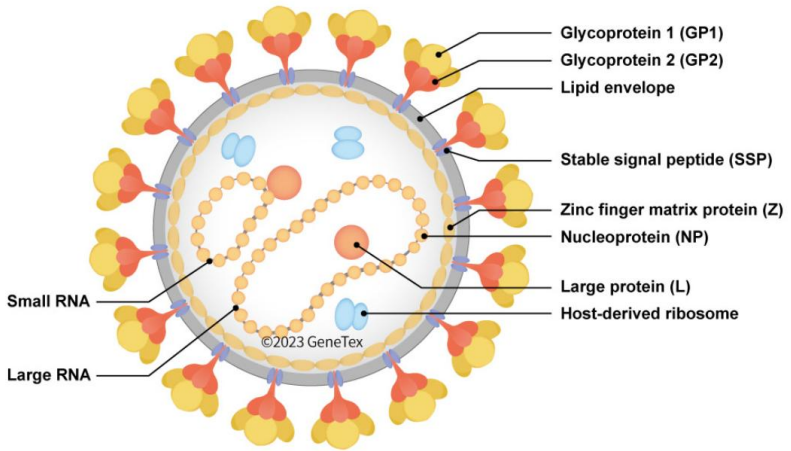
- Vascular damage, increased vascular permeability and plasma leakage
- Hemorrhage
- Hepatocellular necrosis leads to deficiency of coagulation factors
- Complement activation
- Disseminated intravascular coagulation
- Cytokine storm

Common characteristics of viruses causing HF

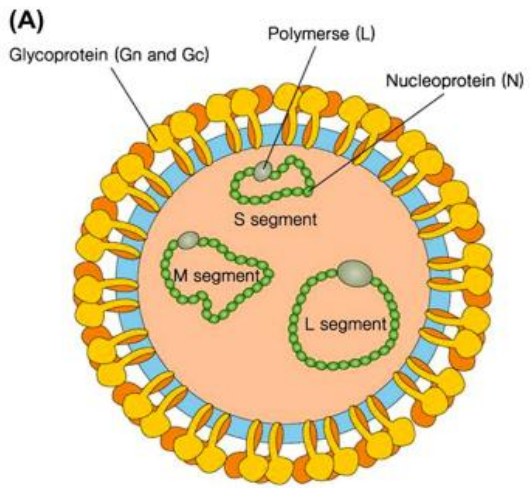
- Enveloped virus with single stranded or multi-segmented RNA genome
- Wide range of natural hosts : zoonotic diseases and some are vector-borne viruses
- Geographically restrict



Flavivirus



Lassa virus



Hantavirus

Vector-borne hemorrhagic fever viruses

- **Mosquito-borne**: Yellow fever, dengue, Rift Valley fever
- **Tick borne**: Crimean-congo, Kyasanur Forest, Omsk, Dabie virus (SFTSV)
- **Rodent-borne**: Hantavirus, Lassa, Sabia virus

Aedes

Mastomys natalensis:
Multimammate rat-Lassa reservoir.
Idris Nasir Abdullahi

Hyalomma ticks-vector for CCHF
(Daktaridudu/Wikimedia Commons)

Ebolavirus Ecology

Enzootic Cycle

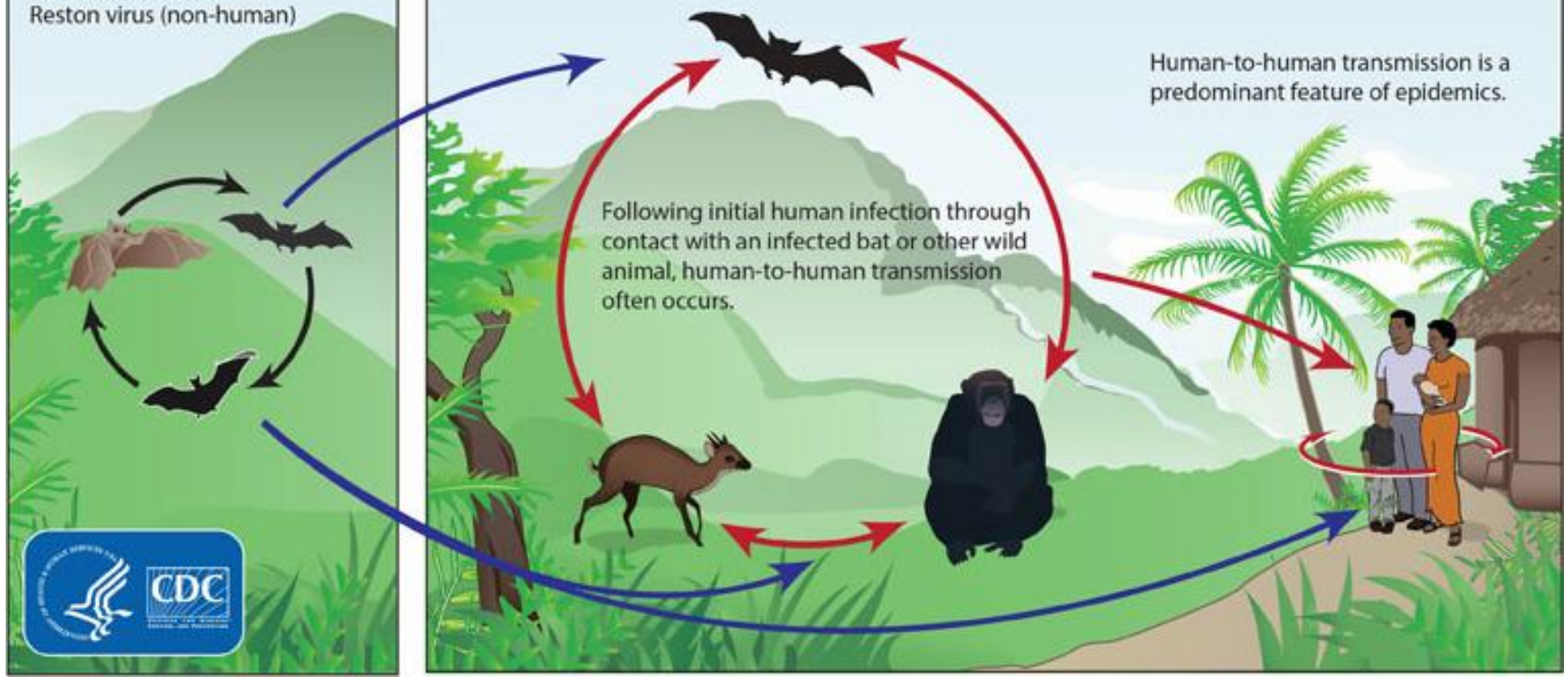
New evidence strongly implicates bats as the reservoir hosts for ebolaviruses, though the means of local enzootic maintainance and transmission of the virus within bat populations remain unknown.

Ebolaviruses:

Ebola virus (formerly Zaire virus)
Sudan virus
Taï Forest virus
Bundibugyo virus
Reston virus (non-human)

Epizootic Cycle

Epizootics caused by ebolaviruses appear sporadically, producing high mortality among non-human primates and duikers and may precede human outbreaks. Epidemics caused by ebolaviruses produce acute disease among humans, with the exception of Reston virus which does not produce detectable disease in humans. Little is known about how the virus first passes to humans, triggering waves of human-to-human transmission, and an epidemic.



Sources of Ebola virus infection

- Animals
- Human body fluids

  Blood, urine, feces, sweat,

  nasal secretion, sputum, breast milk,

  genital secretion, semen,

  aqueous humor of a uveitis case

Geographic distribution of VHF

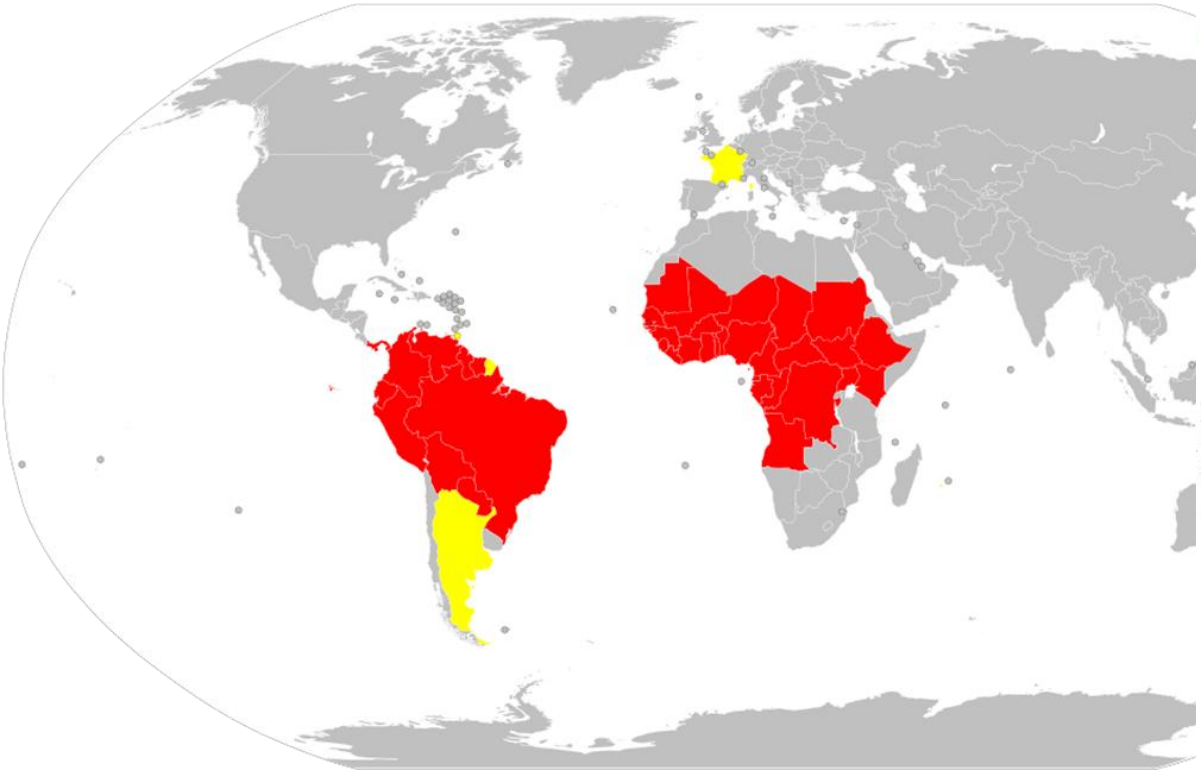
Flaviviruses

- Yellow fever virus- Africa and South America
- Dengue viruses- worldwide: SE Asia, South America, in particular
- Omsk hemorrhagic fever virus- Western Siberia
- Kyasanur Forest disease virus - Kyasanur Forest in India
- Rift Valley fever virus- Sub-Saharan Africa, Arabian peninsula

Filovirus

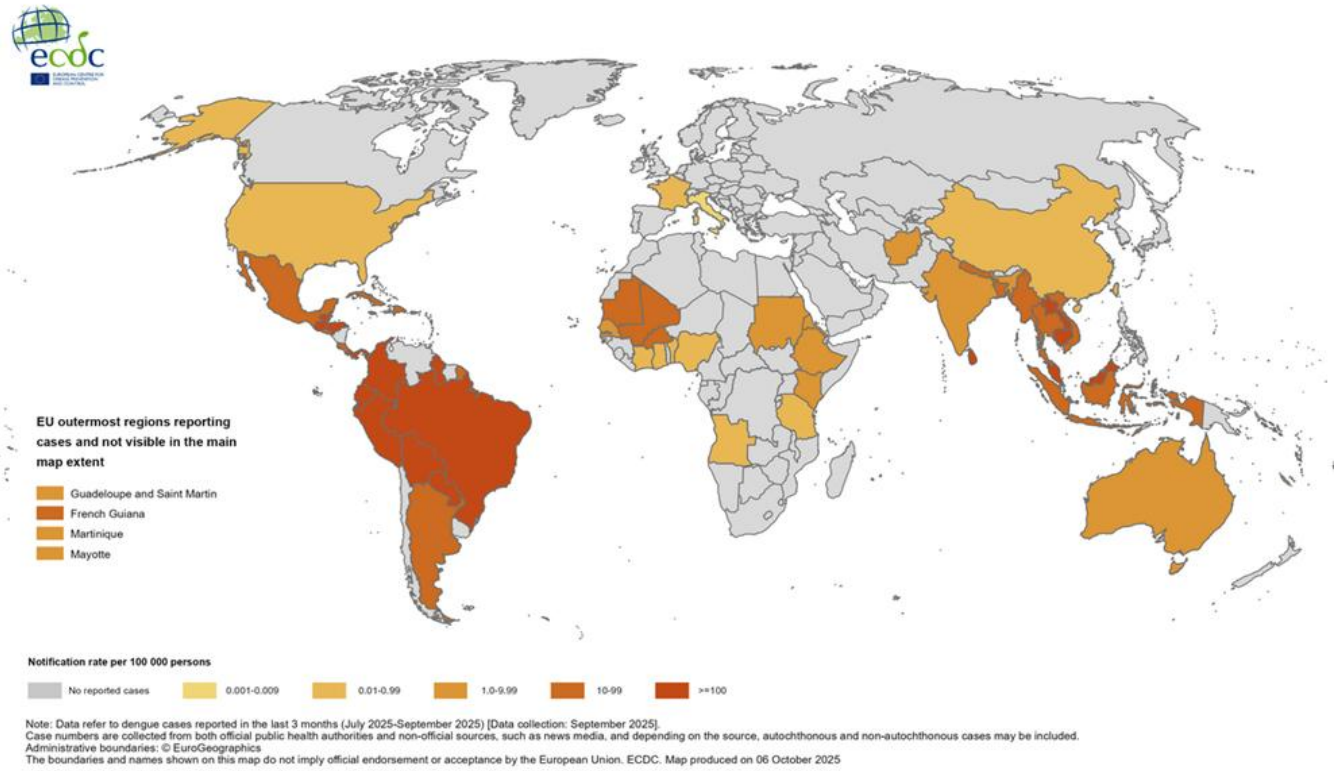
- Ebola virus- Africa
- Marburg virus- Africa

Global distribution of yellow fever and dengue viruses



Yellow fever risk countries, 30 Nov 2000

Wikimedia Common



Dengue case notification rate per 100 000 population, Jun-Aug 2025

Arenaviruses

- Junin virus causes Argentine hemorrhagic fever.
- Machupo virus causes Bolivian hemorrhagic fever.
- Guanarito virus causes Venezuelan hemorrhagic fever.
- Sabia virus causes Brazilian hemorrhagic fever.
- Lassa virus in Africa

Hantavirus

- Hantaan virus- East Asia

Risk groups of viruses causing hemorrhagic fever

- Risk group 2: Dengue virus
- Risk group 3: Lassa virus, Hantaan virus, yellow fever virus
- Risk group 4: Ebola virus, Marburg virus, South American hemorrhagic fever viruses

Vaccines against hemorrhagic fever

- Yellow fever virus vaccine
- Ebola virus vaccine for healthcare workers
- Dengue vaccines

Yellow fever virus

- The first virus known to cause human infection
- The first virus known to be transmitted by insect vector

Max Theiler

Nobel Prize laureate 1950

- Live attenuated vaccine was developed by Max Theiler in 1937.
- Protection begins by the 10th day after vaccination in 95% of people, and last for at least 10 yrs.

VHF in Thailand

- Dengue viruses – Thai hemorrhagic fever
- Hantavirus (Hantaan virus causes hemorrhagic fever with renal syndrome – Korean hemorrhagic fever)
- SFTS virus

Hantavirus in Thailand

- Using IFA (verified by PRNT), hantavirus Ab were detected in 24% of *Bandicota indica*, 3.6% of *Rattus rattus*, and 5.7% of *R. norvegecus.* The antibody was also detected in > 30% of people living around the fields where *B. indica* were trapped (Elwell, et al. Southeast Asian J Trop Med Pub Hlth 1985: 16: 349).

Bandicota indica. Musser, et al. 2004. American Museum Natural History

Rattus norvegicus (Brown rat) Earth.com Earthpedia animal

R*attus rattus*

The first human case infected with hantavirus

(Suputthamongkol, et al. Southeast Asian J Trop Med Hlth 2005; 36: 217.

- One among 115 patients with fever of unknown origin that attended Siriraj Hospital between May 1999 and Nov 2000 was diagnosed hantavirus infection as diagnosed by ELISA IgG/IgM, using IFA as the confirmatory test.
- The patient exhibited acute encephalitic febrile illness, thrombocytopenia, high AST and ALT, and a prolonged coagulation time.