JIHS
Japan Institute for Health Security

Development of a Broad-Spectrum Genetic Detection System for Hantaviruses

Information of the researcher

- Name; Satoru Arai
- Affiliation; Department of Immunization Research
- Collaborator; Ken Maeda in Vet. Research

Research Concepts and Technological Innovations

- Novelty and Advantages
  - In addition to rodent-borne hantaviruses, our approach enables the detection of hantaviruses associated with Eulipotyphla and Chiroptera.
  - This allows rapid identification of both known and novel hantaviruses, thereby contributing to vaccine development and next-generation diagnostic systems for early detection.
- Key Results

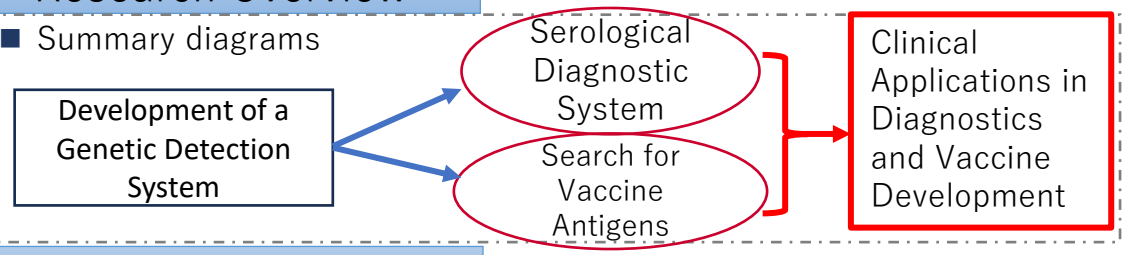
- [1] **Arai S**, Ohdachi SD, Asakawa M, Kang HJ, Mocz G, Arikawa J, et al. Molecular phylogeny of a newfound hantavirus in the Japanese shrew mole (*Urotrichus talpoides*). Proc Natl Acad Sci U S A. 2008;105:16296–301. https://10.1073/pnas.0808942105
- [2] **Arai S**, Nguyen ST, Boldgiv B, Fukui D, Araki K, Dang CN, et al. Novel bat-borne hantavirus, Vietnam. Emerg Infect Dis. 2013;19:1159–61. https://10.3201/eid1907.121549
- [3] **Arai S**, Aoki K, Sơn NT, Tú VT, Kikuchi F, Kinoshita G, et al. Author Correction: Đakrông virus, a novel mobatvirus (*Hantaviridae*) harbored by the Stoliczka's Asian trident bat (*Aselliscus stoliczkanus*) in Vietnam. Sci Rep. 2020;10:760. https://10.1038/s41598-020-57832-y
- [4] Yamada K, Kikuchi F, Dunnum JL, Gutierrez-Moreno P, Gonzalez DP, Armien B, et al. Genetically distinct hantaviruses in two bat species in Panama. iScience. 2025;28:112749. https://10.1016/j.isci.2025.112749

Background and Unmet Challenges

- Hantaviruses are zoonotic viruses naturally harbored by small mammals such as rodents. They can cause severe disease in humans; however, no approved vaccines or effective treatments are currently available.
- In Japan, no human cases have been reported over the past 30 years. Nevertheless, because transmission occurs through rodents, the possibility of latent or sporadic outbreaks cannot be excluded.
- We aim to bridge the gap between research focused on serological diagnostic systems and candidate vaccine antigen identification, and translational research toward vaccine development.

Research Overview

- Summary diagrams



Future Perspectives

- Currently investigating applications in serological diagnostics
- Planning to identify potential vaccine antigens