

The reason of Japanese encephalitis virus genotype I replaced genotype III as the dominant genotype in nature

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2019/9/18

Outline

- I. Introduction
- II. Mechanism of Japanese encephalitis virus genotypes replacement based on human, porcine and mosquito-originated cell lines model
- III. Differential replication efficiencies between Japanese encephalitis virus genotype I and III in avian cultured cells and young domestic ducklings
- IV. Conclusion

Abstract

Japanese encephalitis (JE) is an infectious disease of the central nervous system caused by Japanese encephalitis virus (JEV). Based on the nucleotide sequence of the partial or complete viral genome, JEV is divided into five genotypes, GI-GV. GIII was the most widely distributed genotype since the 1990s, however, GI has replaced GIII as the major genotype emerging in many Asian countries, but all currently licensed JE vaccines are derived only from GIII JEV strains. Thus, genotype replacement, in addition to the strain-specific immune response, may have important implications for future JE vaccine development. The mixture of GI and GIII JEV isolates was inoculated on human rhabdomyosarcoma (RD), pig kidney epithelial (PS) and *Aedes albopictus* C6/36 clone (C6/36). The results showed that GI strain amplified and maintained more efficiently on C6/36 and PS but not RD, whereas GIII strain amplified and maintained more efficiently on RD. The other reports observed that GI viruses show higher replication titers in avian cells and higher viremia levels in young domestic ducklings than GIII viruses, suggesting an enhanced replication efficiency of GI viruses in birds. Based on these findings, we speculated that the enhanced replication of GI viruses in birds and pigs could provide increased mosquito infection, leading to an increase in the birds-mosquitoes-pigs transmission cycle, thereby contributing to JEV genotype shift.

- 1 **Do, L. P., Bui, T. M., & Phan, N. T. (2016).** Mechanism of Japanese encephalitis virus
2 genotypes replacement based on human, porcine and mosquito-originated cell lines
3 model. *Asian Pacific journal of tropical medicine*, 9(4), 333-336.
- 4 **Xiao, C., Li, C., Di, D., Cappelle, J., Liu, L., Wang, X., ... & Shao, D. (2018).** Differential
5 replication efficiencies between Japanese encephalitis virus genotype I and III in avian
6 cultured cells and young domestic ducklings. *PLoS neglected tropical diseases*, 12(12),
7 e0007046.