H9N2 avian influenza virus: Emergence of immune Escape Mutant with No Haemagglutination Activity

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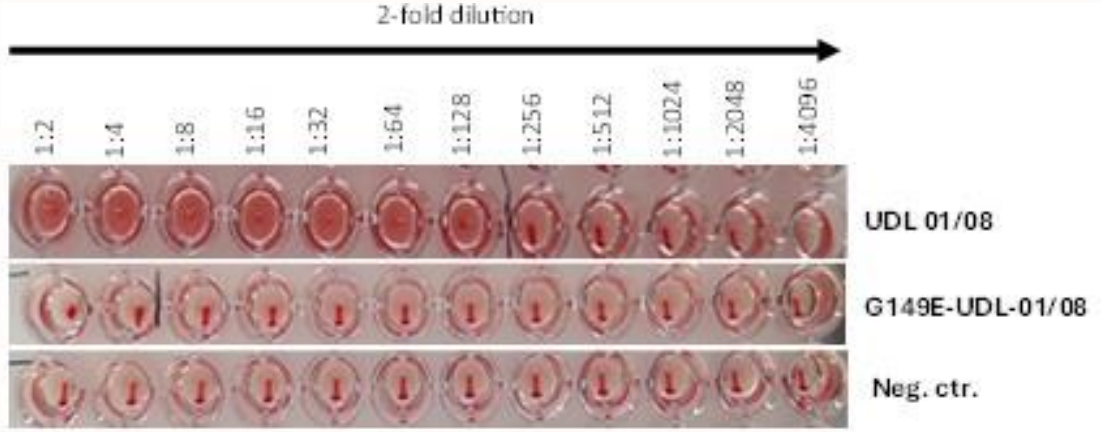
Background

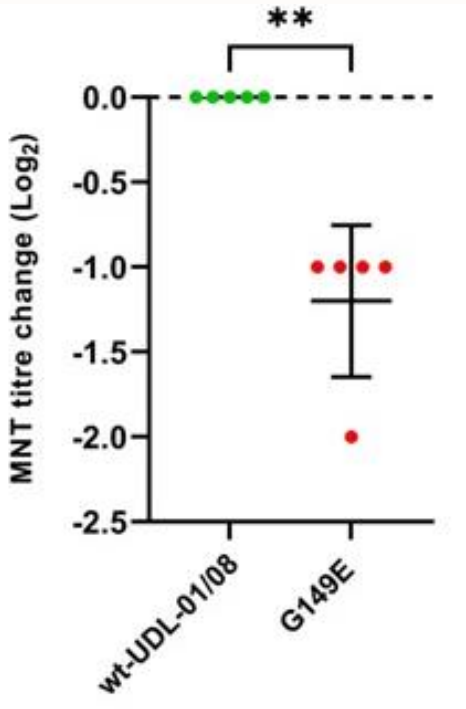
H9N2 avian influenza viruses (AIVs) pose a global threat to animal and human health carrying potential pandemic risk. Vaccination and surveillance collaborate closely for the successful control and prevention of AIVs. The emergence of immune-escape variants impedes vaccines' effectiveness. In this study, we identified an immune-escape (G149E) variant that also contributes to the loss of agglutination of chicken erythrocytes.

Results

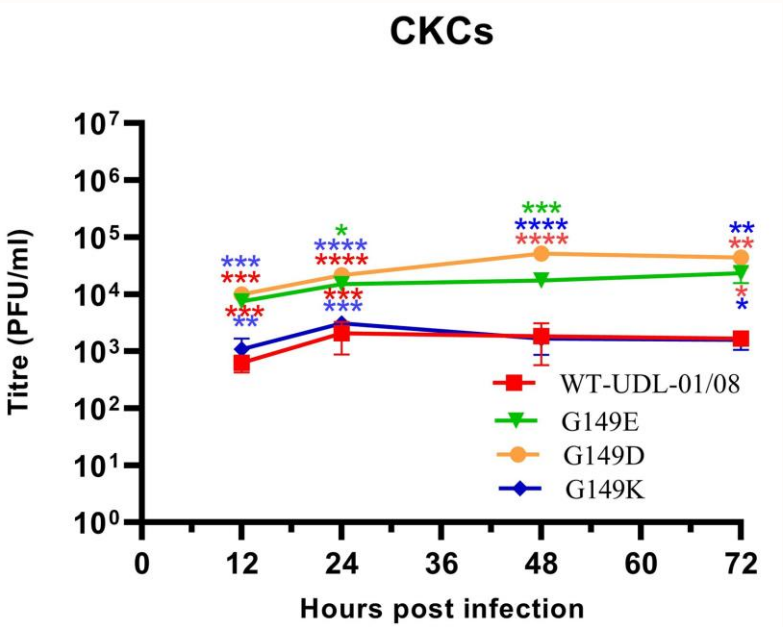
Loss of haemagglutination



Reduced antigenic cross-reactivity



Retained replicative fitness

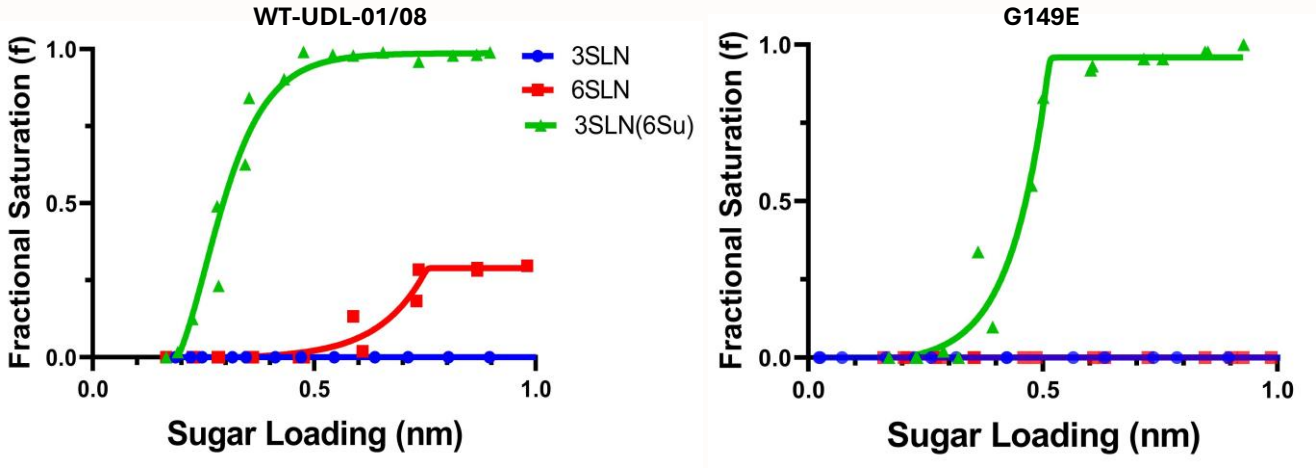


The G149E mutation in the HA of H9N2 virus caused:

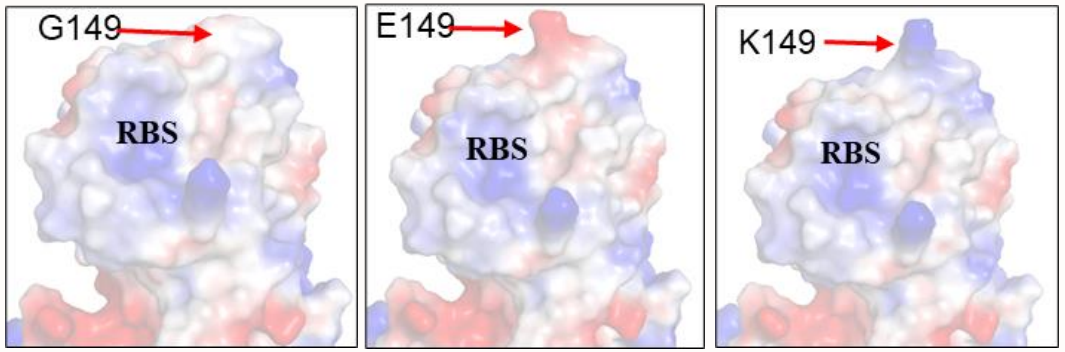
- Loss of haemagglutination activity.
- Reduction in antigenic cross-reactivity compared to the wild-type virus.
- Increase in replication fitness in avian cells.

Results Continued

Altered receptor binding avidity to avian cell surface receptors



Increased the negative charge around the receptor binding site



Take home message

- H9N2 avian influenza virus may likely acquire the G149E mutation under immune pressure in nature.
- G149E variant challenges the vaccination and surveillance efforts.
- This immune escape mutant underscores the intricate interplay between antigenic variation and viral traits.