Characterization of a Monoclonal Antibody 4F3 Binding to the Haemagglutinin Proteins of Different Avian Influenza Viruses

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Background/Objective

The recent outbreaks of highly pathogenic H5N1, H7N7 and H7N9 avian influenza virus (AIV) have raised serious concerns of an influenza pandemic. Monoclonal antibodies (MAb) have been increasingly used successfully in therapeutic purposes with better potency and specificity than their polyclonal counterparts. Hemagglutinin (HA) plays important roles in influenza infection which makes it an attractive target for MAb therapy.
In this study, we investigate the binding of a mouse MAb 4F3 of IgM isotype to HA of different subtypes of AIV and determine its ability to block viral entry.

Method

Comparative ELISA with MAb 4F3 was performed against commercial recombinant full length HA proteins of different subtypes. The HA1 subunit domain of H7N7 and H7N9 was also bacterially expressed and used in ELISA. Pseudotyped lentiviral particles carrying the HA of AIVs were then generated and used to determine the ability of MAb 4F3 to inhibit viral entry.

Result

Previously, MAb 4F3 was generated against the HA protein of H5N1 virus. In this study, MAb 4F3 was found to bind to the full-length HA proteins of H7N7 and H7N9 heterologous viruses. In addition, MAb 4F3 binds to the HA1 subunit and prevents the entry of pseudotyped lentiviral particles carrying HA into MDCK cells.

Conclusion

Our results show that MAb 4F3 binds to the HA1 subunit and has cross subtype binding capability. However, the binding affinity of MAb 4F3 is low and in vitro maturation will be performed to improve its affinity. In addition, its binding epitope on HA and mechanism of inhibition will be investigated in future studies.