

Generation of Universal Anti-influenza Antibodies and their Potential Applications in Vaccine Quality Control and Therapy

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The fusion peptide of influenza hemagglutinin plays a critical role in virus entry by facilitating membrane fusion between the virus and target cells. Multiple sequence alignment and Shannon entropy analysis showed it as the only universally conserved epitope in the hemagglutinin of all influenza A and B viruses. Previous efforts failed to generate antibodies against this peptide due to its high hydrophobicity and low immunogenicity. However, recently we succeeded in producing anti-fusion peptide antibodies (Uni-1 Abs) with remarkable specificity against all HA subtypes of influenza A and B viruses. Immunoassays based on Uni-1 Abs showed robustness in quantifying hemagglutinin in all vaccines produced in embryonated eggs which may lead to the development of novel quality control tests of annual influenza vaccines. Moreover, these antibodies were also able to bind to hemagglutinin in its native conformation in infected cells and cross-neutralize multiple subtypes of influenza A virus by inhibiting the pH-dependant fusion process. Our results suggest that this unique linear sequence in the hemagglutinin is sufficiently exposed to be a target of such antibodies during the course of infection and highlight its potential importance in the protection against diverse strains of influenza viruses.