Characterization of Influenza Neuraminidase Gene and Production of Influenza Virus-Like Particles (VLPs)

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Abstract

Influenza epidemics occur annually and estimated to result in 3 to 5 million severe cases, and approximately 250,000 to 500,000 deaths worldwide. Continuous monitoring of genetic changes of surface glycoproteins hemagglutinin (HA) and neuraminidase (NA) is required to monitor the variability of influenza viruses. Genetic analysis of HA gene is well-documented, but limited information is available about the genetic variation of NA gene, especially from the Indian subcontinent. In our study, a detailed genetic analysis of N1 and N2 genes (2009-2013) was carried out. The results of sequence analysis suggested that genetic variability in NA sequences occurs at a slower rate (0.3-0.7%). The study also detected some new mutations in the catalytic and antigenic site residues, but they did not significantly affect drug and antibody binding, thus rendering NA a prospective candidate for influenza vaccines.

Next generation vaccines such as the virus-like particles (VLPs) are reported to incorporate consistent amounts of NA. In our study, a recombinant baculovirus DNA containing HA, N1, N2, and M gene was constructed to generate influenza VLPs in insect cells. The VLPs were purified and tested for immunogenicity in mice model. The VLP was immunogenic in mice and induced anti-NA and anti-HA responses.