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Bioinformatics in influenza surveillance: From sequence to structure to molecular mechanisms with the FluSurver

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Bioinformatics can play an important role in infectious disease surveillance and research from epidemiological data processing with geographic and temporal visualization to comparing genome phylogenies and structural modeling of mutations. As a classical example, interest in new influenza outbreaks as well as regular surveillance of circulating seasonal strains produce a constant flow of influenza genome sequences that need to be analyzed and interpreted for epidemiological and phenotypic features. Several steps in typical influenza sequence analysis can be automated and we have been actively developing the free online analysis pipeline FluSurver over the last 6 years to facilitate identification and interpretation of mutations in influenza sequences and link them with possible phenotypic consequences. The tool has already been instrumental in the discovery of new influenza strain variants with altered antiviral susceptibility, host specificity, glycosylation and antigenic properties and is being used by researchers, National Influenza Centres, WHO Collaborating Centres and the GISAID initiative. With the help from the greater infectious disease community, it is feasible to extend this tool for the monitoring and surveillance of other pathogens.

Biography

Raphael Tze Chuen Lee has received an A*STAR, Singapore Scholarship in Bioinformatics and completed his MSc training in 2004. Since joining Sebastian Maurer-Stroh's lab in 2008, he has published more than 20 infectious disease related publications. During the 2009 H1N1 pandemic outbreak, he started co-developing the FluSurver, which is currently the most comprehensive influenza mutation analysis tool used by researchers, National Influenza Centres, WHO Collaborating Centres and the GISAID initiative. With the FluSurver being incorporated as an analysis tool within the GISAID EpiFlu database, he has given FluSurver workshops, talks and training in Cape Town, St. Petersburg, Shanghai and Singapore.

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