Early warning of emerging infectious diseases based on multimodal data

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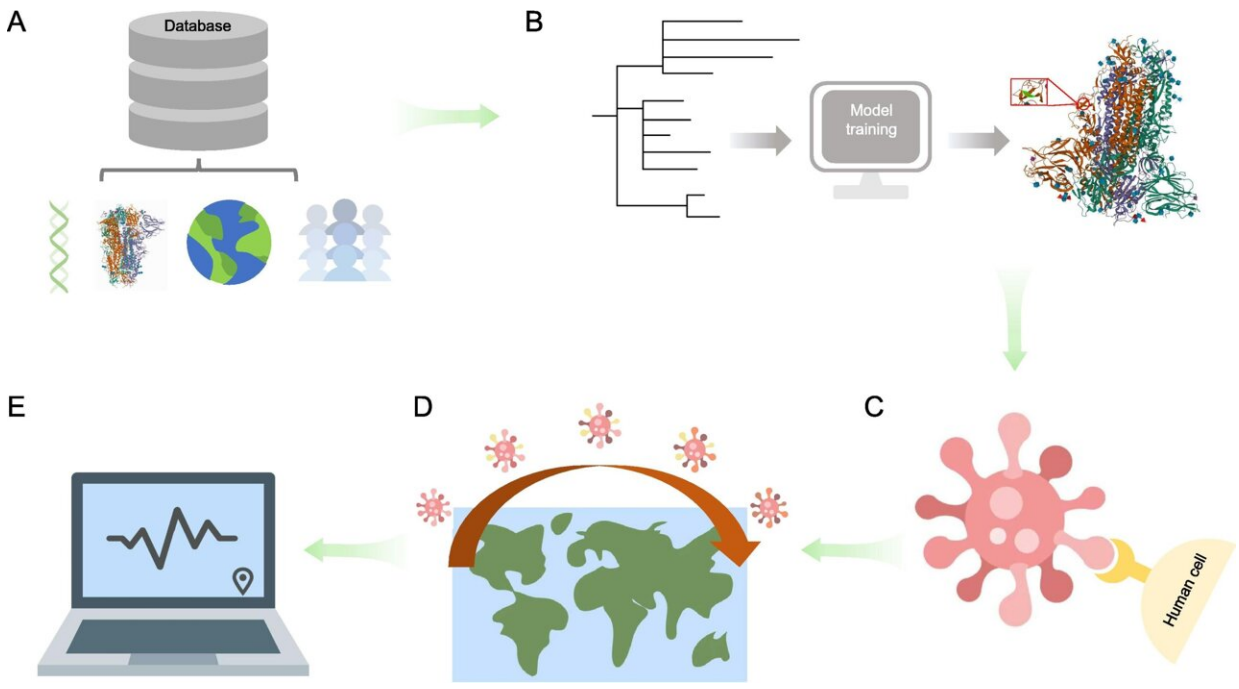

Forecasting and early warning of virus evolution based on a multimodal database. A) A database integrating big data from multiomics, immunology, epidemiology, and clinical research cohorts. B) The virus mutation spectrum was constructed and improved in time, and the hot spots of mutation were predicted by computer modeling. C) According to the mutation prediction results, the affinity between the mutant antigen and receptor was calculated and analyzed, inferring the viral transmissibility. D) Combining the changes in the future biological characteristics of the virus with various social information, the virus's dynamic evolution and transmission model was established. E) Provide monitoring and early warning to virus variants with strong pathogenicity and may easily cause large-scale epidemics and immune evasion. Credit: *Biosafety and*

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The COVID-19 pandemic has dramatically increased the awareness of emerging infectious diseases. The advancement of multiomics analysis technology has resulted in the development of several databases containing virus information. Several scientists have integrated existing data on viruses to construct phylogenetic trees and predict virus mutation and transmission in different ways, providing prospective technical support for epidemic prevention and control.

Research published in the journal *Biosafety and Health* summarizes the databases of known emerging infectious viruses and techniques focusing on virus variant forecasting and early warning. It focuses on the multi-dimensional information integration and database construction of emerging infectious viruses, virus mutation spectrum construction and variant forecast model, analysis of the affinity between mutation antigen and the receptor, propagation model of virus dynamic evolution, and monitoring and early warning for variants.

The authors have focused on the research results of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and influenza viruses to comprehensively review the latest virus research and provided a reference for future virus prevention and control research.

More information: Haotian Ren et al, Early warning of emerging infectious diseases based on multimodal data, *Biosafety and Health* (2023). DOI: 10.1016/j.bsheal.2023.05.006

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