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Integrating genomic analysis and artificial intelligence to anticipate virus mutations and upcoming pandemics

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Integrating genomic analysis and artificial intelligence to anticipate virus mutations and upcoming pandemics

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Over the past few years, the convergence of genomic analysis and the advent of artificial intelligence (AI) have resulted in a substantial change in our comprehension of infectious diseases. This synergy has enhanced our ability to predict viral mutations, potentially foreseeing developments that could lead to future pandemics. Diseases, including those that are emerging, increase from the interaction among infectious agents, hosts, and the environment. Various infectious diseases and pandemics circulating within populations have the potential to significantly escalate morbidity and mortality across extensive geographic regions, leading to substantial social, economic, and political disruptions. In ancient times, when knowledge about diseases and their origins was limited, taking effective action against them was impossible. Due to the rapid advancements in artificial intelligence, it is now feasible to predict viral mutations and anticipate future pandemics. Viruses play a crucial role in people's lives as they can lead to widespread fatalities and pandemics in a short period. Analyzing the genomics of microorganisms through genomic analysis is a key aspect of early detection of potential viral mutations and future pandemics. Next Generation Sequencing (NGS) stands out as the most advanced method in modern genomic analysis. Viruses genomes have been examined using NGS include SARS-CoV-2, HIV, and Ebola viruses. The accelerated progress of artificial intelligence enables the proactive prediction of future pandemics. Artificial intelligence undertakes vital functions such as gathering genomic information about viruses, conducting epidemiological analysis, modeling pandemic scenarios, and developing drugs and vaccines against potential pandemics. Data collection relies on information derived from genomic analysis and environmental sources. Modeling generated by artificial intelligence ascertains virus spread and the environmental impact considering various factors. Simultaneously, the effectiveness of measures taken against the pandemic improves.

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