Unlocking the potential of in silico approach in designing antibodies against SARS-CoV-2

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Abstract

Antibodies are naturally produced safeguarding proteins that the immune system generates to fight against invasive invaders. For centuries, they have been produced artificially and utilized to eradicate various infectious diseases. Given the ongoing threat posed by COVID-19 pandemics worldwide, antibodies have become one of the most promising treatments to prevent infection and save millions of lives. Currently, in silico techniques provide an innovative approach for developing antibodies, which significantly impacts the formulation of antibodies. These techniques develop antibodies with great specificity and potency against diseases such as SARS-CoV-2 by using computational tools and algorithms. Conventional methods for designing and developing antibodies are frequently costly and time-consuming. However, in silico approach offers a contemporary, effective, and economical paradigm for creating next-generation antibodies, especially in accordance

with recent developments in bioinformatics. By utilizing multiple antibody databases and high-throughput approaches, a unique antibody construct can be designed in silico, facilitating accurate, reliable, and secure antibody development for human use. Compared to their traditionally developed equivalents, a large number of in silico-designed antibodies have advanced swiftly to clinical trials and became accessible sooner. This article helps researchers develop SARS-CoV-2 antibodies more quickly and affordably by giving them access to current information on computational approaches for antibody creation. Copyright © 2025 Subramaniam, Mualif, Chan and Abd Halim.

Author keywords

antibody; bioinformatics; computational approach; in silico; molecular dynamic simulation; SARS-CoV-2

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Abstract

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