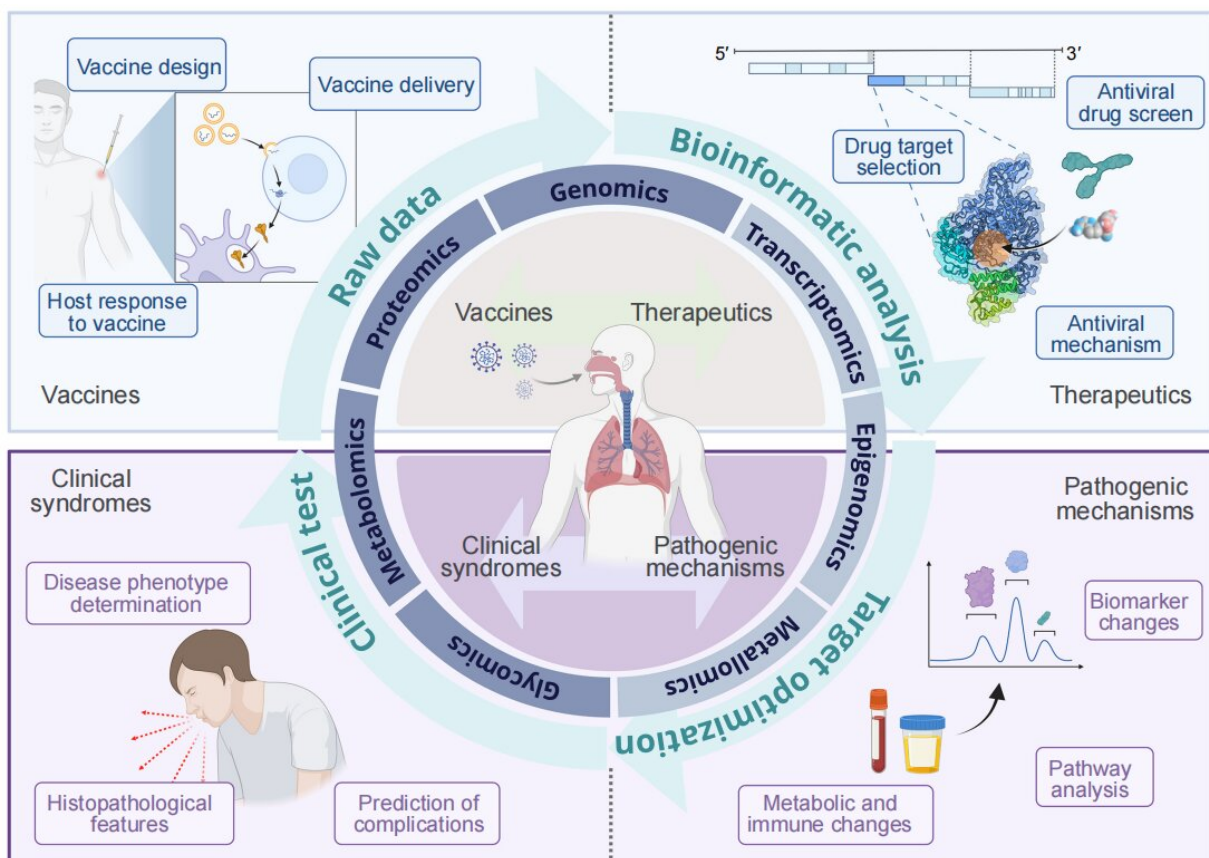


Multi-omics assist in designing the next generation of COVID-19 therapeutics and vaccines

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Multi-omics approaches, including genomics, transcriptomics, proteomics, metabolomics, epigenomics and metalloomics, have helped uncover the molecular processes underlying SARS-Cov-2 and understand the host responses to virus and vaccine. The emerging multi-omic technologies assist in designing the next generation of powerful therapeutics and vaccines. Credit: Science China Press

The ongoing COVID-19 pandemic has raised global concern on public health. There are major challenges ahead to develop new therapeutics and vaccines for difficult-to-target pathogens, for which we urgently need a better understanding of protective immunity. The development of high-throughput sequencing, mass spectrometry, computer science and algorithms provide us with a comprehensive and systematic picture of life processes, and enhance our understanding of human immunity and diseases.

In a new study published in the journal *National Science Review*, researchers present an up-to-date overview of the latest applications of multi-omics technologies in strategies addressing COVID-19. Firstly, they discuss how emerging multi-omics technologies—including genomics, transcriptomics, proteomics, metabolomics, epigenomics and metallomics—have helped create an understanding of the structural and molecular features of the virus.

Then, they elaborate on how multi-omics technologies have played a key role in assisting the screening of [antiviral drugs](#), the characterization of drug antiviral activities, and the study of the mechanism of action of antiviral drugs. In addition, many multi-omics approaches, including glycomics, transcriptomics, proteomics and others provide potential value in finding the characteristics of pathogens and elucidating host responses to vaccines, which can ultimately lead to a roadmap for [vaccine](#) design.

This review aims to provide suggestions towards the development of highly effective therapeutics (antibodies and small molecular drugs) and vaccines, which is particularly important in chemistry, material and immunology science.

This study was led by Dr. Chunying Chen (National Center for Nanoscience and Technology), Dr. Yechun Xu (Shanghai Institute of Materia Medica, Chinese Academy of Sciences), Dr. Chengqi Yi (Peking University) and Dr. Guanbo Wang (Peking University).

More information: Mengyu Guo et al, Multi-omics in COVID-19: Driving development of therapeutics and vaccines, *National Science Review* (2023). [DOI: 10.1093/nsr/nwad161](https://doi.org/10.1093/nsr/nwad161)

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