

Structures of Antibodies and Nanobodies in Complex with Spike/RBD: The vital role of CDR loops in capturing epitopes

Jiansheng Jiang¹, Christopher T Boughter², Javeed Ahmad³, Kannan Natarajan⁴, Lisa F. Boyd⁵,
Martin Meier-Schellersheim⁶, David H. Margulies⁷

¹*NIAID/NIH* ²*Computational Biology Section, LISB/NIAID/NIH*, ³*Molecular Biology Section,*

⁴*Molecular Biology Section, Laboratory of Immune System Biology*, ⁵*LISB/NIAID/NIH,*

⁶*Computational Biology Section, LISB/NIAID/NIH*, ⁷*LISB/NIAID/NIH*

jiangji@niaid.nih.gov

The COVID-19 pandemic and SARS-CoV-2 variants continue to threaten human health and life worldwide. Thousands of structures of SARS-CoV-2 and antibodies, either determined by X-ray crystallography or CryoEM, have been deposited in the Protein Data Bank since 2020. We investigated 217 structures of antibodies and 42 nanobodies complexed with the spike protein or its receptor-binding domain (RBD). We have identified 23 Frequently Contacted Sites (FCS) on the RBD surface and revealed the vital role of the complementarity determining region (CDR) loops in recognizing epitopes. The characterization of these FCS provides insights for structural-based vaccine design. This structural information may help the development of therapeutic strategies against emerging variants of SARS-CoV-2.

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