The influence of single amino acid exchanges on the sensitivity of rapid antigen tests illustrated by the example of the N protein of SARS-CoV-2

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Introduction: Even after the pandemic has subsided, monitoring of SARS-CoV-2 variants is necessary to respond rapidly to the emergence of possible new highly contagious forms of the virus. Rapid antigen tests (RATs), which proved their worth during the pandemic, are well suited for this purpose. However, this requires that they are also able to recognize variants with substitutions of individual amino acids.

Objectives: The main target for SARS-CoV-2 RATs is the nucleocapsid protein (N), which has fewer mutations compared with the spike protein (S), but amino acid exchanges also occur in this protein, which may lead to a change in the binding epitopes of the detection antibodies in the RATs. Therefore, we investigated whether amino acid exchanges in the SARS-CoV-2 nucleocapsid protein can affect the sensitivity of RATs from different suppliers.

Methods: We constructed multiple recombinant protein mutants (mirroring specific amino acid exchanges SARS-CoV-2 nucleocapsid proteins), by prokaryotic expression and side-directed PCR mutagenesis. Sensitivity of RATs was tested by loading different amounts of coronavirus proteins into the RATs according to a generalized protocol.

Results: We were able to confirm the loss of sensitivity of some RATs to detect N proteins with single amino acid exchanges. Therefore, we recommend the use of RATs with SARS-CoV-2 variant adapted detection antibodies.

Keywords

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Professional Status of the Speaker

Senior Scientist

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