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LIMIT OF DETECTION OF SARS-COV2-ANTIBODY ASSAYS

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BACKGROUND

- Seroprevalence studies of antibodies to SARS-CoV-2 are crucial for public health surveillance.
- Recent studies have shown that antibodies to SARS-CoV-2, both from natural infection and vaccination, decrease with time from exposure.
- Variation in the performance of antibody assays will impact the estimates of SARS-CoV-2 exposure and vaccination levels in a population.
- Using standardized serial dilutions, we evaluated 17 SARS-CoV-2 assays to establish an approximate limit of detection for each assay.

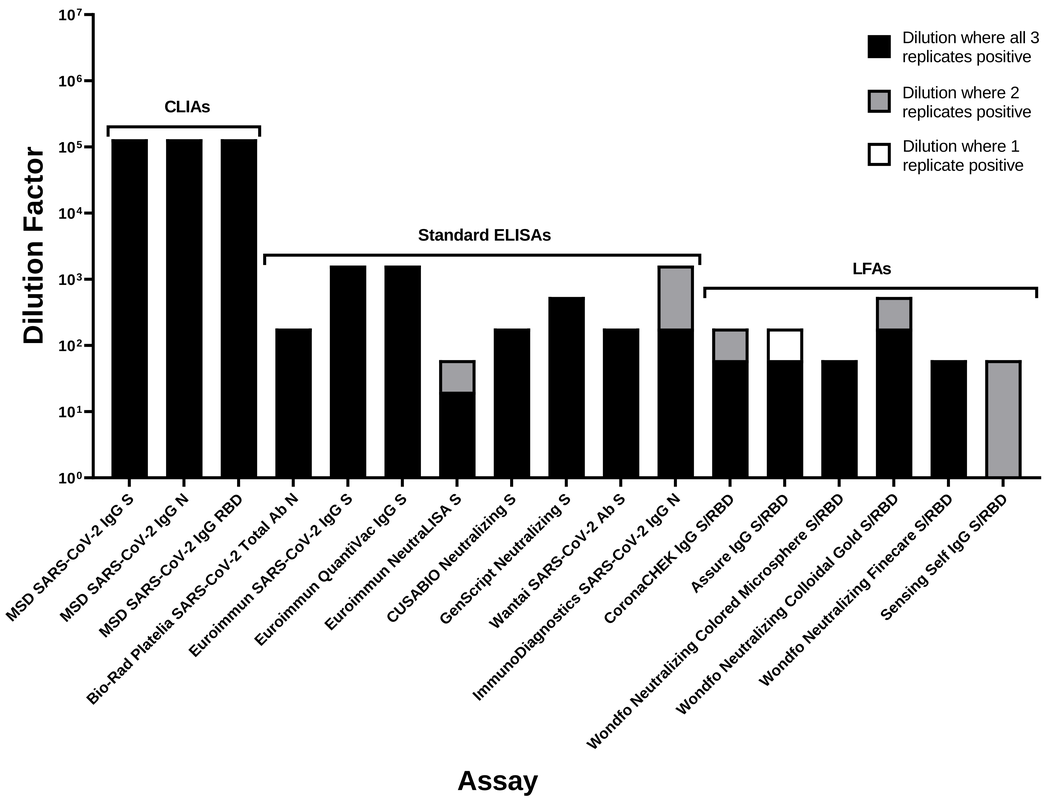
METHODS

- We evaluated the limit of detection of the following assays:
  - 3 chemiluminescent assays (CLIAs)
  - 8 standard enzyme-linked immunosorbent assays (ELISAs)
  - 6 lateral flow assays (LFAs)
- All assays either evaluated IgG antibodies or total antibodies to SARS-CoV-2.
- The target antigen of 14 assays was the spike protein (S) or receptor binding domain (RBD); three assays evaluated antibodies to the nucleocapsid protein (N).
- A human serology standard with a WHO SARS-CoV-2 serology international standard binding antibody units (BAU) value of 764 BAU/mL to spike IgG and 681 BAU/mL to nucleocapsid IgG was used in all trials.
- Half-logarithmic serial dilutions of the standard were then run in triplicate on each assay.

RESULTS

- The MSD V-Plex CLIAs were the most sensitive by two logs, with positive results at a dilution than 1:10^5.
- Standard ELISAs were less sensitive, with limits of detection ranging from dilutions of 1:20 to 1:1620.
- Lateral flow assays (LFAs) were the least sensitive, with only the Wondfo colloidal gold having at least one positive result with a dilution greater than 1:180.

As antibody levels decline after SARS-CoV-2 vaccination or infection, highly sensitive **chemiluminescent assays** can help accurately assess SARS-CoV-2 seroprevalence.



CONCLUSIONS

- As cases continue to rise, tests with high limits of detection will be important for population-level serosurveillance studies.
- As antibody levels decline after vaccination or infection, our data indicate that CLIAs like the MSD may provide the best opportunity to capture asymptomatic cases and individuals with low antibody titers.

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NIH National Institute of Allergy and Infectious Diseases

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