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SYNOPSIS

04/02/2020

Review of "Antibody responses to SARS-CoV-2 in patients of novel coronavirus disease 2019"

Article citation: Zhao J, Yuan Q, Wang H, Liu W, Liao X, Su Y, et al. Antibody responses to SARS-CoV-2 in patients of novel coronavirus disease 2019. Clin Infect Dis. 2020 Mar 28 [Epub ahead of print]. Available from: https://dx.doi.org/10.1093/cid/ciaa344

One-Minute Summary

- This study examines the **antibody (Ab) response in coronavirus disease 2019 (COVID-19) cases and investigates the use of serology for clinical testing.**
- 2-5 serial samples were collected from 173 COVID-19 cases (N=535) from a single hospital in Shenzhen, China (Guangdong province) and tested for total Ab, IgM, and IgG.
- **Seroconversion was 161/173 (93.1%) for total Ab, 143/173 (82.7%) for IgM, and 112/173 (64.7%) for IgG** by **39 days** post symptom onset.
- **Median time from symptom onset to seroconversion was 11 days for total Ab**, **12 days for IgM and 14 days for IgG**. Total Ab and IgM positivity was ~100% by 1 month.
- Within the **first week of illness, RNA detection was more sensitive** compared to Ab detection (66.7% vs 19.1-38.3%); however, **after 7 days, sensitivity of RNA gradually decreased** (54.0% at 8-14 days, 45.5% at 15-39 days) while the **sensitivities of Abs increased** (100% for total Ab, 94.3% IgM, 79.8% IgG by day 15-39).
- **Combining RNA and Ab detection increased sensitivity**, most notably for RNA-negative cases in the late stages of illness.
- In longitudinal analyses of 9 patients, RNA was generally detected earlier (day 2-7) than Ab (day 1-19) and a rise in **Abs was not always associated with viral RNA clearance**.
- **Total Ab titres were significantly higher in critically ill patients** after 12 days of illness and were an independent predictor of severity.
- The authors conclude that **Ab testing can be used as a supplement to RNA detection and as a marker for clinical severity in the later course of illness.**

Additional Information

- COVID-19 cases were confirmed using real-time PCR on throat and nasal swabs. Cases included patients admitted to hospital between January 11 and February 9, 2020.
- Demographic and clinical characteristics of patients:
    - Median age: 48 years (interquartile range [IQR]: 35-61)
    - Female: 89/173 (51.4%)
    - Comorbidities: 41/173 (23.7%)
    - Severity: 32/173 (18.5%) were critically ill

    - Outcome (as of Feb 19, 2020): 109/183 (63.0%) hospitalized; 62/173 (35.8%) recovered; 2/173 (1.2%) deceased
- Ab testing was done using a commercial enzyme-linked immunosorbent assays (ELISAs). The total Ab and IgM ELISAs used recombinant receptor binding domain (RBD) of the spike protein of COVID-19 as the antigen and the IgG ELISA used recombinant nucleoprotein as antigen. Using samples collected from healthy individuals before the emergence of COVID-19, specificity was determined to be 99.1% (211/213), 98.6% (210/213) and 99.0% (195/197) for total Ab, IgM, and IgG, respectively. **Cross-reactivity with other coronaviruses was not assessed.**
- Seroconversion was not detected in 12 patients but the authors state that this is likely do to early sample collection.
- **Total Ab was detected in 17/35 (48.6%) of RNA-negative patients in ≤7 days of illness and in 86/87 (98.9%) in RNA-negative patients tested between 8-39 days of illness.**
- Specimens past day 39 of illness were not tested; therefore, the duration of Abs is unknown.
- PCR sensitivity may have been higher if lower respiratory tract specimens were also tested.

PHO Reviewer's Comments

- The performance characteristics for the commercial ELISAs were not provided.

Citation

Ontario Agency for Health Protection and Promotion (Public health Ontario). Review of "Antibody responses to SARS-CoV-2 in patients of novel coronavirus disease 2019". Toronto, ON: Queen's Printer for Ontario; 2020.

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