



IgG Antibody Response to SARS-CoV-2 Infection and Viral RNA Persistence in Patients on Maintenance Hemodialysis

An S. De Vriese, MD, PhD, Marijke Reynders, MD

PII: S0272-6386(20)30733-2

DOI: <https://doi.org/10.1053/j.ajkd.2020.05.009>

Reference: YAJKD 57158

To appear in: *American Journal of Kidney Diseases*

Received Date: 19 May 2020

Accepted Date: 29 May 2020

Please cite this article as: De Vriese AS, Reynders M, IgG Antibody Response to SARS-CoV-2 Infection and Viral RNA Persistence in Patients on Maintenance Hemodialysis, *American Journal of Kidney Diseases* (2020), doi: <https://doi.org/10.1053/j.ajkd.2020.05.009>.

This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

© 2020 Published by Elsevier Inc. on behalf of the National Kidney Foundation, Inc.

IgG Antibody Response to SARS-CoV-2 Infection and Viral RNA Persistence in Patients on Maintenance Hemodialysis

To the editor:

Quarantining dialysis patients infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a logistical challenge. Appropriately identifying noninfectiousness in patients is essential to safely lift quarantine measures. Serological tests are used to establish previous infection with SARS-CoV-2, but the extent to which antibody positivity translates to actual immunity is currently unknown.⁽¹⁾ Hemodialysis patients are known to have impaired humoral immune responses to vaccination and infection, and it is uncertain whether hemodialysis patients mount an effective antibody response against SARS-CoV-2.

Of our 282 maintenance hemodialysis patients, 7 developed SARS-CoV-2 infection between March 14 and April 7, 2020. All patients displayed symptoms of coronavirus disease 2019 (COVID-19) and tested positive for SARS-CoV-2 RNA on a nasopharyngeal swab on the day of symptom onset. Three patients died (at days 6, 11, and 36), 1 patient is currently still ventilated, and 3 patients recovered clinically. Longitudinal serum sampling and nasopharyngeal swabs were performed in 6 of 7 patients (1 patient died before follow-up samples were obtained).

Overall IgG seroconversion rate was 100% and occurred in the second week after symptom onset. Antibody titer plateaued during the third week (Figure 1A). Virus persisted in respiratory samples of non-survivors until death. In survivors, nucleic acid conversion time, defined as the interval from symptom onset to first negative RT-PCR, was 34, 37, 37, and 44 days. Cycle threshold values, an inverse measure of nucleic acid concentration, were lowest in the first week of infection and remained relatively stable thereafter (Figure 1B).

In conclusion, maintenance hemodialysis patients are able to mount an antibody response against SARS-CoV-2 that is similar in intensity and timing to that of the non-dialysis population. However, anti-SARS-CoV-2 IgG antibodies appeared weeks before the actual clearance of the virus from the upper airways, suggesting that these antibodies are not neutralizing. Viral shedding persisted for more than 5 weeks after symptom onset in survivors. Although viral shedding does not necessarily equal infectiousness,² awaiting negative RT-PCR testing on at least two sequential samples before lifting quarantine in hemodialysis patients is the prudent approach.

An S. De Vriese, MD, PhD

Marijke Reynders, MD

Article Information

Authors' Affiliations: Division of Nephrology and Infectious Diseases (ASDV) and Division of Medical Microbiology (MR), AZ Sint-Jan Brugge-Oostende AV, Brugge, and Department of Internal Medicine, Ghent University, Ghent (ASDV), Belgium.

Address for Correspondence: An S. De Vriese, MD, PhD, Division of Nephrology and Infectious Diseases, AZ Sint-Jan Brugge-Oostende AV, Ruddershove 10, 8000 Brugge, Belgium. E-mail: An.DeVriese@azsintjan.be

Financial Disclosure: The authors declare that they have no relevant financial interests.

Acknowledgements: The authors thank Frank De Geeter, Manon Verhulst, and Jessica Van Besien for logistical support.

Peer Review: Received May 19, 2020. Direct editorial input from an Associate Editor and a Deputy Editor. Accepted in revised form May 29, 2020.

References

1. Melgaço JG, Azamor T, Ano Bom APD. Protective immunity after COVID-19 has been questioned: What can we do without SARS-CoV-2-IgG detection? *Cell Immunol* 2020 Apr 28;353:104114. doi: 10.1016/j.cellimm.2020.104114. [Epub ahead of print]
2. Wölfel R, Corman VM, Guggemos W, Seilmaier M, Zange S, Müller MA, Niemeyer D, Jones TC, Vollmar P, Rothe C, Hoelscher M, Bleicker T, Brünink S, Schneider J, Ehmann R, Zwirgmaier K, Drosten C, Wendtner C. Virological assessment of hospitalized patients with COVID-2019. *Nature* 2020 Apr 1. doi: 10.1038/s41586-020-2196-x. [Epub ahead of print]
3. Okba NMA, Muller MA, Li W, Wang C, Geurts van Kessel CH, Corman VM, Lamers MM, Sikkema RS, de Bruin E, Chandler FD, Yazdanpanah Y, Le Hingrat Q, Descamps D, Houhou-Fidouh N, Reusken CBEM, Bosch B-J, Drosten C, Koopmans MPG, Haagmans BL. SARS-CoV-2 specific antibody responses in COVID-19 patients. *Emerging Infectious Diseases* 2020 Apr 8;26(7). doi: 10.3201/eid2607.200841

Figure 1. Dynamics of (A) anti-SARS-CoV-2 IgG in serum and (B) SARS-CoV-2 viral load in upper airways. IgG measured by N-protein based ELISA³ (NovaLisa, NovaTec; validated in-house; approved by the Federal Agency for Drugs and Health Products). A level of >11 NTU (“NovaTec Units”) is interpreted as positive and 9-11 NTU as borderline. Viral load measured by a laboratory-developed semi-quantitative real-time reverse transcriptase-polymerase chain reaction (RT-PCR) targeting the *N* (nucleocapsid) and *RdRp* (RNase-dependent RNA polymerase) genes. A phocine distemper virus was used as a control to test for extraction errors or presence of inhibitors. A cycle threshold value of <40 is interpreted as positive.

