Predictors of Response to SARS-CoV-2 Vaccines Among Maintenance Dialysis Patients

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Background: Vaccines against SARS-CoV-2 are highly effective in the general population; however, their efficacy may be diminished in maintenance dialysis patients, a population particularly vulnerable to COVID-19. We assessed vaccine response in a national sample of maintenance dialysis patients.

Methods: Using retrospective clinical data, we assessed seroreactivity to vaccine among maintenance dialysis patients cared for at 130 Dialysis Clinic, Inc (DCT) facilities. Via a clinical protocol available to early vaccinating facilities, antibodies against SARS-CoV-2 spike antigen were semi-quantitatively assessed beginning with the monthly blood draw at least two weeks after completion of a SARS-CoV-2 vaccine series. Vaccine response was defined as a titer >1:10, and logistic regression analysis was used to identify characteristics associated with response. Patients with history of COVID-19 prior to antibody assessment were excluded.

Results: Among 1,352 patients, 996 (74%) had a serologic response. Serologic response differed significantly by vaccine type: 314/386 (81%) among BNT162b2/Pfizer recipients, 615/655 (94%) among mRNA-1273/Moderna recipients, and 67/311 (22%) among Ad26.COV2.S Janssen recipients. Age greater than 75, lack of hepatitis B immunity, immune-modulating medication, lower serum albumin, and COPD were associated with vaccine non-response (Figure).

Conclusions: Serologic response to mRNA vaccines is robust among chronic dialysis patients, and the use of mRNA vaccines should be promoted aggressively in this vulnerable population. High rates of non-response to the Janssen vaccine warrant further study. Future research should evaluate the potential role for boosters and whether seropositivity corresponds with protection from COVID-19.

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Humoral Responses to Single-Dose BNT162b2 mRNA Vaccination in Dialysis Patients Previously Infected with SARS-CoV-2

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Background: Seroconversion rates following infection and vaccination are lower in dialysis patients compared to healthy controls. There is an urgent need for the characterization of humoral responses and success of a single-dose SARS-CoV-2 vaccination in previously infected dialysis patients.

Methods: We performed a dual-center study with 43 dialysis patients after BNT162b2 vaccination and 25 dialysis patients after PCR-confirmed COVID-19. Single-dose vaccination was performed in 13 previously infected patients. Anti-S1 IgG, neutralizing antibodies, and antibodies against various SARS-CoV-2 epitopes were measured 6 weeks after the first vaccination or onset of COVID-19 and 3 weeks after single-dose vaccination.

Results: Previously infected patients without vaccination showed a significantly higher neutralizing capacity than patients vaccinated twice (median [IQR] percent inhibition 88.0 [71.5–95.5] vs. 50.7 [26.4–81.0]; P=0.018). After one single vaccine dose, infected individuals generated 15- to 34-fold higher levels of anti-S1 IgG than age- and dialysis vintage-matched patients after infection or two-time vaccination with a median (IQR) index of 274 (151–791) compared to 18 (8–41) and 8 (1–21) (for both P<0.001). With a median (IQR) percent inhibition of 97.6 (97.2–98.9), the neutralizing capacity of SARS-CoV-2 antibodies was significantly higher in previously infected patients compared to other groups (for both P<0.001). Bead-based analysis showed high antibody reactivity against various SARS-CoV-2 spike protein epitopes after single-dose vaccination in previously infected patients.

Conclusions: Single-dose vaccination in previously infected dialysis patients induced a strong and broad antibody reactivity against various SARS-CoV-2 spike protein epitopes with high neutralizing capacity.