

Impact of Kidney Transplantation on Humoral Immunity Against SARS-CoV-2: A Case Series From Belgium

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Anti-severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) vaccines have shown good efficacy in kidney transplant candidates¹, contrasting with disappointing results in kidney transplant recipients (KTRs).² However, the impact of starting immunosuppressive treatments for KTRs on anti-SARS-CoV-2 humoral immunity has been poorly investigated to date.

We report the evolution of anti-SARS-CoV-2 antibody (Ab) titers in 14 KTRs, transplanted in our center between January 2021 and June 2021, who received at least 1 vaccine dose before KT. We assessed the anti-receptor-binding domain (RBD) Ab titers (Elecsys anti-SARS-CoV-2, Roche Diagnostics GmbH, Mannheim, Germany; positive threshold ≥ 0.8 U/mL) on the day of transplantation (day 0) and 28 d after (d 28). This work received an institutional review board approval.

Ten patients had received their second dose of either the BNT162b2 (Pfizer-BioNTech, n=8) or ChAdOx1 nCoV-19 vaccine (AstraZeneca, n=2) with a mean time of 57 d (range, 25–78) before KT. Four patients had received a single dose of vaccine (Pfizer n=2, AstraZeneca n=2) with a mean time of 29 d (range, 15–30) before KT. The mean age was 58 y (range, 32–77) and 57% were male individuals. Twelve patients were on dialysis before transplantation

with a mean duration of 54 mo (range, 20–122). One patient had a prior history of COVID-19.

After KT, all patients were treated with an association of tacrolimus (trough levels, 10–13 ng/mL), mycophenolate (500 mg BID), and steroids. Sensitized patients (n=3) and KTRs who received a graft from a living donor (n=2) were additionally inducted with thymoglobulin and basiliximab, respectively. None of the patients developed COVID-19 after KT.

On day 0, the mean anti-RBD Ab titer was high (mean $\pm$ SEM: 1124 ± 441 U/mL). However, KTRs who had received a single dose of vaccine (n=4) showed low mean Ab titer (0.83 ± 0.43 U/mL). On day 28, we observed a significant decrease of anti-RBD Ab titers (Figure 1). However, Ab titers remained high (514 ± 205 U/mL) compared with those reached in vaccinated KTRs that we previously published.² Not surprisingly, the 4 patients who had received a single dose of vaccine had low Ab titer on day 28 (2.85 ± 1.84 U/mL). Interestingly, on day 28, anti-RBD Ab titers in patients inducted with thymoglobulin

Anti-RBD titers (U/mL)

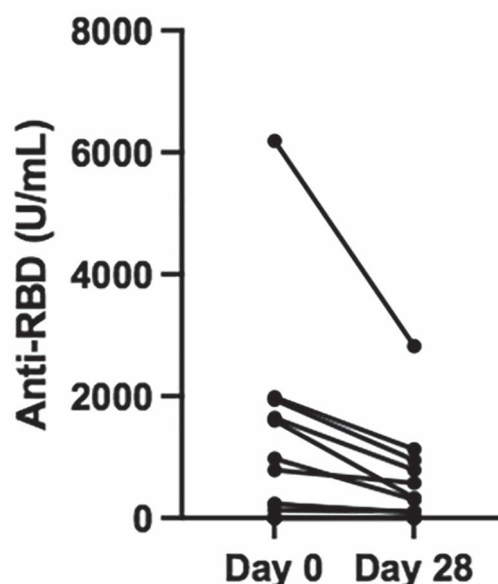


FIGURE 1. Evolution of anti-RBD antibody titers. Mean $\pm$ SEM antibody titer on d 0 and d 28: 1124 ± 441 U/mL and 514 ± 205 U/mL ($P=0.003$, Wilcoxon test). RBD, receptor-binding domain.

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G.F., A.D., A.S., and N.K. participated in research idea, study design, and data analysis. G.F. participated in data acquisition. A.S. and B.K. performed serologic analysis. A.S. performed statistical analysis. G.F., A.D., A.S., B.K., M.D.M., M.M., T.D., A.B., J.D.G., L.B., J.C.Y., E.G., and N.K. took care of the patients. All authors discussed and reviewed the article.

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(n=3) or basiliximab (n=2) were high (107, 332, 787 and 577, 1132 U/mL, respectively).

Our results are in line with those recently published.^{3,4} Yi et al³ showed persistent immunogenicity 25 d after KT of the mRNA vaccine in 8 KTRs (including 5 who received a T-cell depleting induction). Mohamadou et al⁴ also demonstrated that despite a 55% drop, anti-SARS-CoV-2 Ab titers remained high 15 d after KT in 7 patients (6 induced with antithymocyte globulins and 1 with basiliximab) who had received 2 mRNA vaccine doses before transplantation.

These results suggest that fully vaccinated patients maintain high Ab titers against SARS-CoV-2 in the first month post-KT, even in KTRs receiving induction therapy. It highlights the benefit to vaccinate all candidates before KT.⁵ Other studies are required to assess the long-term evolution and the impact of other therapies used

in KT (ie, rituximab) on anti-SARS-CoV-2 Ab acquired before KT.

REFERENCES

1. Georgery H, Devresse A, Yombi JC, et al. High response rate to BNT162b2 mRNA COVID-19 vaccine among self-care dialysis patients. *Clin Kidney J*. 2021;14:2129–2131.
2. Georgery H, Devresse A, Yombi JC, et al. Disappointing immunization rate after two doses of the BNT162b2 vaccine in a Belgian cohort of kidney transplant recipients. *Transplantation*. 2021;105:e142–e143.
3. Yi SG, Eager T, Moore L, et al. Persistent immunogenicity of the mRNA COVID-19 vaccine in patients vaccinated before kidney transplant. *Transplantation*. 2021;105:e133–e134.
4. Mohamadou I, Nkok J, Galichon P, et al. Immediate impact of induction treatment on post-vaccination SARS-Cov-2 serology in kidney transplant recipients. *Transplantation*. 2021;105:e135–e136.
5. Pascual J, Melilli E, Jiménez-Martín C, et al. COVID-19-related mortality during the first 60 days after kidney transplantation. *Eur Urol*. 2020;78:641–643.