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Humoral Response after SARS-Cov-2 mRNA Vaccine

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Introduction

The coronavirus disease 2019 (COVID-19) pandemic is having a major impact on global healthcare, and has brought to light important inequalities by income, age, sex, race, geographic areas, and medical fragilities. Since the early stages of the pandemic, immunocompromised subjects, including patients with impaired kidney function (chronic renal failure, dialysis, transplantation), have been deeply burdened, showing increased risk of infection, unfavourable outcomes, and higher mortality rates with respect to the general population [1].

Description

A meta-analysis on a total of 29 articles published until September 2020, pooling 3261 confirmed COVID-19 cases out of 396,062 hemodialysis (HD) patients, estimated a 7.7% incidence and a 22.4% overall mortality rate in this weak population-with increased values among non-Asian countries. Concerning the epidemiology of COVID-19 in renal transplant patients, data are variable across the different countries based on the information available from nationwide registries and multicenter or local studies [2]. The incidence of COVID-19 in kidney transplant recipients (KTR) per 1000 patients provided by European and US national registries ranges between 8.3% and 17.7%, but local single-center studies reported higher numbers.

Besides the important advances of the pharmacological research for novel antiviral agents against COVID-19, at present, mass vaccination remains the most effective strategy to achieve successful long-term control of the pandemic. Until the last week of May 2022, above 11.8 billion doses of COVID-19 vaccines have been administered globally, and 65.8% of the world population has received at least one dose [3]. Several efforts have been made to identify the most suitable vaccine schemes (number of doses, time schedule of administrations, booster doses) in both the general population and vulnerable subjects. The question of whether vaccination-induced immunity confers a better protection against COVID-19 compared to infection-induced immunity has become a hot topic of current research. Up to now, limited evidence is available on the response to COVID-19 vaccines in immunocompromised nephropathic subjects who previously experienced SARS-CoV-2 infection. Prior research from our group found that HD patients and KTRs that recovered from COVID-19 show a delayed viral clearance, in front of a valuable serological response with a tendency to an earlier decline of antibody titers over time—especially in the asymptomatic or paucisymptomatic cases-compared to the immunocompetent subjects with normal renal function.

To highlight eventual differences in antibody response between the BNT162b2 vaccine and the mRNA-1273 vaccine, the incremental delta was calculated on the antibody titers measured before and after first dose administration. No significant difference between the mRNA vaccine types was detected in the overall cohort, while the calculation could not be done separately in HD patients and KTRs due to the small numerosity of each group [4].

It is worth mentioning two patients in the transplant group for their peculiar response to both infection-induced and vaccine-induced immune triggers. The first is a 62-year-old male who never developed antibodies either after recovery or after vaccine. The second is a 24-year-old male who always tested negative in serum specimens collected prior to vaccination, and then displayed a positive antibody response after vaccination.

Since the beginning of vaccination campaigns, health authorities identified first-phase priority categories, in particular elderly people (above 80 years of age), healthcare/public health workers, and subjects with pre-existing medical conditions and co-morbidities. Patients under dialysis treatment and KTRs are listed among the clinical extremely vulnerable groups who should receive primary COVID-19 immunization and tailored vaccination schedules to ensure adequate immune coverage [5]. Fairly promising data are emerging on the immunogenicity of SARS-CoV-2 vaccines in the dialysis population, while lower immunization rates and neutralizing capacities have been found in KTRs.

Conclusion

This divergent behaviour in vaccine responsiveness between HD patients and KTRs might be explained by the different mechanisms underlying immunodepression. While for HD the pathogenetic link between uremia and immune dysfunction feasibly lies in the detrimental effects of the uremic milieu itself and the related disorders of immunocompetent cells, KTRs must be maintained under life-long immunosuppressive therapy to prevent graft rejection.

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