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## **The Impact of Anti-Viral Therapy and Vaccination on Outcomes In KTRs with COVID-19**

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It has already been 3 years since the COVID-19 pandemic began, and in the meantime, a lot of information about the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has been known, and many treatments and preventive vaccines have been introduced. However, the evidence for the prevention and treatment of COVID-19 is lacking in kidney transplant recipients (KTRs), because they were excluded from original trials for COVID-19. This time, based on the research results reported so far, we will discuss the effects of therapies of COVID-19 and vaccination in KTRs. From the beginning of pandemic to present, many COVID-19 treatments have been applied. In the early pandemic, hydroxychloroquine, azithromycin, and lopinavir-ritonavir were the main therapeutic agents for COVID-19, but these drugs did not show a clear therapeutic effects or improvement over the course of the disease. Recently, the paradigm of treatment has changed. Oral agents such as nirmatrelvir/ritonavir (Paxlovid) and molnupiravir (Lagevrio), remdesivir injection, monoclonal antibodies that targeting SARS-CoV-2, and high-titer convalescent plasma extracted from cured patients are available and the latest research results are introduced.

To impede the spread of COVID-19, various vaccine platforms have been investigated, and have proven safe and successful in the general population. However, KTRs have decreased cellular and humoral immune responses, which are important for developing neutralizing antibodies after vaccination, so only 4-48% KTRs have detectable anti-spike IgGs after receiving 2 vaccine doses. Therefore, the need for additional booster vaccination has been emphasized in KTRs. However, in the analysis of Korean KTRs, KTRs did not show significant improvement in clinical course even after receiving a booster dose, confirming that the effect of the booster vaccination was reduced compared to a booster dose in the matched general population. The emergence of various variants and immunosuppression may reduce the effectiveness of vaccination, and further studies are needed to confirm the vaccination effect of the improved COVID-19 vaccines and appropriate booster dose intervals in KTRs.