Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Torque-Teno virus to optimize timing of vaccination against severe acute respiratory syndrome coronavirus 2 in solid organ transplant recipients

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To control the current epidemics of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) millions of people including solid organ transplant (SOT) recipients have been vaccinated. Though, SOT recipients are immunocompromised and despite two or three doses of vaccination, a considerable proportion of them have a weak immune response and therefore, may be susceptible to SARS-CoV-2 infection [1,2]. The immune response to vaccine is a multifactorial process and it is not possible to modify all the factors as desired [3]. Currently, there is no accurate method to determine the optimal time for vaccination in SOT recipients. Therefore, a method to determine the time that immune system can mount an efficient immune response to the vaccine, is warranted.

As a part of human virome, Torque-Teno virus (TTV) has been introduced as a possible endogenous marker of the immune function in SOT recipients [4,5]. TTV load increases after transplantation, peaks at the end of the third month post-transplantation and reaches steady state afterward [6]. There are accumulating evidence that TTV load or its kinetics are associated with immune function in SOT recipients [4,5,7]. At present, knowledge about the interaction between TTV and SARS-CoV-2 infection is limited. However, in a recent case report, a kidney transplant recipient with SARS-CoV-2 infection had a TTV load of 5.6 log10 copy/ml prior to the SARS-CoV-2 infection. The TTV load increased to 7.87 log10 copy/ml on day 43 after diagnosis of SARS-CoV-2 infection. The SARS-CoV-2 RNA was detectable up to day 48 after diagnosis, and IgG antibodies against SARS-CoV-2 were positive on day 17 after diagnosis but became negative after day 40 [8]. The interaction between TTV kinetics and other viral antigens has been described previously [9]. In healthy individuals, TTV load slightly increase after immunologic stimulation with influenza and hepatitis B vaccines [9]. Healthy individuals with a median baseline TTV load of 3.8 log10 copy/ml have efficient immune response to influenza vaccine 30 days after vaccination. More than 80% of healthy individuals with a median baseline TTV load of 4.1 log10 copy/ml have response to hepatitis B vaccine when is measured at day 90 after vaccination [9]. A lower TTV load is associated with a stronger immune function, although in SOT recipients, a TTV load lower than 6 log10 copy/ml is equal to sub-optimal immunosuppression and with high risk of rejection [6].

The preliminary results showed that SARS-CoV-2 vaccination could reduce risk of death following COVID-19 in SOT recipients [10]. Therefore, it is important to vaccinate SOT recipients without delay. Future studies can test if there is any association between TTV load at the time of vaccination and the magnitude or durability of immune response to the vaccine. To save time and reduce the risk of infection, the first jab can be done as soon as possible, and the TTV load or kinetics may be used to determine the optimal time for an efficient boosting. This could be a strategy to improve the vaccine response in SOT recipients and should be teste in clinical trials.

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CRediT authorship contribution statement

Omid Rezahosseini: Conceptualization, Writing – original draft. **Susanne Dam Nielsen:** Conceptualization, Writing – original draft.

Declaration of Competing Interest

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