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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Letter to the Editor

SARS-CoV-2 re-infection, vaccination and neutralizing antibodies

Dear Editor,

The letter by Hsu et al.[1] that was recently reported into your Journal was very educational and worthy of attention. Authors investigated a nursing home outbreak in which a group of subjects was tested positive for SARS-CoV-2 after receiving the second vaccine dose, although staff and visitors were tested negative by rapid antigen tests; further, in several cases subsequent infections were then confirmed by contact tracing, suggesting that actual vaccines strategy cannot lead to global immunity. Moreover, it has been postulated that, after completing BNT162b2 vaccination, a neutralization of newly emerged SARS-CoV-2 variants was observed, in particular of the B.1.1.7 variant.[2,3] Nevertheless, these report did not take in account the determination of antibody titre after SARS-CoV-2 vaccination, as well as other immune factors possibly related to neutralizing capacity as specific T-cell release, heterogeneous antibody population or the occurrence of non-spike mutations that can influence both viral replication and immune response.[2,4] The significance of SARS-CoV-2 specific antibody tests to determine the efficacy of vaccination and the duration of protection is still debated.[5–7] Finally, with the spread of multiple viral variants, several individuals were re-infected by SARS-CoV-2,[8–10] but the correlation between re-infection, immune-protection and vaccination remains unclear. In this paper, we describe the case of a healthcare worker who has been infected three times by SARS-CoV-2 despite three dose of vaccination with mRNA-BNT162b2 (Comirnaty ®, BioNtech/Pfizer, Mainz, _Germany/New York, United States); further, during the third infection, she also infected her own 4 years-old child.

We described here the case of a 34 years old nurse who was firstly infected by SARS-CoV-2 at March 2020; at that time, she had an asymptomatic disease, with only rhinorrhea as main symptom. In anamnesis, she had not chronic diseases and she did not take chronic medications. Nasopharyngeal swab resulted negative 2 weeks after diagnosis. She never referred symptoms compatible with long-COVID during the following months. At the beginning of November 2020 she developed fever and muscle pain; a nasopharyngeal swab confirmed a second infection by SARS-CoV-2 that recovered after 10 days. No further clinical symptoms were observed in the following weeks. One month after re-infection, she underwent to chest X-ray, spirometry, 6-minutes walking test and DLCO (diffusing capacity of the lung for carbon monoxide) that were all normal. At that time, we determined also antibody titer by using Elecsys anti-SARS CoV-2 test (quantitative test to determine antibodies against the receptor binding-domain –RBD- of the spike protein; protective titer > 0,8 UI/mL, upper threshold limit > 2500 UI/mL) that resulted > 2500 UI/mL. At January 2021, she was vaccinated against SARS-CoV-2 with mRNA-BNT162b2 (first dose January 8th, second dose January 29th). Six week after completing vaccination cycle antibody titer was > 2500 UI/mL; it declines to 871 UI/mL at October 2021 when the third dose was planned, raising up to > 2500 UI/mL 6 weeks later. At December 24th she developed fever, dysgeusia and sore throat and the nasopharyngeal swab was positive again for SARS-CoV-2. Symptoms recovered in 5 days and nasopharyngeal swab got negative after 2 weeks. Three days after diagnosis, also her child developed fever and sore throat and nasopharyngeal swab was also positive.

Although this is only a single case report, it can highlighted and discussed different aspects related to the management of SARS-CoV-2 infection. First, due to the rapid spread of different viral variants re-infection is possible, especially in populations most exposed at risk such as healthcare workers. Secondly, the growing evidence that several individuals were re-infected despite a full cycle of vaccination demonstrates that actual SARS-CoV-2 vaccines cannot lead to herd immunity in the future. Thirdly, the periodic evaluation of quantitative antibody titer cannot be considered an useful method to assess the protection against SARS-CoV-2 infection. This obvious observation must be firmly reiterated in all circumstances in which patients with high antibody titer ask to postpone vaccination or reduce attention in the use of personal protective equipment. Finally, even subjects with a complete vaccination course can transmit SARS-CoV-2 infection. Taken together, all these findings are relevant for the future strategies in preventing SARS-CoV-2 spread, because they suggest that SARS-CoV-2 infection leaves a poor immunity memory, leading to a lack of protection against colonization or re-infection in a medium-term period, and a residual risk for transmission despite vaccination. In this specific context, though the vaccination significantly reduced both the individual and the collective risk of severe/life threatening SARS-CoV-2 infections, we should continue to take in account that also vaccinated subjects may be spreader of the virus, even if for a shorter period. Consequently, in our opinion, the prevention methods suggested in the last two years, such as the face mask or the careful hygiene strategies, and the restrictive measures related to the pandemic should be also maintained in the future.

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