clinical and translational neuroscience

MDPI

Case Report

Waning Humoral Immune Response to SARS-CoV-2 Vaccination with Symptomatic Infection after Initiation of Anti-CD20 Treatment in a Patient with Multiple Sclerosis

Robert Hoepner and Anke Salmen *

Department of Neurology, Inselspital, Bern University Hospital, University of Bern, 3010 Bern, Switzerland; robert.hoepner@insel.ch

* Correspondence: anke.salmen@insel.ch; Tel.: +41-31-632-2111

Abstract: Waning humoral responses to SARS-CoV-2 vaccination have been reported arguing for booster vaccinations even in healthy populations. Multiple sclerosis (MS) immunotherapy with anti-CD20 monoclonal antibodies may negatively influence morbidity and mortality of COVID-19. The opportunity to treat patients at risk for a severe COVID-19 course with specific monoclonal antibodies targeting SARS-CoV-2 represents an important novel measure for patient safety. We report a patient with waning humoral vaccination response around five months after two mRNA vaccination doses upon initiation of ocrelizumab treatment. Symptomatic COVID-19 infection was treated with casirivimab/imdevimab with rapid symptom recovery.

Keywords: MS; COVID-19; ocrelizumab; rituximab; casirivimab/imdevimab

Citation: Hoepner, R.; Salmen, A. Waning Humoral Immune Response to SARS-CoV-2 Vaccination with Symptomatic Infection after Initiation of Anti-CD20 Treatment in a Patient with Multiple Sclerosis. *Clin. Transl. Neurosci.* **2022**, *6*, 8. https://doi.org/10.3390/ctn6010008

Academic Editor: Claudio Bassetti

Received: 12 December 2021
Accepted: 9 March 2022
Published: 18 March 2022

1. Introduction

Treatment with anti-CD20 agents, such as rituximab and ocrelizumab, in patients with multiple sclerosis (MS) has been associated with both a higher risk for a severe course of infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1] and reduced humoral immune responses upon vaccination against SARS-CoV-2 [2].

2. Case Report

We report a 34-year-old female patient with relapsing remitting MS (RRMS) who had been vaccinated against SARS-CoV-2 with Comirnaty® (BNT162b2, BioNTech Pfizer, 2nd dose given on 25 May 2021) twice with a 4-week interval between the two doses while being treated with dimethyl fumarate (Tecfidera®, Biogen, Cambridge, MA, USA). Initial vaccination response was evaluated after three months (20 August 2021) and revealed a positive result (257 AU/mL anti-spike IgG; cut-off value of ≥100 AU/mL considered as positive, internal communication of in-house infectious disease specialists). Due to MS disease activity, ocrelizumab (Ocrevus®, Roche, Basel, Switzerland) was started on 6 August 2021 (1st dose of 300 mg on 6 August 2021, 2nd dose of 300 mg on 20 August 2021), controlling MS disease activity during the short-term follow-up.

The patient developed fever and chills, fatigue, anosmia, and respiratory symptoms with cough on 16 November 2021 and performed a SARS-CoV-2 antigen self-test, which was positive. Due to anti-CD20 treatment and previous vaccination, the patient's anti-spike antibody response was retested, demonstrating a decline in the antibody level to 88.7 AU/mL (16 November 2021), and SARS-CoV2 infection was additionally confirmed by a positive PCR test (17 November 2021, nasopharyngeal swab: Ct-value 25.51, internal reference: ≥34 low, 26.01–33.99 medium, ≤26 high viral load).

Due to the high viral load, insufficient anti-spike IgG and drug-induced immunosuppression, casirivimab 1200 mg and imdevimab 1200 mg (REGEN-COV™, Roche) [3] were given intravenously on 17 November 2021. Four days later, she recovered without sequelae.

3. Concluding Remarks

In line with the recently published data on the gradual decline in humoral responses starting early after vaccination [4,5], our immunosuppressed, albeit young and female, patient experienced a relevant loss in anti-spike protein IgG around five months after the second vaccination followed by symptomatic SARS-CoV-2 infection. This case supports the notion that anti-spike protein IgG may serve as a proxy for protective immunity. A vaccination strategy with a total of four dosages in immunosuppressed patients as recommended by the Swiss regulatory authority might be useful in such situations. As a limitation, neutralizing antibodies and T cell responses were not measured during clinical routine in our patient.

Author Contributions: Conceptualization, R.H. and A.S.; methodology, R.H. and A.S.; writing—original draft preparation, review and editing, R.H. and A.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: The patient consented to this individual case report in written form.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest related to this article. R.H. has received speaker/advisor honoraria from Merck, Novartis, Roche, Biogen, Alexion, Sanofi, Bristol-Myers Squibb, and Almirall. He received research support within the last 5 years from Roche, Merck, Sanofi, Biogen, and Bristol-Myers. Squibb. He also received research grants from the Swiss MS Society. A.S. received speaker honoraria and/or travel compensation for activities with Bristol Myers Squibb, Novartis, and Roche, and research support by Baasch Medicus Foundation and the Swiss MS Society.

References

1. Sormani, M.P.; Schiavetti, I.; Carmisciano, L.; Cordioli, C.; Filippi, M.; Radaelli, M.; Immovilli, P.; Capobianco, M.; De Rossi, N.; Brichetto, G.; et al. COVID-19 Severity in Multiple Sclerosis: Putting Data Into Context. *Neurol.-Neuroimmunol. Neuroinflamm.* **2022**, *9*, e1105. [CrossRef] [PubMed]
2. Tallantyre, E.C.; Vickaryous, N.; Anderson, V.; Asardag, A.N.; Baker, D.; Bestwick, J.; Bramhall, K.; Chance, R.; Evangelou, N.; George, K.; et al. COVID-19 Vaccine Response in People with Multiple Sclerosis. *Ann. Neurol.* **2021**, *91*, 89–100. [CrossRef] [PubMed]
3. Weinreich, D.M.; Sivapalasingam, S.; Norton, T.; Ali, S.; Gao, H.; Bhore, R.; Xiao, J.; Hooper, A.T.; Hamilton, J.D.; Musser, B.J.; et al. REGEN-COV Antibody Combination and Outcomes in Outpatients with COVID-19. *N. Engl. J. Med.* **2021**, *385*, e81. [CrossRef] [PubMed]
4. Levin, E.G.; Lustig, Y.; Cohen, C.; Fluss, R.; Indenbaum, V.; Amit, S.; Doolman, R.; Asraf, K.; Mendelson, E.; Ziv, A.; et al. Waning Immune Humoral Response to BNT162b2 COVID-19 Vaccine over 6 Months. *N. Engl. J. Med.* **2021**, *385*, e84. [CrossRef] [PubMed]
5. Hatzakis, A.; Karabinis, A.; Roussos, S.; Pantazis, N.; Degiannis, D.; Chaidaroglou, A.; Petsios, K.; Pavlopoulou, I.; Tsiodras, S.; Paraskevis, D.; et al. Modelling SARS-CoV-2 Binding Antibody Waning 8 Months after BNT162b2 Vaccination. *Vaccines* **2022**, *10*, 285. [CrossRef] [PubMed]