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Abstract

Importance:

Our study demonstrates high rates of infection with SARS-CoV-2 infections in patients with multiple sclerosis (MS) on ocrelizumab after three mRNA vaccinations.

Objective:

To investigate the rate of breakthrough SARS-CoV-2 infection and clinical outcomes in a cohort of MS patients who were treated with the antiCD20 monoclonal antibody, ocrelizumab, before first, second, and third BNT162b2 mRNA vaccinations. To correlate clinical outcomes with the humoral and cellular response.

Design:

The study was a prospective nonrandomized controlled multicenter trial observational study.

Setting:

The study included participants from three MS clinics in Denmark and the University of California San Francisco in the United States.

Participants:

Participants with a diagnosis of MS, who were treated for at least 12 months with ocrelizumab prior to the first BNT162b2 mRNA vaccination, were prospectively followed from January 2021 to June 2022.

Results

Out of 54 participants, 32 (59.3%) developed a positive SARS-CoV-2 PCR test in the study period. Mild infection was observed in all participants. After the third vaccination, the non-infected participants had higher mean antibody levels compared to the infected participants (54.3 vs. 26.5 BAU/mL, p=0.030). The difference in reactivity between spike-specific $CD4^+$ and $CD8^+$ T-lymphocytes in the two groups was non-significant.

Conclusion and Relevance

These results demonstrate high rates of breakthrough infections after 3rd SARS-CoV-2 mRNA vaccination in ocrelizumab treated MS patients, suggesting that vaccination in B-cell depleted patients offer only low protection. These findings point to the need for better prophylactic options, or more specific vaccines, to allow for better clinical protection.

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