The Use of RNA-Based COVID-19 Vaccines and B Cell Therapy

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Received 02 Apr 2021; **Accepted** 20 Apr 2021; **Published** 27 Apr 2021

Abstract

As the number of people access vaccines to coronavirus disease (COVID-19) are increasing, those with Multiple Sclerosis (MS), Neuromyelitis Optica (NMO), and other are concerned about about the safety and efficacy of these vaccines as these individuals are receiving immunosuppressive medications. B cell depletion with anti-CD20 drugs such as rituximab, ocrelizumab, or the more recently approved, ofatumamab [1], are of particular interest because prior studies have suggested that there is a decrease in vaccine-induced protection in the setting of CD20 blockade [2]. While there is yet no published data about vaccine effectiveness of COVID-19 in any immunosuppressed populations, there are convincing arguments on both sides of the debate surrounding whether CD20 blocking immunotherapy may have an impact on the efficacy of new RNA-based COVID-19 vaccines.

Introduction

Several previous studies of vaccine responses in patients receiving anti-CD20 therapies have been done with rituximab and ocrelizumab. In a prospective controlled study of vaccination in rituximab-treated pa-tients with rheumatoid arthritis, predominantly B cell-dependent vaccination responses (to pneumococcal vaccine and the neoantigen keyhole limpet hemocyanin (KLH)) were decreased, while more T-cell dependent responses, as measured by the response to Tetanus Toxoid (TT) vaccine and the delayed-type hypersensitivity response, were preserved in both groups.

The recently completed 'Study to Evaluate the Effects of Ocrelizumab on Immune Responses in Partici-pants With Relapsing Forms of Multiple Sclerosis' (VELOCE) was a trial conducted to specifically assess humoral responses to various (non-COVID-19) inactivated vaccines in ocrelizumab-treated patients with multiple sclerosis [3].

This study signifies attenuated humoral responses, as measured by antibody titers, to tetanus-toxoid containing vaccine, Pneumovax vaccine, KLH, and influenza vaccine in patients who had received ocrelizumab. The outcome measures in the trial were antibody titers, and anti-CD20 medications are known to mechanistically block formation of new memory B cells and lower antibody production. Vac-cine efficacy, however, is not exclusively antibody-mediated, and no study has looked directly at infection rates after vaccination, as this would not be feasible in the setting of extremely low baseline rates of most vaccine-preventable disease. So, the ultimate question of whether patients on CD20-depleting medications receive less real-world protection from vaccines remains unaddressed.

References

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Cite this article: Aron. The Use of RNA-Based COVID-19 Vaccines and B Cell Therapy. J Mult Scler (Foster City), 2021, 8(4), 243.