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COVID vaccination less effective for those with rheumatic, musculoskeletal diseases

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Johns Hopkins Medicine researchers recently reported that while two doses of a vaccine against SARS-CoV-2—the virus that causes COVID-19—confers some protection for people who have received

solid organ transplants, it isn't sufficient to enable them to dispense with masks, physical distancing and other safety measures.

Now, the researchers have shown a similar lower-than-normal immune response to the messenger RNA (mRNA) COVID-19 vaccines for patients with rheumatic and musculoskeletal diseases (RMDs), conditions that often call for treatment with medications that suppress the immune system.

The study was detailed in a research letter published May 25 in the *Annals of Internal Medicine*.

"Our findings suggest that patients with RMDs who are on immunosuppressive therapies have less-than-optimal responses to vaccination, and therefore, are still at risk for SARS-CoV-2 infection," says study lead author Caoilfhionn Connolly, M.D., a postdoctoral fellow in rheumatology at the Johns Hopkins University School of Medicine.

According to the American College of Rheumatology, RMDs are a diverse group of autoimmune diseases that affect children and adults, and can impact any organ of the body, often the joints. Most RMDs are due to problems of the immune system, which can result in inflammation and gradual deterioration of joints, muscles and bones. Over 46 million people in the United States are living with some type of RMD, including rheumatoid arthritis, systemic lupus erythematosus, scleroderma, vasculitis and Sjögren's syndrome.

Between Dec. 7, 2020, and March 11, 2021, the Johns Hopkins Medicine researchers recruited patients age 18 and older with RMDs for the immune response study. One month after the participants received their second dose of either the Pfizer-BioNTech or Moderna mRNA COVID-19 vaccine, blood samples were analyzed for neutralizing antibodies against the target of both vaccines, the SARS-CoV-2 spike

protein.

Twenty patients did not have detectable antibodies. The majority were women (95%), white (90%), diagnosed with lupus (50%) and receiving multiple immunosuppressive agents (80%)—of which the most common medications were rituximab (55%), a biologic used to treat autoimmune disorders such as rheumatoid arthritis and vasculitis, and mycophenolate (50%), a drug commonly used as a first-line therapy for scleroderma lung disease and lupus nephritis (kidney inflammation). Both immune suppressants work by depleting B-lymphocytes (also known as B-cells), immune cells that produce antibodies in response to foreign invaders such as bacteria and viruses.

"Based on our findings, we urge patients with autoimmune diseases who are taking these particular immunosuppressive agents to continue practicing recommended COVID-19 safety measures, even after vaccination," says study co-author Brian Boyarsky, M.D., Ph.D., a research fellow at the Johns Hopkins University School of Medicine.

Connolly and Boyarsky say additional research is needed to better understand the immune response to COVID-19 vaccination in patients with RMDs to find potential methods for raising the vaccine effectiveness in this population—including adjusting the dosage and timing of immunosuppressive agents prior to vaccination.

More information: Caoilfhionn M. Connolly et al, Absence of Humoral Response After Two-Dose SARS-CoV-2 Messenger RNA Vaccination in Patients With Rheumatic and Musculoskeletal Diseases: A Case Series, *Annals of Internal Medicine* (2021). DOI: 10.7326/M21-1451

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