MedicalXpress

After first dose of Pfizer vaccine, antibody, but not T-cell response, is weakened in patients receiving methotrexate

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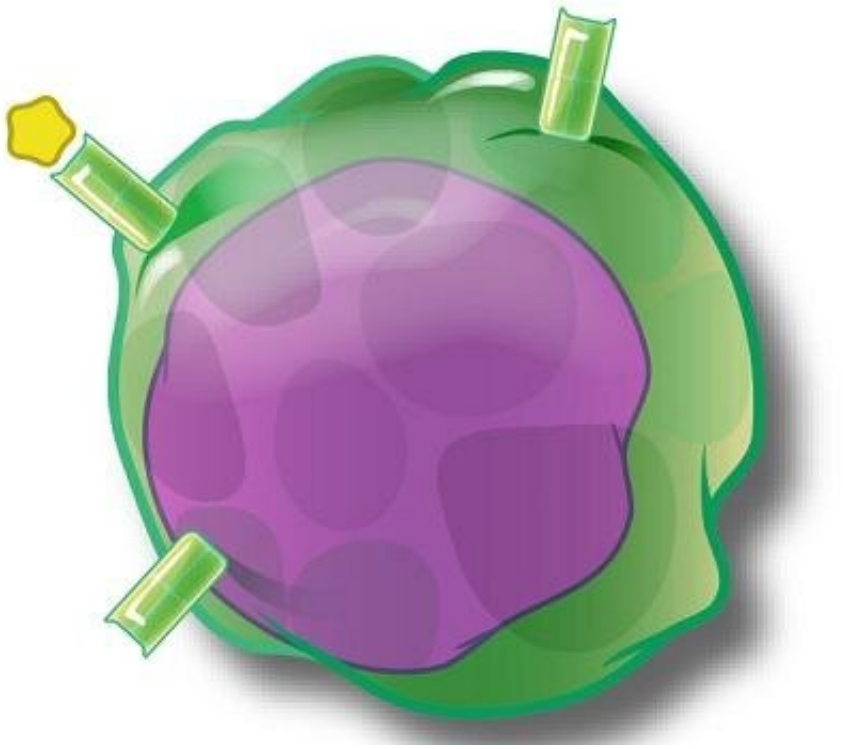

An artist's depiction of a T cell. Credit: NIAID

A new study presented at this year's European Congress of Clinical Microbiology & Infectious Diseases (ECCMID) and published in *The Lancet Rheumatology*, shows that the antibody—but not the T-cell—response to the first dose of the Pfizer COVID-19 vaccine is

weakened in patients taking the immunosuppressant methotrexate. In contrast, antibody and T-cell responses are preserved in patients taking biological drugs such as tumor necrosis factor (TNF) inhibitors.

Around 3% to 7% of people in Europe and North America have immune-related inflammatory diseases such as psoriasis, rheumatoid arthritis and inflammatory bowel disease. Treatments such as methotrexate, TNF inhibitors, and other targeted biological therapies work by suppressing the immune system and, while they can be highly effective, they can also increase the risk of serious infections.

Patients taking immunosuppressants for immune-mediated inflammatory diseases were excluded from COVID-19 vaccine trials, so there is a lack of data on how well they work in this vulnerable group.

Assessment of immune responses to a single dose of vaccine is particularly important given that many countries, including the UK, have extended the interval between doses to maximize population coverage.

Dr. Satveer Mahil, Professor Catherine Smith and colleagues at St John's Institute of Dermatology, Guy's and St Thomas' NHS Foundation Trust, London, UK and King's College London, enrolled 101 participants from January 14 2021 to April 4 2021 (84 patients with the skin condition psoriasis and 17 healthy volunteers). The participants' median age was 43, 55% were male, 84% were of White ethnicity, and none had had COVID-19 previously.

The psoriasis patients were taking methotrexate (17 patients, median dose of 15 mg/week), TNF inhibitors (27 patients), interleukin (IL)-17 inhibitors (15 patients) or IL-23 inhibitors (25 patients).

Immune responses were measured immediately before being given a single dose of the Pfizer vaccine and 28 days later. The primary

outcomes were humoral immunity (neutralizing antibody response) to the wild-type SARS-CoV-2 virus and T-cell response 28 days after vaccination.

Rates of seroconversion (the development of antibodies against the virus) were lower in the patients on immunosuppressants. All 17 (100%) healthy volunteers had evidence of seroconversion, compared with 78% of those on immunosuppressants. The lowest seroconversion rate, 47%, was in patients taking methotrexate.

Levels of neutralizing antibodies, those able to stop the virus from entering cells, were significantly lower in patients taking methotrexate compared to healthy controls but were preserved in those taking biologics.

T-cell responses were detected in all groups at similar rates and levels, and many participants without evidence of seroconversion showed a T-cell response.

Levels of neutralizing antibodies to the B.1.1.7 (Alpha) variant were also tested. These were similarly low in all participants (including healthy volunteers), underlining the need to continue to take preventative measures after having a first dose of the vaccine.

Data on the participants' response to the second dose are awaited.

The authors say, "While global mass COVID-19 vaccination programs are underway, there remains concern over vaccine efficacy in immunocompromised patients, including against novel SARS-CoV-2 variants that threaten immune escape.

"Measures of the immune response that correspond to decreased risk of COVID-19 after vaccination are unknown, and emerging research in

immunocompromised patients has focused on seroconversion alone. We show that serological responses are not representative of the complex immune response to vaccines.

"Our data showing that the T-cell responses following the first dose of the Pfizer COVID-19 vaccine were not affected in those taking methotrexate or a biologic therapy—including in some of those who didn't seroconvert—is reassuring. However, ongoing monitoring of these patients is needed to determine what this means for the clinical effectiveness of the vaccines."

More information: Satveer K Mahil et al, The effect of methotrexate and targeted immunosuppression on humoral and cellular immune responses to the COVID-19 vaccine BNT162b2: a cohort study, *The Lancet Rheumatology* (2021). DOI: 10.1016/S2665-9913(21)00212-5

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