Medizinische Universität Graz

Rector's Office
Auenbruggerplatz 2, A-8036 Graz

Thomas Edlinger, BA
Public relations and event management

thomas.edlinger@medunigraz.at
Tel +43 / 316 / 385-72055
Fax +43 / 316 / 385-72030

Press release
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COVID-19 vaccination for immunocompromised people: Researchers find an important cell type that predicts immune response

Graz,15 December 2021 – While knowledge of the safety and efficacy of COVID-19 vaccines for healthy people is advanced, their effect on people with a compromised immune system has not been fully investigated. Med Uni Graz scientists have conducted research on how vaccination affects immunocompromised people and what factors are the most important.

Reduced response in the immunocompromised

If individuals have a weakened immune system due to either a congenital or acquired disease or a treatment, they are particularly in danger of severe illness from COVID-19. This state of health also has an impact on the response to the COVID-19 vaccine. Yet not every immune deficiency has the same consequences. A Med Uni Graz study is dedicated to the question of what type of immune response is elicited by COVID-19 vaccination in immunosuppressed patients and what factors encourage a positive immune response.

With the mRNA vaccines currently authorized in Austria, the body's own cells receive instructions for how to produce the so-called spike proteins of the SARS-CoV-2 virus. The cells follow these instructions and ultimately "present" parts of the manufactured spike proteins on their surface. T cells of the immune system are able to recognize them and then activate B cells (also called B lymphocytes). They belong to the immune system's "arsenal" and produce the antibodies that are required to neutralize pathogens. Some of the activated B cells become memory cells that rapidly produce more antibodies when SARS-CoV-2 later finds its way into the body, which in turn prevents further spread of the virus within the body.

Specific cells as predictive markers of immune response

The Graz trial analyzes B cells and their subtypes before and antibody response after COVID-19 mRNA vaccination. An interdisciplinary team analyzed the immune response of 199 trial participants: 120 had a compromised immune system and 79 were part of a healthy control group. To collect the data, blood was drawn twice from all 199 individuals: before the first vaccination and 21 to 28 days after the second vaccination. Analysis of the second samples concentrated on how many COVID-19-specific antibodies were present in the blood of the trial participants. As expected, the strength of the antibody response was significantly reduced in many of the trial participants with a compromised immune system as compared to the control group.
"Our study (CoVVac) confirms that the vaccine response of immunocompromised patients after vaccination against the new coronavirus is generally lower, yet it also shows that many of these patients can achieve antibody levels similar to those in healthy individuals," says Eduard Schulz from the Med Uni Graz Division of Haematology.

However, it appeared that the number of B lymphocytes in the blood of the tested person before vaccination was a good indicator of which individuals in the immunocompromised group would produce enough antibodies after vaccination. The special and novel value of the trial is that the subtype of the naive B cells in the analysis stood out as a specific predictive marker of antibody production. These are B cells that had not had any contact with a foreign structure (a so-called antigen).

"For the first time, we were able to identify a marker that might be able to predict how the body will respond to COVID-19 vaccination. Independent of simultaneous immunodeficiency treatment or disease, our study revealed that the number of naive B cells in the blood is associated with a vaccine response similar to the antibody levels of healthy subjects," says Eduard Schulz, summarizing the study findings.

Potential application of the study findings

In the future, it might be beneficial to determine the number of naive B cells in certain immunocompromised patients before vaccination. This could help predict whether it can be expected that any antibodies at all are produced following COVID-19 vaccination. "Measurement of the number of naive B cells in the blood of immunocompromised patients might help to plan future vaccinations so that an optimal antibody reaction is achieved," concludes Eduard Schulz. The findings of the Graz researchers have recently been published in the renowned journal Frontiers in Immunology.

Further information and contact:
Eduard Schulz
Medical University of Graz
Division of Haematology
Tel.: +43 316 385 14086
eduard.schulz@medunigraz.at

Profile: Eduard Schulz
Eduard Schulz is a specialist in internal medicine. His main interest is in improving treatment of aggressive hematologic neoplasia with innovative therapy concepts. He will be a visiting researcher at the National Institutes of Health in Bethesda (Maryland), U.S.A. starting in 2022. Another area of interest is diagnosis and therapy of infections in patients with hematological cancer.

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