Transplant recipients with limited protection from primary COVID-19 vaccinations, find third dose boosts response

August 11 2023, by Noah Brown

A medical assistant prepares a dose of a COVID-19 vaccine to be administered to a patient. Credit: Public domain image courtesy of Lisa Ferdinando, U.S. Department of Defense

Transplant recipients must take life-long immunosuppressive medications to prevent rejection, but these drugs can compromise the

effectiveness of vaccines.

New research indicates that lung and heart transplant recipients experienced diminished and delayed antibody responses to the first two COVID-19 mRNA vaccine doses, but most developed significantly better responses following a third dose. Cross-protection of vaccination against SARS-CoV-2 viral variants was only partial, however.

The study, which was conducted by a team led by investigators at Massachusetts General Hospital (MGH) and is published in *Open Forum Infectious Diseases*, included 18 lung transplant recipients, 17 heart transplant recipients, seven non–lung-transplanted patients with cystic fibrosis, and 12 healthy individuals (all without SARS-CoV-2 infection).

Scientists measured blood levels of antibodies against different variants of SARS-CoV-2 at various time points after a primary mRNA COVID-19 vaccination series.

Among healthy controls, strong antibody responses to the SARS-CoV-2 spike protein arose immediately following vaccination and displayed cross-neutralization against all variants.

Among heart and lung transplant recipients, increases in antibody concentrations occurred only gradually following the first two vaccine doses, and cross-neutralization was less than 10% against variants (and completely absent against the omicron variant).

Most (73%) transplant recipients developed a significant response after the third vaccine dose, however, reaching levels comparable to those of healthy controls, with improved but lower level responses against beta, gamma, and omicron variants. Responses of non–lung-transplanted cystic fibrosis patients paralleled those of healthy controls.

"Our findings highlight that effective protection of most transplant recipients is achievable but requires the recommended additional doses of vaccine. However, for most individuals, cross-protection of their responses to currently circulating immune-evasive SARS-CoV-2 variants is attenuated. The multiple subsequent vaccine doses recommended for transplant recipients are likely critical for maintaining immunity," says co–senior author Marcia B. Goldberg, MD, an investigator in the Division of Infectious Diseases at MGH.

"Next steps are to analyze the cellular immune responses of solid organ transplant recipients over the same longitudinal time frame."

More information: May Y Liew et al, Delayed and Attenuated Antibody Responses to Coronavirus Disease 2019 Vaccination With Poor Cross-Variant Neutralization in Solid-Organ Transplant Recipients—A Prospective Longitudinal Study, *Open Forum Infectious Diseases* (2023). DOI: 10.1093/ofid/ofad369

Provided by Massachusetts General Hospital