Unstable housing, homelessness associated with COVID-19 re-infection

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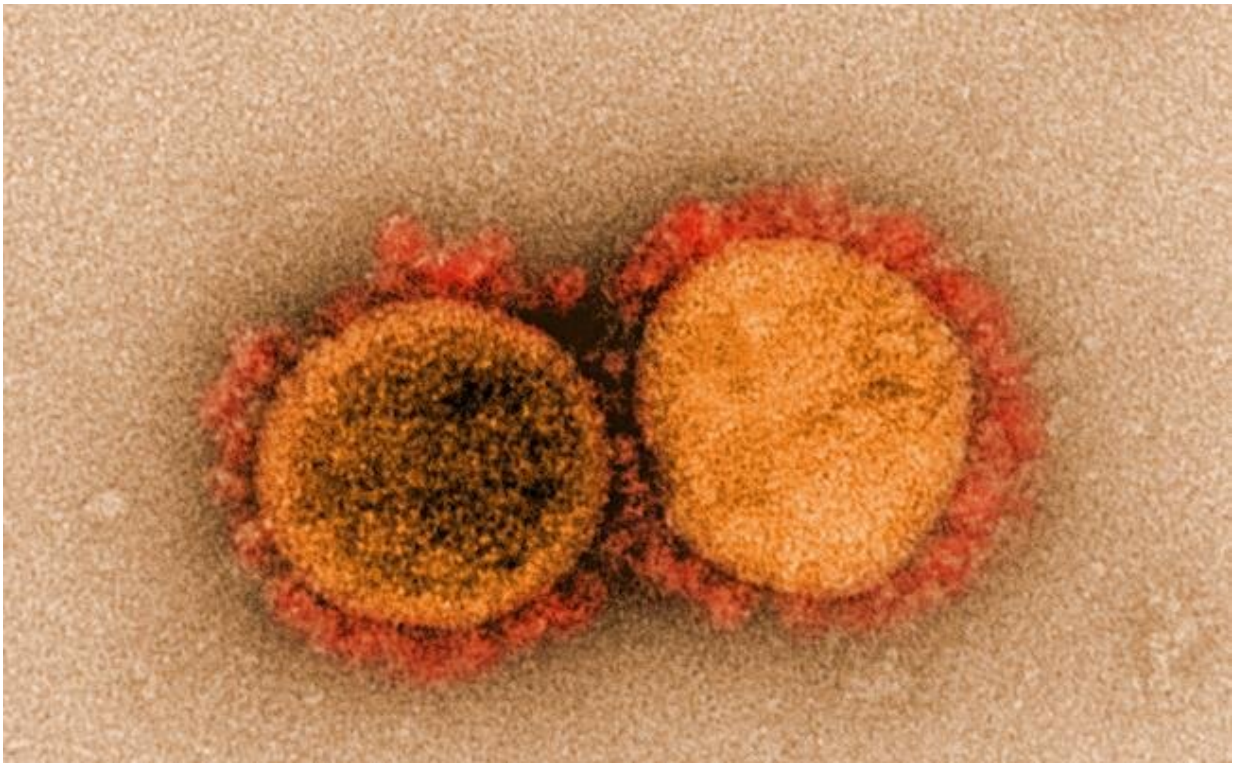

Transmission electron micrograph of SARS-CoV-2 virus particles, isolated from a patient. Image captured and color-enhanced at the NIAID Integrated Research Facility (IRF) in Fort Detrick, Maryland. Credit: NIAID

New study results demonstrate that unstable housing and homelessness is associated with a two-fold greater chance of being re-infected with SARS-CoV-2 compared to those who are securely housed. Led by

researchers at Boston Medical Center, the data indicates that unstable housing was the only demographical factor associated with re-infection despite the presence of antibodies from the first infection. Published online in *Clinical Infectious Diseases*, the findings demonstrate that potentially high levels of SARS-CoV-2 exposure can overcome robust immune responses, and continuing to follow COVID-19 guidelines may help prevent high risk SARS-CoV-2 exposure among individuals who are experiencing housing insecurity.

"Most individuals with a previous SARS-CoV-2 infection seem to be protected from the virus for many months or even longer, yet some individuals can become infected again with the virus only a few months later," said Manish Sagar, MD, an infectious diseases physician at Boston Medical Center. "We conducted this study to understand whether cases of re-infection with SARS-CoV-2 are associated with any demographic characteristics or if reinfection is due to a deficiency in the patient's immune response."

Using electronic medical record data from Boston Medical Center patients, individuals who tested positive for SARS-CoV-2 who tested positive again for SARS-CoV-2 after at least 90 days after initial infection were included in the study cohort (n=75). All individuals that tested negative at least 90 days after an initial SARS-CoV-2 infection were included and classified as the convalescent group (n=1,594). The researchers compared many clinical and demographical characteristics, such as age, sex, and comorbidities, between the reinfection and convalescent group. Next, plasma from a smaller subset of patients in each of the two groups was tested for the presence of antibodies that recognize SARS-CoV-2. To confirm re-infection, the researchers sequenced the virus from a few patients after their first infection and compared it to a virus from the same patient after their second infection. No individuals in this study received a COVID-19 vaccine given that the data was collected prior to the public availability of these vaccines.

The analysis showed that the only demographical factor associated with re-infection was unstable housing and/or homelessness, suggesting that individuals who are homeless are more at risk for re-infection than those with a stable living environment. The data also showed no significant differences in the antibodies between the re-infection and convalescent groups, and individuals who were re-infected still had SARS-CoV-2 antibodies present, suggesting that exposure to repeated and/or high levels of virus may be able to overcome the immune responses.

"The association of homelessness with COVID-19 re-infection may be a result of increased exposure to SARS-CoV-2 due to the difficulty of complying with COVID-19 health recommendations, like social distancing and mask usage," said Sagar, MD, also an associate professor of medicine and microbiology at Boston University School of Medicine.

The researchers are currently exploring additional components of the immune system that may be important in the protection against SARS-CoV-2 re-infection. They also note that future research focusing on transmission networks within the homeless population and understanding if there are specific behaviors that are leading to higher rates of re-infection could help identify potential mitigation strategies.

More information: David J Bean et al, SARS-CoV-2 reinfection associates with unstable housing and occurs in the presence of antibodies, *Clinical Infectious Diseases* (2021). DOI: 10.1093/cid/ciab940

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