

Vaccinated Individuals With Prior COVID-19 Have Lower Risk of Incident SARS-CoV-2 Infection When Compared With Vaccinated Individuals Without Prior Infection

Dear Editor,

Incident severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections are occurring among vaccinated individuals [1]. While it is known that prior coronavirus disease 2019 (COVID-19) is protective against incident SARS-CoV-2 infection [2, 3], it is not clear how much extra protection is conferred to individuals who both are vaccinated and had prior COVID-19 when compared with people who are only vaccinated. We aimed to measure the difference in incident infection among a cohort of vaccinated employees who were routinely tested for COVID-19.

In March 2020, Curative, a SARS-CoV-2 testing company, began routinely screening its workforce with a Food and Drug Administration–authorized SARS-CoV-2 polymerase chain reaction (PCR)–based test [4]. The workforce was screened daily. A standardized employee testing database was implemented on May 8, 2020. On December 15, 2020, SARS-CoV-2 vaccinations became available, and dates of vaccination were recorded. Vaccinations were required for employees. Routine screening has continued through December 2021.

The SARS-CoV-2-naïve, vaccinated group was defined as any employee without previous SARS-CoV-2 infection. The previously infected, vaccinated group was defined as any employee with documented previous SARS-CoV-2 infection (at least 2 positive sequential PCR tests). Individuals were added to the cohort when they completed a vaccination form and were followed until December 20, 2021.

Person-days were measured from the date reported vaccination to last test date up to December 20, 2021. A period of at least 3 weeks was given between infections before a new incident infection would be counted. The incidence rate ratio (IRR), the ratio of confirmed COVID-19 cases per 100 person-years of follow-up, with 95% confidence intervals, was calculated. Analyses were performed on StataSE (StataCorp, College Station, TX, USA).

Patient Consent

The study of de-identified electronic medical record data was determined by the Advarra institutional review board (Pro00054560) to be exempt from review.

We identified 3045 and 328 employee records for the SARS-CoV-2-naïve group and prior COVID-19 group, respectively. The median age of employees (range) was 31 (17–63) years, and 64.4% were women. The SARS-CoV-2-naïve group was followed for a total of 327 729 days, and the prior COVID-19 group was followed for a total of 28 988 days. During the observation period, 109 and 5 SARS-CoV-2 incident infections were identified among the SARS-CoV-2-naïve group and prior COVID-19 group, respectively. The incidence of SARS-CoV-2 infection in the SARS-CoV-2-naïve group was 12.1 (95% CI, 10.0–14.7) cases per 100 person-years. The incidence of SARS-CoV-2 infection in the prior COVID-19 group was 6.3 (95% CI, 2.0–14.7) cases per 100 person-years. When compared with the SARS-CoV-2-naïve group, the IRR for SARS-CoV-2 infection among those with prior COVID-19 was 0.52 (95% CI, 0.21–1.00).

One limitation of our study was the lack of SARS-CoV-2 sequencing to determine which SARS-CoV-2 variant was predominant between groups and whether the variants were the same between groups. It remains to be established

whether our results could also apply to the omicron variant of SARS-CoV-2 or other SARS-CoV-2 variants.

We found that individuals who were vaccinated and had a history of prior COVID-19 were roughly half as likely to have an incident infection when compared with individuals who were only vaccinated.

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Potential conflicts of interest. N.K. is a consultant for Curative. A.R. and A.B. are employed by Curative. J.D.K. is an independent consultant and serves as the Medical Director of Curative. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

N. Kojima,^{1,2} A. Roshani,² A. Baca,² and J. D. Klausner³

¹Department of Medicine, University of California Los Angeles, Los Angeles, California, USA, ²Curative Inc., San Dimas, California, USA, and ³Department of Population and Public Health Sciences, University of Southern California, Keck School of Medicine, Los Angeles, California, USA

References

- Lipsitch M, Krammer F, Regev-Yochay G, Lustig Y, Balicer RD. SARS-CoV-2 breakthrough infections in vaccinated individuals: measurement, causes and impact. *Nat Rev Immunol*. **In press**.
- Kojima N, Klausner JD. Protective immunity after recovery from SARS-CoV-2 infection. *Lancet Infect Dis*. **In press**.
- Kojima N, Shrestha NK, Klausner JD. A systematic review of the protective effect of prior SARS-CoV-2 infection on repeat infection. *Eval Health Prof* **2021**; 44:327–32.
- Kojima N, Turner F, Slepnev V, et al. Self-collected oral fluid and nasal swab specimens demonstrate comparable sensitivity to clinician-collected nasopharyngeal swab specimens for the detection of SARS-CoV-2. *Clin Infect Dis*. **In press**.

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