# Supplementary Appendix

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This appendix has been provided by the authors to give readers additional information about the work.

## **Supplementary Appendix**

### **CONTENTS**

Supplementary Methods	3
Table S1. Study Population	
Table S2. SARS-CoV-2 Infected Participants	.6

### Neutralization Escape by the SARS-CoV-2 Omicron Variants BA.2.12.1 and BA.4/BA.5

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### **Supplementary Methods**

### Study population

A specimen biorepository at Beth Israel Deaconess Medical Center (BIDMC) obtained convenience samples from individuals who received a SARS-CoV-2 vaccine and/or had a history of SARS-CoV-2 infection. The BIDMC institutional review board approved this study (2020P000361). All participants provided informed consent. For the group of individuals receiving three doses of BNT162b2, participants were excluded if they had a history of SARS-CoV-2 infection or a positive nucleocapsid (N) serology by electrochemiluminescence assays (ECLA), or if they received other COVID-19 vaccines or immunosuppressive medications. For the infection cohort, the infecting strain was presumed based on the predominant circulating variant at the time of infection.

#### Pseudovirus neutralizing antibody assay

The SARS-CoV-2 pseudoviruses expressing a luciferase reporter gene were used to measure pseudovirus neutralizing antibodies. In brief, the packaging construct psPAX2 (AIDS Resource and Reagent Program), luciferase reporter plasmid pLenti-CMV Puro-Luc (Addgene) and spike protein expressing pcDNA3.1-SARS-CoV-2 SΔCT were co-transfected into HEK293T cells (ATCC CRL\_3216) with lipofectamine 2000 (ThermoFisher Scientific). Pseudoviruses of SARS-CoV-2 variants were generated by using WA1/2020 strain (Wuhan/WIV04/2019, GISAID accession ID: EPI\_ISL\_402124), Omicron B.1.1.529 BA.1 (GISAID ID: EPI\_ISL\_7358094.2), or BA.2 (GISAID ID: EPI\_ISL\_6795834.2), BA.2.12.1 (GISAID ID: EPI\_ISL\_12003853.1), and BA.4/BA.5 (GSAID ID: EPI\_ISL\_12268495.2). The supernatants containing the pseudotype

viruses were collected 48h after transfection; pseudotype viruses were purified by filtration with 0.45-μm filter. To determine the neutralization activity of human serum, HEK293T-hACE2 cells were seeded in 96-well tissue culture plates at a density of 2 × 10<sup>4</sup> cells per well overnight. Three-fold serial dilutions of heat-inactivated serum samples were prepared and mixed with 50 μl of pseudovirus. The mixture was incubated at 37 °C for 1 h before adding to HEK293T-hACE2 cells. After 48 h, cells were lysed in Steady-Glo Luciferase Assay (Promega) according to the manufacturer's instructions. SARS-CoV-2 neutralization titers were defined as the sample dilution at which a 50% reduction (NT50) in relative light units was observed relative to the average of the virus control wells.

**Table S1. Study Population** 

N=27   N=27   N=27		BNT162b2	Omicron infection	
Sex at birth, female         24 (89)         21 (78)           Race         23 (85)         21 (78)           White         23 (85)         21 (78)           Assian         2 (7)         1 (4)         2 (7)           More than one race         1 (4)         0 (0)         3 (11)           Ethnicity         Unknown/Other*         0 (0)         3 (11)           Ethnicity         Ethnicity         1 (4)         2 (7)         1 (4)           Hispanic or Latino         2 (7)         1 (4)         2 (7)           Medical condition         2 (89)         24 (89)         24 (89)           Other         1 (4)         2 (7)         2 (7)           Hypertension         3 (11)         4 (15)         3 (11)         4 (15)           Diabetes         2 (7)         3 (11)         4 (15)         3 (11)         4 (15)         3 (11)         A (15)         A (11)         A (15)         A (11)         A (15)         A (11)         A (15) <th< th=""><th></th><th>N=27</th><th>N=27</th></th<>		N=27	N=27	
Race   White   23 (85)   21 (78)	Age (years), median (range)	35 (23-76)	34 (27-41)	
White       23 (85)       21 (78)         Asian       2 (7)       1 (4)         Black       1 (4)       2 (7)         More than one race       1 (4)       0         Unknown/Other*       0 (0)       3 (11)         Ethnicity       3 (11)       4 (89)         Hispanic or Latino       2 (7)       1 (4)       2 (7)         Non-Hispanic       24 (89)       24 (89)       24 (89)         Other       1 (4)       2 (7)       2 (7)         Medical condition       3 (11)       4 (15)       3 (11)         Obese (BMI ≥ 30 kg/m2)       2 (7)       2 (7)       2 (7)         Hypertension       3 (11)       4 (15)       3 (11)         Pregnant       2 (7)       7 (26)       1 (4)         Lactating       4 (15)       3 (11)       3 (11)         Ashma       0       3 (11)       3 (11)       4 (15)       3 (11)         COVID-19 vaccination history       27 (100)       8 (30)       8 (30)       BNT162b2 (2 doses)/mRNA-1273 (1 dose)       0       2 (7)       7 (26)       1 (4)       1 (4)       1 (4)       1 (4)       1 (4)       1 (4)       1 (4)       1 (4)       1 (4)       1 (4)       1 (4)	Sex at birth, female	24 (89)	21 (78)	
Asian Black	Race			
Black	White	23 (85)	21 (78)	
More than one race       1 (4)       0         Unknown/Other*       0 (0)       3 (11)         Ethnicity       I (4)         Hispanic or Latino       2 (7)       1 (4)       2 (89)         Other       1 (4)       2 (7)         Medical condition       Other       2 (7)       2 (7)         Medical condition       Other         Obese (BMI ≥ 30 kg/m2)       2 (7)       2 (7)         Hypertension       3 (11)       4 (15)         Diabetes       2 (7)       3 (11)         Pregnant       2 (7)       7 (26)         Lactating       4 (15)       3 (11)         Ashma       0       3 (11)         COVID-19 vaccination history         BNT162b2 (3 doses)       27 (100)       8 (30)         BNT162b2 (3 doses)       27 (100)       8 (30)         BNT162b2 (3 doses)/mRNA-1273 (1 dose)       0       2 (7)         mRNA-1273 (3 doses)       0       7 (26)         mRNA-1273 (2 doses)/MRNA-1273 (1 dose)       0       2 (7)         mRNA-1273 (2 doses)/MRNA-1273 (1 dose)       0       1 (4)         Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)       0       1 (4)	Asian	2 (7)	1 (4)	
Unknown/Other*       0 (0)       3 (11)         Ethnicity       Hispanic or Latino       2 (7)       1 (4)       24 (89)       3 (11)       24 (89)       3 (11)       2 (7)       2 (7)       2 (7)       3 (11)       2 (7)       2 (7)       3 (11)       2 (7)       2 (7)       3 (11)       2 (7)       2 (7)       3 (11)       2 (7)       2 (7)       2 (7)       2 (7)       2 (7)       2 (7)       2 (7)       2 (7) <th colsp<="" td=""><td>Black</td><td>1 (4)</td><td>2 (7)</td></th>	<td>Black</td> <td>1 (4)</td> <td>2 (7)</td>	Black	1 (4)	2 (7)
Ethnicity         Hispanic or Latino       2 (7)       1 (4)         Non-Hispanic       24 (89)       24 (89)         Other       1 (4)       2 (7)         Medical condition         Obese (BMI ≥30 kg/m2)       2 (7)       2 (7)         Hypertension       3 (11)       4 (15)         Diabetes       2 (7)       7 (26)         Lactating       4 (15)       3 (11)         Asthma       0       3 (11)         COVID-19 vaccination history         BNT162b2 (3 doses)       27 (100)       8 (30)         BNT162b2 (3 doses)       27 (100)       8 (30)         BNT162b2 (2 doses)/mRNA-1273 (1 dose)       0       2 (7)         mRNA-1273 (2 doses)/BNT-1273 (1 dose)       0       2 (7)         mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)       0       1 (4)         BNT162b2 (2 doses)       0       4 (15)         Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)       0       1 (4)         BNT162b2 (2 doses)       0       1 (4)         Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)       0       1 (4)         Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)       0       1 (4)         Unvaccinated       N/A       1 (4)	More than one race	1 (4)	0	
Hispanic or Latino Non-Hispanic Other    1 (4)   24 (89)   24 (89)     1 (4)   2 (7)     Medical condition   Obese (BMI ≥30 kg/m2)   2 (7)   2 (7)     Hypertension   3 (11)   4 (15)     Diabetes   2 (7)   7 (26)     Lactating   4 (15)   3 (11)     Asthma   0   3 (11)    COVID-19 vaccination history  BNT162b2 (3 doses)   27 (100)   8 (30)     BNT162b2 (2 doses)/mRNA-1273 (1 dose)   0   2 (7)     mRNA-1273 (3 doses)   0   7 (26)     mRNA-1273 (2 doses)/BNT-1273 (1 dose)   0   2 (7)     mRNA-1273 (2 doses)/BNT-1273 (1 dose)   0   2 (7)     mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)   0   1 (4)     BNT162b2 (2 doses)   0   4 (15)     Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)   0   1 (4)     Unvaccinated   0   1 (4)     COVID-19 disease severity (NIH scale)   0   1 (4)     COVID-19 disease severity (NIH scale)   N/A   2 (4 (89)     Moderate   N/A   0     Severe   N/A   0     Critical   N/A   0     Days from last vaccine dose to positive PCR test, median (IQR)   N/A   83 (37-153)     Days from positive PCR test to sampling,   1 (4)     Covided   Covid	Unknown/Other*	0 (0)	3 (11)	
Non-Hispanic         24 (89)         24 (89)           Other         1 (4)         2 (7)           Medical condition         2 (7)         2 (7)           Obese (BMI ≥ 30 kg/m2)         2 (7)         3 (11)           Hypertension         3 (11)         4 (15)           Diabetes         2 (7)         7 (26)           Lactating         4 (15)         3 (11)           Asthma         0         3 (11)           COVID-19 vaccination history         8 (30)           BNT162b2 (3 doses)         27 (100)         8 (30)           BNT162b2 (3 doses)/mRNA-1273 (1 dose)         0         2 (7)           mRNA-1273 (3 doses)         0         7 (26)           mRNA-1273 (2 doses)/BNT-1273 (1 dose)         0         2 (7)           mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)         0         1 (4)           BNT162b2 (2 doses)         0         4 (15)           Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)         0         1 (4)           BNT162b2 (2 doses)         0         1 (4)           BV162b2 (2 doses)/mRNA-1273 (1 dose)         0         1 (4)           BV162b2 (2 doses)/mRNA-1273 (1 dose)         0         1 (4)           BV162b2 (2 doses)/mRNA-1273 (1 dose)         0	Ethnicity			
Other         1 (4)         2 (7)           Medical condition         2 (7)         2 (7)           Obese (BMI ≥30 kg/m2)         2 (7)         2 (7)           Hypertension         3 (11)         4 (15)           Diabetes         2 (7)         7 (26)           Lactating         4 (15)         3 (11)           Asthma         0         3 (11)           COVID-19 vaccination history         8 (30)           BNT162b2 (3 doses)         27 (100)         8 (30)           BNT162b2 (2 doses)/mRNA-1273 (1 dose)         0         2 (7)           mRNA-1273 (2 doses)/BNT-1273 (1 dose)         0         2 (7)           mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)         0         2 (7)           mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)         0         1 (4)           BNT162b2 (2 doses)         0         4 (15)         0           Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)         0         1 (4)           Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)         0         1 (4)           Unvaccinated         0         1 (4)           COVID-19 disease severity (NIH scale)         N/A         1 (4)           Asymptomatic         N/A         0           Mild         N/A         2 (7)	Hispanic or Latino	2 (7)	1 (4)	
Other         1 (4)         2 (7)           Medical condition         2 (7)         2 (7)           Obese (BMI ≥30 kg/m2)         2 (7)         2 (7)           Hypertension         3 (11)         4 (15)           Diabetes         2 (7)         7 (26)           Lactating         4 (15)         3 (11)           Asthma         0         3 (11)           COVID-19 vaccination history         8 (30)           BNT162b2 (3 doses)         27 (100)         8 (30)           BNT162b2 (2 doses)/mRNA-1273 (1 dose)         0         2 (7)           mRNA-1273 (2 doses)/BNT-1273 (1 dose)         0         2 (7)           mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)         0         2 (7)           mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)         0         1 (4)           BNT162b2 (2 doses)         0         4 (15)         0           Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)         0         1 (4)           Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)         0         1 (4)           Unvaccinated         0         1 (4)           COVID-19 disease severity (NIH scale)         N/A         1 (4)           Asymptomatic         N/A         0           Mild         N/A         2 (7)	Non-Hispanic	24 (89)	24 (89)	
Obese (BMI ≥30 kg/m2)       2 (7)       2 (7)         Hypertension       3 (11)       4 (15)         Diabetes       2 (7)       3 (11)         Pregnant       2 (7)       7 (26)         Lactating       4 (15)       3 (11)         Asthma       0       3 (11)         COVID-19 vaccination history         BNT162b2 (3 doses)       27 (100)       8 (30)         BNT162b2 (2 doses)/mRNA-1273 (1 dose)       0       2 (7)         mRNA-1273 (3 doses)       0       7 (26)         mRNA-1273 (2 doses)/BNT-1273 (1 dose)       0       2 (7)         mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)       0       1 (4)         BNT162b2 (2 doses)       0       4 (15)         Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)       0       1 (4)         Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)       0       1 (4)         Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)       0       1 (4)         Unvaccinated       0       1 (4)         COVID-19 disease severity (NIH scale)       N/A       1 (4)         Asymptomatic       N/A       2 (7)         Moderate       N/A       0         Severe       N/A       0         Critical       <	Other	1 (4)		
Hypertension	Medical condition	, ,	, ,	
Hypertension	Obese (BMI $\geq$ 30 kg/m2)	2 (7)	2 (7)	
Pregnant         2 (7)         7 (26)           Lactating         4 (15)         3 (11)           Asthma         0         3 (11)           COVID-19 vaccination history           BNT162b2 (3 doses)         27 (100)         8 (30)           BNT162b2 (2 doses)/mRNA-1273 (1 dose)         0         2 (7)           mRNA-1273 (3 doses)         0         7 (26)           mRNA-1273 (2 doses)/BNT-1273 (1 dose)         0         2 (7)           mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)         0         1 (4)           BNT162b2 (2 doses)         0         4 (15)           Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)         0         1 (4)           Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)         0         1 (4)           Unvaccinated         0         1 (4)           COVID-19 disease severity (NIH scale)         N/A         1 (4)           Asymptomatic         N/A         1 (4)           Mild         N/A         24 (89)           Moderate         N/A         0           Severe         N/A         2 (7)           Critical         N/A         0           Days from last vaccine dose to positive PCR test to sampling,         N/A         83 (37-153)		* *	* *	
Lactating Asthma       4 (15)       3 (11)         COVID-19 vaccination history       3 (11)         BNT162b2 (3 doses)       27 (100)       8 (30)         BNT162b2 (2 doses)/mRNA-1273 (1 dose)       0       2 (7)         mRNA-1273 (3 doses)       0       7 (26)         mRNA-1273 (2 doses)/BNT-1273 (1 dose)       0       2 (7)         mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)       0       1 (4)         BNT162b2 (2 doses)       0       4 (15)         Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)       0       1 (4)         Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)       0       1 (4)         Unvaccinated       0       1 (4)         COVID-19 disease severity (NIH scale)       N/A       1 (4)         Asymptomatic       N/A       24 (89)         Moderate       N/A       0         Severe       N/A       0         Critical       N/A       0         Days from last vaccine dose to positive PCR test, median (IQR)       N/A       83 (37-153)         Days from positive PCR test to sampling,       83 (37-153)	Diabetes	2 (7)	3 (11)	
Lactating Asthma       4 (15)       3 (11)         COVID-19 vaccination history       8 (30)         BNT162b2 (3 doses)       27 (100)       8 (30)         BNT162b2 (2 doses)/mRNA-1273 (1 dose)       0       2 (7)         mRNA-1273 (3 doses)       0       7 (26)         mRNA-1273 (2 doses)/BNT-1273 (1 dose)       0       2 (7)         mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)       0       1 (4)         BNT162b2 (2 doses)       0       4 (15)         Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)       0       1 (4)         Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)       0       1 (4)         Unvaccinated       0       1 (4)         COVID-19 disease severity (NIH scale)       N/A       1 (4)         Asymptomatic       N/A       24 (89)         Moderate       N/A       2 (7)         Critical       N/A       0         Days from last vaccine dose to positive PCR test, median (IQR)       N/A       83 (37-153)         Days from positive PCR test to sampling,       83 (37-153)	Pregnant	2 (7)	7 (26)	
COVID-19 vaccination history         27 (100)         8 (30)           BNT162b2 (2 doses)/mRNA-1273 (1 dose)         0         2 (7)           mRNA-1273 (3 doses)         0         7 (26)           mRNA-1273 (2 doses)/BNT-1273 (1 dose)         0         2 (7)           mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)         0         1 (4)           BNT162b2 (2 doses)         0         4 (15)           Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)         0         1 (4)           Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)         0         1 (4)           Unvaccinated         0         1 (4)           COVID-19 disease severity (NIH scale)         N/A         1 (4)           Asymptomatic         N/A         1 (4)           Mild         N/A         24 (89)           Moderate         N/A         0           Severe         N/A         0           Critical         N/A         0           Days from last vaccine dose to positive PCR         test, median (IQR)         N/A         83 (37-153)           Days from positive PCR test to sampling,         N/A         83 (37-153)	Lactating		3 (11)	
BNT162b2 (3 doses) BNT162b2 (2 doses)/mRNA-1273 (1 dose)  BNT162b2 (2 doses)/mRNA-1273 (1 dose)  mRNA-1273 (3 doses)  mRNA-1273 (2 doses)/BNT-1273 (1 dose)  mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)  BNT162b2 (2 doses)  Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)  Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)  Unvaccinated  COVID-19 disease severity (NIH scale)  Asymptomatic  Asymptomatic  Mild  Mild  N/A  Moderate  Severe  N/A  Severe  N/A  O  Days from last vaccine dose to positive PCR test, median (IQR)  Days from positive PCR test to sampling,	Asthma	0	3 (11)	
BNT162b2 (2 doses)/mRNA-1273 (1 dose)  mRNA-1273 (3 doses)  mRNA-1273 (2 doses)/BNT-1273 (1 dose)  mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)  BNT162b2 (2 doses)  Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)  Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)  Unvaccinated  COVID-19 disease severity (NIH scale)  Asymptomatic  Asymptomatic  N/A  Mild  N/A  Mild  N/A  Severe  N/A  Critical  Days from last vaccine dose to positive PCR test, median (IQR)  N/A  N/A  N/A  S2 (7)  C1 (26)  C1 (4)  C2 (7)  T1 (4)  T1 (4)  T1 (4)  T1 (4)  T1 (4)  T2 (7)  T3 (1 dose)  N/A  T3 (1 dose)  N/A  T4 (1 (4)  N/A  T5 (7)  N/A  T6 (7)  T7 (26)  T7 (26)  T1 (4)  T1 (4)	COVID-19 vaccination history			
BNT162b2 (2 doses)/mRNA-1273 (1 dose)  mRNA-1273 (3 doses)  mRNA-1273 (2 doses)/BNT-1273 (1 dose)  mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)  BNT162b2 (2 doses)  Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)  Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)  Unvaccinated  COVID-19 disease severity (NIH scale)  Asymptomatic  Asymptomatic  N/A  Mild  N/A  Mild  N/A  Severe  N/A  Critical  Days from last vaccine dose to positive PCR test, median (IQR)  N/A  N/A  N/A  S2 (7)  C1 (26)  C1 (4)  C2 (7)  T1 (4)  T1 (4)  T1 (4)  T1 (4)  T1 (4)  T2 (7)  T3 (1 dose)  N/A  T3 (1 dose)  N/A  T4 (1 (4)  N/A  T5 (7)  N/A  T6 (7)  T7 (26)  T7 (26)  T1 (4)  T1 (4)	BNT162b2 (3 doses)	27 (100)	8 (30)	
mRNA-1273 (3 doses)       0       7 (26)         mRNA-1273 (2 doses)/BNT-1273 (1 dose)       0       2 (7)         mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)       0       1 (4)         BNT162b2 (2 doses)       0       4 (15)         Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)       0       1 (4)         Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)       0       1 (4)         Unvaccinated       0       1 (4)         COVID-19 disease severity (NIH scale)       N/A       1 (4)         Asymptomatic       N/A       24 (89)         Moderate       N/A       0         Severe       N/A       2 (7)         Critical       N/A       0         Days from last vaccine dose to positive PCR test, median (IQR)       N/A       83 (37-153)         Days from positive PCR test to sampling,       N/A       83 (37-153)	BNT162b2 (2 doses)/mRNA-1273 (1 dose)	•	2 (7)	
mRNA-1273 (2 doses)/BNT-1273 (1 dose)       0       2 (7)         mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)       0       1 (4)         BNT162b2 (2 doses)       0       4 (15)         Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)       0       1 (4)         Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)       0       1 (4)         Unvaccinated       0       1 (4)         COVID-19 disease severity (NIH scale)       N/A       1 (4)         Asymptomatic       N/A       24 (89)         Moderate       N/A       0         Severe       N/A       2 (7)         Critical       N/A       0         Days from last vaccine dose to positive PCR test, median (IQR)       N/A       83 (37-153)         Days from positive PCR test to sampling,       N/A       83 (37-153)	mRNA-1273 (3 doses)	0	* *	
BNT162b2 (2 doses)		0	2 (7)	
Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)       0       1 (4)         Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)       0       1 (4)         Unvaccinated       0       1 (4)         COVID-19 disease severity (NIH scale)       N/A       1 (4)         Asymptomatic       N/A       24 (89)         Mild       N/A       24 (89)         Moderate       N/A       0         Severe       N/A       2 (7)         Critical       N/A       0         Days from last vaccine dose to positive PCR test, median (IQR)       N/A       83 (37-153)         Days from positive PCR test to sampling,       N/A       83 (37-153)	mRNA-1273 (2 doses)/Ad26.COV2.S (1 dose)	0	1 (4)	
Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)       0       1 (4)         Unvaccinated       0       1 (4)         COVID-19 disease severity (NIH scale)       N/A       1 (4)         Asymptomatic       N/A       1 (4)         Mild       N/A       24 (89)         Moderate       N/A       0         Severe       N/A       2 (7)         Critical       N/A       0         Days from last vaccine dose to positive PCR test, median (IQR)       N/A       83 (37-153)         Days from positive PCR test to sampling,       N/A       83 (37-153)	BNT162b2 (2 doses)	0	4 (15)	
Unvaccinated         0         1 (4)           COVID-19 disease severity (NIH scale)         N/A         1 (4)           Asymptomatic         N/A         1 (4)           Mild         N/A         24 (89)           Moderate         N/A         0           Severe         N/A         2 (7)           Critical         N/A         0           Days from last vaccine dose to positive PCR         N/A         83 (37-153)           Days from positive PCR test to sampling,         N/A         83 (37-153)	Ad26.COV2.S (1 dose)/mRNA-1273 (1 dose)	0	1 (4)	
COVID-19 disease severity (NIH scale)         N/A         1 (4)           Asymptomatic         N/A         24 (89)           Mild         N/A         0           Moderate         N/A         0           Severe         N/A         2 (7)           Critical         N/A         0           Days from last vaccine dose to positive PCR         test, median (IQR)         N/A         83 (37-153)           Days from positive PCR test to sampling,         N/A         83 (37-153)	Ad5/Ad26 (2 doses)/mRNA-1273 (1 dose)	0	1 (4)	
Asymptomatic         N/A         1 (4)           Mild         N/A         24 (89)           Moderate         N/A         0           Severe         N/A         2 (7)           Critical         N/A         0           Days from last vaccine dose to positive PCR         V/A         83 (37-153)           Days from positive PCR test to sampling,         N/A         83 (37-153)	Unvaccinated	0	1 (4)	
Mild         N/A         24 (89)           Moderate         N/A         0           Severe         N/A         2 (7)           Critical         N/A         0           Days from last vaccine dose to positive PCR         test, median (IQR)         N/A         83 (37-153)           Days from positive PCR test to sampling,         N/A         83 (37-153)	COVID-19 disease severity (NIH scale)			
Moderate Severe N/A Critical N/A Critical N/A O  Days from last vaccine dose to positive PCR test, median (IQR) N/A N/A 83 (37-153) Days from positive PCR test to sampling,	• ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` ` `	N/A	1 (4)	
Severe N/A 2 (7) Critical N/A 0  Days from last vaccine dose to positive PCR test, median (IQR) N/A 83 (37-153)  Days from positive PCR test to sampling,	Mild	N/A	24 (89)	
Critical N/A 0  Days from last vaccine dose to positive PCR test, median (IQR) N/A 83 (37-153)  Days from positive PCR test to sampling,	Moderate	N/A	` ´	
Critical N/A 0  Days from last vaccine dose to positive PCR test, median (IQR) N/A 83 (37-153)  Days from positive PCR test to sampling,	Severe	N/A	2 (7)	
test, median (IQR)  N/A  83 (37-153)  Days from positive PCR test to sampling,	Critical	N/A		
Days from positive PCR test to sampling,	Days from last vaccine dose to positive PCR			
Days from positive PCR test to sampling,	<u> </u>	N/A	83 (37-153)	
	Days from positive PCR test to sampling,			
		N/A	29 (14-74)	

Data displayed as median (range or interquartile range, IQR) and n (%). BMI, body mass index; NIH, National Institutes of Health; PCR, polymerase chain reaction; pregnant designation reflects time of sampling. \*Self-identified race as Jamaican, Brazilian, and Colombian.

Table S2. SARS-CoV-2 Infected Participants

	Table 52.	5/11	B-CU V	-2 Illiecteu I al	1		Г	Γ		
ID	Dominant variant*	Age	Sex at birth	Medical history	COVID-19 vaccine history (primary/boost)	Days from boost or last dose to PCR	Days from PCR to sampling	COVID-19 NIH disease severity		
1	BA.1	32	F		BNT162b2	69	106	mild		
2	BA.1	42	M		BNT162b2/ mRNA-1273	26	81	mild		
3	BA.1	42	M	Asthma	BNT162b2/ mRNA-1273	40	74	mild		
4	BA.1	30	F	Pregnant	mRNA-1273/ mRNA-1273	59	52, 102	mild		
5	BA.1	31	F		mRNA-1273/ mRNA-1273	67	13, 113	mild		
6	BA.1	35	F	Pregnant	mRNA-1273/ mRNA-1273	21	12	mild		
7	BA.1	59	F	HTN	BNT162b2/ BNT162b2	88	25, 109	mild		
8	BA.1	35	F	Pregnant, Obesity	BNT162b2	287	17	mild		
9	BA.1	39	M	Obesity	Ad26.COV2.S/ mRNA-1273	11	15, 102	mild		
10	BA.1	24	F		BNT162b2/ BNT162b2	99	22	mild		
11	BA.1	23	F		mRNA-1273/ Ad26.COV2.S	67	51, 94	mild		
12	BA.1	50	F	DM, HTN	mRNA-1273/ mRNA-1273	6	8	asymptomatic		
13	BA.1	59	M	DM	BNT162b2	210	9	severe		
14	BA.1	22	F	Pregnant	Unvaccinated	N/A	4	severe		
15	BA.1	35	F	Pregnant	mRNA-1273/ mRNA-1273	77	35	mild		
16	BA.1	33	F	Pregnant	BNT162b2	228	2	mild		
17	BA.1	27	M	Asthma	BNT162b2/ BNT162b2	101	13, 71	mild		
18	BA.1	29	F	Asthma	mRNA-1273/ BNT162b2	15	14	mild		
19	BA.1	50	F		mRNA-1273/ mRNA-1273	11	33	mild		
20	BA.1	34	F	Lactating	BNT162b2/ BNT162b2	116	10, 54	mild		
21	BA.1	34	F		mRNA-1273/ BNT162b2	42	16, 29, 91	mild		
22	BA.1	32	F	Lactating, HTN	BNT162b2/ BNT162b2	102	18, 74	mild		
23	BA.1	25	F	Pregnant	Sputnik V (Ad5/Ad26)/ mRNA-1273	239	32	mild		
24	BA.1	36	F	Lactating	BNT162b2/ BNT162b2	113	41	mild		
25	BA.1	25	F	DM	BNT162b2/ BNT162b2	164	12	mild		
26	BA.2	41	M	HTN	BNT162b2/ BNT162b2	169	16	mild		
27	BA.2	24	F		mRNA-1273/ mRNA-1273	149	16	mild		
	* >50% of sequences in New England (Region 1) according to CDC: PCR polymerase chain reaction for									

<sup>\* &</sup>gt;50% of sequences in New England (Region 1) according to CDC; PCR, polymerase chain reaction for SARS-CoV-2; NIH, National Institutes of Health; HTN, hypertension; DM, diabetes mellitus.