nature portfolio

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Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our Editorial Policies and the Editorial Policy Checklist.

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed
☐	☒ The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement
☐	☒ A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☐	☒ The statistical test(s) used AND whether they are one- or two-sided *Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
☒	☐ A description of all covariates tested
☒	☐ A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☐	☒ A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
☐	☒ For null hypothesis testing, the test statistic (e.g. *F*, *t*, *r*) with confidence intervals, effect sizes, degrees of freedom and *P* value noted *Give P values as exact values whenever suitable.*
☒	☐ For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
☒	☐ For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
☒	☐ Estimates of effect sizes (e.g. Cohen's *d*, Pearson's *r*), indicating how they were calculated

Our web collection on statistics for biologists contains articles on many of the points above.

Software and code

Policy information about availability of computer code

Data collection	Microsoft Excel for Mac 2021
Data analysis	Microsoft Excel for Mac 2021, GraphPad Prism 9, and R (version 4.0.4)

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio guidelines for submitting code & software for further information.

Data

Policy information about availability of data

All manuscripts must include a data availability statement. This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our policy

Aggregated data used for figures/tables are available upon request. All sequences will be uploaded to GISAID before publication.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☒ Life sciences ☐ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Life sciences study design

All studies must disclose on these points even when the disclosure is negative.

Sample size	Sample size calculation was not done. All cases reported during the investigation period were included.
Data exclusions	136 cases were reported during the study period; 4 cases were excluded because specimens for diagnosis were collected <14 days after the first dose, and 2 cases were excluded for having no vaccination date for the first dose. Thus, the final analysis included 130 cases.
Replication	Due to limitation in sample availability, replication was not done.
Randomization	All cases reported during the investigation period were included. Post vaccination control was drawn from healthcare workers who were vaccinated during the same period to ensure similar baseline characteristics. Unvaccinated recovered control was drawn based on sample availability. To validate the selection of our second control, a separate group of unvaccinated recovered individuals' data that were previously published (https://doi.org/10.1016/j.immuni.2021.06.015) were used.
Blinding	All samples were anonymized and experiments were done in a department different from the department that performed sample collection and data analysis.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☐	☒ Antibodies
☐	☒ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☐	☒ Human research participants
☒	☐ Clinical data
☒	☐ Dual use research of concern

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Antibodies

Antibodies used	We used First WHO International Standard Anti-SARS-CoV-2 Immunoglobulin (NIBSC code 20/13) to convert our neutralization titer to International Units per milliliter (IU/mL).
Validation	First WHO International Standard Anti-SARS-CoV-2 Immunoglobulin (NIBSC code 20/13) had been validated by NIBSC.

Eukaryotic cell lines

Policy information about cell lines

Cell line source(s)	VeroE6/TMPRSS2 cells (JCRB1819, JCRB Cell Bank, Osaka, Japan)
Authentication	VeroE6/TMPRSS2 cells distributed from the JCRB Cell Bank had been confirmed as contaminant free and authenticated.
Mycoplasma contamination	VeroE6/TMPRSS2 cell line was confirmed to be negative for mycoplasma contamination.
Commonly misidentified lines (See ICLAC register)	n/a

Human research participants

Policy information about studies involving human research participants

Population characteristics	Details of case characteristics are described in Table 1. Baseline characteristics of two control groups are described in the method section.
Recruitment	Cases were recruited as as part of public health activity under the Infectious Diseases Control Law. Controls were recruited as part of research studies as below.
Ethics oversight	Demographic data and respiratory samples were collected as part of public health activity under the Infectious Diseases Control Law. Blood specimens were collected for clinical testing provided by NIID with patient consent and retrospective analysis was done as a research activity with ethics approval (NIID ethics committee approval number 1275). Serology data for recovered cases and post-vaccinated individuals without SARS-CoV-2 infection are also included from other studies (NIID ethics committee approval numbers 1245, 1273). Preliminary results of the public health activity portion (case characteristics/respiratory specimen analysis) were published in Japanese on the MHLW/NIID websites to meet statutory requirements.

Note that full information on the approval of the study protocol must also be provided in the manuscript.