Materials Design Analysis Reporting (MDAR)
Checklist for Authors

The MDAR framework establishes a minimum set of requirements in transparent reporting applicable to studies in the life sciences (see Statement of Task: doi:10.31222/osf.io/9sm4x.). The MDAR checklist is a tool for authors, editors and others seeking to adopt the MDAR framework for transparent reporting in manuscripts and other outputs. Please refer to the MDAR Elaboration Document for additional context for the MDAR framework.

Other things needed

If you have not done so at submission, you MUST provide to *Science* copies of any paper that you or your co-authors have submitted or that is in press as of the date you return your revision that relates to the paper under consideration at *Science*. Access to this material will let us put the results in your *Science* submission in the proper context and make the best decision regarding your manuscript.

Send us copies of any in press or submitted manuscripts from any co-authors related to this work (see note on cover page) and include an explanation in your cover letter.

License Waiver

All authors must obtain a waiver from open-access policies of their employer, as at Harvard and MIT.

Materials

Antibodies	**Yes (indicate where provided: page no/section/legend)**	**n/a**
For commercial reagents, provide supplier name, catalogue number and RRID, if available.	Yeast display antibodies: Methods, "Yeast display" and "Directed evolution" Pharmacokinetics antibodies: Methods, "Single-dose pharmacokinetics of the de novo decoys"	

Cell materials	**Yes (indicate where provided: page no/section/legend)**	**n/a**
Cell lines: Provide species information, strain. Provide accession number in repository **OR** supplier name, catalog number, clone number, **OR** RRID	Vero E6 cells for viral infection assay (Fig. 5A, S15, S16, S17): Methods, "Viral infection assay of the SARS-CoV-2 virus in Vero E6 cells" Vero E6 cells for ACE2 functional activity assay (Fig. S16): Methods, "ACE2 in vitro cellular enzymatic activity assessment" Calu-3 cells: Methods, "Viral infection assay of the NanoLuc SARS-CoV-2 virus in Calu-3 cells"	
Primary cultures: Provide species, strain, sex of origin, genetic modification status.		x

Experimental animals	**Yes (indicate where provided: page no/section/legend)**	**n/a**
Laboratory animals: Provide species, strain, sex, age, genetic modification status. Provide accession number in repository **OR** supplier name, catalog number, clone number, **OR** RRID	Mice (Figure 5B, lung pharmacokinetics): Methods, section "Single-dose pharmacokinetics of the de novo decoys" Mice (Figure 5B, daily administration toxicity): Methods, section "Multi-dose mouse pharmacokinetics of CTC-445.2d" Hamsters: Methods, section "Syrian Hamster in vivo model for SARS-CoV-2 infection"	

Animal observed in or captured from the field: Provide species, sex and age where possible		x
Model organisms: Provide Accession number in repository (where relevant) **OR** RRID		x

Plants and microbes	**Yes (indicate where provided: page no/section/legend)**	**n/a**
Plants: provide species and strain, unique accession number if available, and source (including location for collected wild specimens)		x
Microbes: provide species and strain, unique accession number if available, and source	E. coli: Methods, "Recombinant protein expression" Yeast: Methods, "Yeast display" and "Directed evolution", and "Deep mutational scanning" SARS-CoV-nLuc used in Calu3 cell assay (Fig 5A): Methods, "Viral infection assay of the SARS-CoV-2 virus in Vero E6 cells" SARS-CoV-2 virus used in VeroE6 cell assay (Fig. 5A, S14, S16, S17): Methods, "Viral infection assay of the SARS-CoV-2 virus in Vero E6 cells" SARS-CoV-2 (Fig 5C): Methods, "Syrian hamster in vivo model for SARS-CoV-2 infection"	

Human research participants	**Yes (indicate where provided: page no/section/legend)**	**n/a**
Identify authority granting ethics approval (IRB or equivalent committee(s), provide reference number for approval.		x
Provide statement confirming informed consent obtained from study participants.		x
Report on age and sex for all study participants.		x

Design

Study protocol	Yes (indicate where provided: page no/section/legend)	n/a
For clinical trials, provide the trial registration number **OR** cite DOI in manuscript.		x

Laboratory protocol	Yes (indicate where provided: page no/section/legend)	n/a
Provide DOI or other citation details if detailed step-by-step protocols are available.		

Experimental study design (statistics details)	Yes (indicate where provided: page no/section/legend)	n/a
State whether and how the following have been done**, or** if they were not carried out.		x
Sample size determination		x
Randomisation		x
Blinding		x
Inclusion/exclusion criteria		x

Sample definition and in-laboratory replication	Yes (indicate where provided: page no/section/legend)	n/a
State number of times the experiment was replicated in laboratory	Legends for Fig. 5, S14, S18, Methods: "VSV-Luc psuedovirus neutralization", "Viral infection assay of the SARS-CoV-2 virus in Vero E6 cells", "Viral infection assay of the NanoLuc SARS-CoV-2 virus in Calu-3 cells", "Human proteome binding specificity", "single-dose pharmacokinetics of the de novo decoys", "Multi-dose mouse toxicity of CTC-445.2d", "Syrian Hamster in vivo model for SARS-CoV-2 infection", "ACE2 in vitro cellular enzymatic activity assessment"	
Define whether data describe technical or biological replicates	Legends for Fig. 5, S14, S18 Methods: "VSV-Luc psuedovirus neutralization", "Viral infection assay of the SARS-CoV-2 virus in Vero E6 cells", "Viral infection assay of the NanoLuc SARS-CoV-2 virus in Calu-3 cells", "Human proteome binding specificity", "single-dose pharmacokinetics of the de novo decoys", "Multi-dose mouse toxicity of CTC-445.2d", "Syrian Hamster in vivo model for SARS-CoV-2 infection", "ACE2 in vitro cellular enzymatic activity assessment"	

Ethics	Yes (indicate where provided: page no/section/legend)	n/a
Studies involving human participants: State details of authority granting ethics approval (IRB or equivalent committee(s), provide reference number for approval.		x

Studies involving experimental animals: State details of authority granting ethics approval (IRB or equivalent committee(s), provide reference number for approval.	Methods: "Single-dose pharmacokinetics of the de novo decoys", "Multi-dose mouse toxicity of CTC-445.2d", "Syrian Hamster *in vivo* model for SARS-CoV-2 infection."	
Studies involving specimen and field samples: State if relevant permits obtained, provide details of authority approving study; if none were required, explain why.		x

Dual Use Research of Concern (DURC)	**Yes (indicate where provided: page no/section/legend)**	**n/a**
If study is subject to dual use research of concern, state the authority granting approval and reference number for the regulatory approval		x

Analysis

Attrition	Yes (indicate where provided: page no/section/legend)	n/a
State if sample or data point from the analysis is excluded, and whether the criteria for exclusion were determined and specified in advance.		x

Statistics	Yes (indicate where provided: page no/section/legend)	n/a
Describe statistical tests used and justify choice of tests.		x

Data Availability	Yes (indicate where provided: page no/section/legend)	n/a
State whether newly created datasets are available, including protocols for access or restriction on access.	Data and materials availability section	
If data are publicly available, provide accession number in repository or DOI or URL.	Data and materials availability section	
If publicly available data are reused, provide accession number in repository or DOI or URL, where possible.		x

Code Availability	Yes (indicate where provided: page no/section/legend)	n/a
For all newly generated code and software essential for replicating the main findings of the study:		
State whether the code or software is available.	SI, Appendix A.	
If code is publicly available, provide accession number in repository, or DOI or URL.	Code is in the supplemental information file, Appendix A	

Reporting

Adherence to community standards	Yes (indicate where provided: page no/section/legend)	n/a
MDAR framework recommends adoption of discipline-specific guidelines, established and endorsed through community initiatives. Journals have their own policy about requiring specific guidelines and recommendations to complement MDAR.		
State if relevant guidelines (eg., ICMJE, MIBBI, ARRIVE) have been followed, and whether a checklist (eg., CONSORT, PRISMA, ARRIVE) is provided with the manuscript.		x