

Editorial Policy Checklist

This form is used to ensure compliance with Nature Portfolio editorial policies related to research ethics and reproducibility. For further information, please see our [editorial policies](#) site. All relevant questions on the form must be answered.

Competing interests

Policy information about [competing interests](#)

In the interest of transparency and to help readers form their own judgements of potential bias, Nature Portfolio journals require authors to declare any competing financial and/or non-financial interest in relation to the work described in the submitted manuscript.

Competing interests declaration

- ☐ We declare that none of the authors have competing financial or non-financial interests as defined by Nature Portfolio.
- ☒ We declare that one or more of the authors have a competing interest as defined by Nature Portfolio.

Specify all competing interests in detail followed by the initial of the relevant author. If you have opted for double blind peer review, provide the minimal statement "The authors declare the existence of a financial/non-financial competing interest."

Authorship

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Prior to submission all listed authors must agree to all manuscript contents, the author list and its order and the author contribution statements. Any changes to the author list after submission must be approved by all authors.

- ☒ We have read the Nature Portfolio Authorship Policy and confirm that this manuscript complies.

Policy information about Authorship: inclusion & ethics in global research

All authors are encouraged to provide an "Inclusion & Ethics" statement where relevant.

- ☐ We have provided an "Inclusion & Ethics" statement.

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Policy information about [availability of data](#)

Data availability statement

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](#)

- ☒ We have provided a full data availability statement in the manuscript.

Mandated accession codes ([where applicable](#))

Confirm that all relevant data are deposited into a public repository and that accession codes are provided.

- ☐ All relevant accession codes are provided ☒ Accession codes will be available before publication ☐ No data with mandated deposition

Code availability

Policy information about [availability of computer code](#)

Code availability statement

For all studies using custom code or mathematical algorithm that is deemed central to the conclusions, the manuscript must include a statement under the heading "Code availability" describing how readers can access the code, including any access restrictions. Code availability statements should be provided as a separate section after the data availability statement but before the References.

- ☒ We have provided a full code availability statement in the manuscript

Data presentation

For all data presented in a plot, chart or other visual representation confirm that:

n/a | Confirmed

- ☒ ☐ Individual data points are shown when possible, and always for $n \leq 10$
- ☒ ☐ The format shows data distribution clearly (e.g. dot plots, box-and-whisker plots)
- ☒ ☐ Box-plot elements are defined (e.g. center line, median; box limits, upper and lower quartiles; whiskers, 1.5x interquartile range; points, outliers)
- ☒ ☐ Clearly defined error bars are present and what they represent (SD, SE, CI) is noted

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Additional policy considerations

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- | Does not apply | Involved in the study |
|-------------------------------------|---|
| ☐ | ☒ Macromolecular structural data |
| ☒ | ☐ Unique biological materials |
| ☒ | ☐ Research animals and/or animal-derived materials that require ethical approval |
| ☒ | ☐ Human embryos, gametes and/or stem cells |
| ☒ | ☐ Human research participants |
| ☒ | ☐ Clinical data |
| ☒ | ☐ Archaeological, geological, and palaeontological materials |

Macromolecular structural data

Policy information about [special considerations](#) for specific types of data

Validation report

- ☒ We have provided an official validation report from [wwPDB](#) for all macromolecular structures studied.

I certify that all the above information is complete and correct.

Typed signature Hamish Galloway Brown Date 8/09/2023