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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.

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Authorship

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

Large Language Models (LLMs), such as ChatGPT, do not currently satisfy our authorship criteria. Notably an attribution of authorship carries with it accountability for the work, which cannot be effectively applied to LLMs. Use of an LLM should be properly documented in the Methods section (and if a Methods section is not available, in a suitable alternative part) of the manuscript.

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

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

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Data availability statement

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- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
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- ☒ We have provided a full data availability statement in the manuscript.

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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

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Code availability statement

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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)
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- ☐ ☒ Clearly defined error bars are present and what they represent (SD, SE, CI) is noted

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Where blots and gels are presented, please take particular care to ensure that lanes have not been spliced together, that loading controls are run on the same blot, and that unprocessed scans match the corresponding figures.

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Some types of research require additional policy disclosures. Please indicate whether each of these apply to your study. If you are not certain, please read the appropriate section before selecting a response.

Does not apply

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- ☒ ☐ 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

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☒ We have complied with all relevant ethical regulations and include a statement affirming this in the manuscript.

Ethics committee

Confirm that the manuscript states the name(s) of the board and/or institution that:

☒ Approved the study protocol -OR- ☐ Provided guidelines for study procedures (if protocol approval is not required)

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☒ We have obtained informed consent from all participants and this is noted in the manuscript.

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For publication of identifiable images of research participants, confirm that consent to publish was obtained and is noted in the Methods.

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☐ Yes ☒ No identifiable images of human research participants

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Typed signature *Danfurpas* *Double-blind peer review submissions: type DBPR here as a signature.* Date 8/18/26