**Title is a maximum of 145 characters, including spaces,** **and avoids the use of jargon and uncommon abbreviations**

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# SUMMARY

The summary is a single paragraph of no more than 150 words, which should include: (1) the background and/or purpose of the research; (2) a description of the principal results, approaches/model systems, and major conclusions; and (3) an indication of the broader significance of the work. Please keep in mind that the summary is often read as stand-alone text. For this reason, do not include reference citations, and avoid the use of non-standard abbreviations.

# KEYWORDS

After the summary, you may include up to 10 keywords with your paper, separated by commas. These keywords will be associated with your paper on Cell Press platforms and on PubMed and other abstract indexing platforms. Keywords entered into Editorial Manager are not carried over to production; only keywords included in the main text file will be used in the final article metadata. (Note that for some journals, keywords are chosen by the editors.)

# INTRODUCTION

A good introduction should be succinct, provide pertinent background information needed for readers to understand the motivation for the study and the context of the results, and end with a brief statement of what has been achieved. The introduction should not include subheadings.

**For the journal *Cell Reports Methods***, please discuss in the introduction related methods that are currently in use and and how the method you developed differs from existing methods. Please also indicate whether the method is suitable for use in a specific context.

# RESULTS

The results section should be clear, concise, and divided into subsections with short, informative subheadings. Subheadings should be specific and convey information about the findings: for example, rather than "Analysis of factors X and Y using approach Q," a subheading should say "Factor X requires factor Y to function in process Z." We recommend that you use similar language in your figure titles for clarity and structural harmony.

## Example subheading: Writing and style

Use of abbreviations and acronyms should be kept to a minimum. Nonstandard or uncommon abbreviations should be defined at their first appearance in the text.

IUPAC and IUBMB nomenclature should be used for chemical compounds and biomolecules, respectively. Names of organisms should comply with genetic conventions. Genus and species names should be written in italics and spelled out in full at their first appearance. Gene symbols should be italicized, and protein products should not be italicized.

Please do not use footnotes (except in the author list and in tables). Section headings and subheadings should not be numbered.

The words "new" or "novel" should not be used as priority claims or to refer to chemical compounds or structures. Use a period (full stop) instead of a comma in the decimal place of numerals (e.g., write “50.25” instead of “50,25”). Do not use numbered citations as parts of speech. For example, write “see Smith et al.1” (not “see 1”) or “this was reported by Lee and colleagues2” (not “this was reported by 2”).

## Example subheading: Math formulae and equations

Write math equations in OMML (Office Math Markup Language) if possible—this is the format used for typesetting. Other editable formats, such as MathType, are also acceptable, but please note that they will be converted to OMML. Equations should not be submitted as images, and failure to supply equations in an editable format risks causing a delay in publication.

Simple formulae should appear in line with the text whenever possible; larger, more complex equations or formulae may appear separately (e.g., on a new line). If any equations or formulae need to be referred to or cited again later in the text, label these as Equation 1, Equation 2, etc.; for example, "E = mc2 (Equation 1)."

Use the solidus (/) instead of a horizontal line for small fractional terms, e.g., X/Y. In principle, variables should be presented in italics. Powers of e are often more conveniently denoted by "exp."

# DISCUSSION

The discussion should not simply repeat what has been described in the results section. Rather, it should explain the implications of the work and place them into a broader context. You can use the discussion to explain how the experiments support your central hypothesis, include supporting findings from the literature, and indicate directions the work might be built on in the future.

For some article types, if appropriate, the discussion may be combined with the results as a "results and discussion" section. See the article types page or consult your editor if you think this is the case for your paper.

## Limitations of the study

Within the discussion, a limitations of the study subsection may be included and, for some journals, is required. This section should highlight potential caveats of the work: for example, possible drawbacks of the system studied, limitations of the model, and/or situations where related methods might be preferable to the method presented in the paper.

# RESOURCE AVAILABILITY

The resource availability section is required for all research articles. This section might also be required for applicable reviews and perspectives. This section must contain the following required subsections under the resource availability heading: "lead contact," "materials availability," and "data and code availability."

For complete information on requirements, including formatting instructions, refer to the the Info for Authors page specific to the journal you are publishing with.

## ***Lead contact***

In this section, you must provide the full name and email address of the lead contact, which should match the author indicated with a dedicated footnote in the author list. The lead contact is responsible for communicating with the journal before and after publication, communicating relevant information to co-authors, and arbitrating decisions and disputes. They are also responsible for responding to requests and providing information regarding materials and resource sharing. They must be willing to distribute all materials, datasets, and protocols used in the manuscript. While manuscripts may have multiple corresponding authors and senior authors, there must only be one lead contact, who must also be a corresponding author.

An example of a lead contact statement is below.

* Requests for further information and resources should be directed to and will be fulfilled by the lead contact, Jane Doe (janedoe@qwerty.com).

## ***Materials availability***

The materials availability statement describes the availability of newly generated materials associated with the paper, including any conditions for access. In cases where there are restrictions for distribution of materials, we require a written explanation of the restriction (i.e., MTA). For ease of distribution, we encourage the use of repositories (e.g., Addgene, The Jackson Laboratory, American Type Culture Collection, etc.). For journals using STAR Methods, newly generated items should also be listed in the key resources table, where the source should be stated as "this paper." (Refer to the [STAR authors guide](https://www.cell.com/information-for-authors/star-authors-guide) for more information on STAR Methods.) We require a materials availability statement even if no materials were generated in the study.

Examples of materials availability statements are below. A combination of these statements may be appropriate.

* This study did not generate new unique reagents.
* Plasmids generated in this study have been deposited to [Addgene, name and catalog number or unique identifier].
* Mouse lines generated in this study have been deposited to [the Knockout Mouse Project (KOMP), name and catalog number or unique identifier].
* There are restrictions to the availability of [reagent] because of [reason why restrictions exist].
* There are restrictions to the availability of [reagent] because of the lack of an external centralized repository for its distribution and our need to maintain the stock. We are glad to share [reagent] with reasonable compensation by requestor for its processing and shipping.
* [Reagent] generated in this study will be made available on request, but we may require a payment and/or a completed materials transfer agreement if there is potential for commercial application.
* All unique/stable reagents generated in this study are available from the lead contact without restriction.
* All unique/stable reagents generated in this study are available from the lead contact with a completed materials transfer agreement.

## ***Data and code availability***

You must include a comprehensive and accurate data and code availability statement within the resource availability section, including any accession numbers and DOIs. **This statement is structured and consists of three sections (bullet points are recommended). Each section must be present.** In total, the three sections describe the steps that have been taken or will be taken to ensure that the datasets and original code reported in the study are available after publication. Detailed instructions for each section are included below, followed by an example of a complete data and code availability statement.

**Instructions for section 1: Data**

The statements below may be used in any number or combination, but at least one must be present. They can be edited to suit your circumstance. If your paper contains a STAR Methods section, please also include DOIs and accession numbers in the key resources table. Please ensure that all data types reported in your paper are represented in section 1.

* [Standardized data type] data have been deposited at [data-type-specific repository] as [Database: accession number] and are publicly available as of the date of publication.
* [Adjective] data have been deposited at [general-purpose repository] and are publicly available as of the date of publication at [DOI].
* [De-identified human/patient standardized data type] data have been deposited at [data-type-specific repository] as [Database: accession number]. They are publicly available as of the date of publication until [date or delete “until”].
* [De-identified human/patient standardized data type] data have been deposited at [data-type-specific repository] as [Database: accession number]. They are available upon request until [date or delete “until”] if access is granted. To request access, contact [insert name of governing body and instructions for requesting access]. [Insert the following when applicable] In addition, [summary statistics describing these data/processed datasets derived from these data] have been deposited at [data-type-specific repository] and are publicly available as of the date of publication.
* Raw [standardized data type] data derived from human samples have been deposited at [data-type-specific repository] as [Database: accession number]. Local law prohibits depositing raw [standardized data type] datasets derived from human samples outside of the country of origin. Prior to publication, the authors officially requested that the raw [adjective] datasets reported in this paper be made publicly accessible. To request access, contact [insert name of governing body and instructions for requesting access]. [Insert the following when applicable] In addition, [summary statistics describing these data/processed datasets derived from these data] have been deposited at [data-type-specific repository] and are publicly available as of the date of publication.
* The [adjective] data reported in this study cannot be deposited in a public repository because [reason]. To request access, contact [insert name of governing body and instructions for requesting access]. [Insert the following when applicable] In addition, [summary statistics describing these data/processed datasets derived from these data] have been deposited at [data-type-specific or general-purpose repository] and are publicly available as of the date of publication.
* This paper analyzes existing, publicly available data, accessible at [DOI or Database: accession number].
* [Adjective or all] data reported in this paper will be shared by the lead contact upon request.

**Instructions for section 2: Code**

The statements below may be used in any number or combination, but at least one must be present. They can be edited to suit your circumstance. For papers that include a STAR Methods section, DOIs should also be listed in the key resources table.

* All original code has been deposited at [repository] and is publicly available at [DOI] as of the date of publication.
* All original code is available in this paper’s supplemental information.
* This paper does not report original code.

**Instructions for section 3: Additional information**

Section 3 consists of the following statement: "Any additional information required to reanalyze the data reported in this paper is available from the lead contact upon request."

***Example of a complete “data and code availability statement,” containing all three sections:***

**Data and code availability**

* Single-cell RNA-seq data have been deposited at GEO at GEO: accession number and are publicly available as of the date of publication.
* Original western blot images have been deposited at Mendeley at [DOI] and are publicly available as of the date of publication. Microscopy data reported in this paper will be shared by the lead contact upon request.
* All original code has been deposited at Zenodo at [DOI] and is publicly available as of the date of publication.
* Any additional information required to reanalyze the data reported in this paper is available from the lead contact upon request.

# ACKNOWLEDGMENTS

Use this section to acknowledge contributions from non-authors and list funding sources. Because this section contains important information and many funding bodies require inclusion of grant numbers here, please check it carefully.

# AUTHOR CONTRIBUTIONS

Conceptualization, S.C.P. and S.Y.W.; methodology, A.B., S.C.P., and S.Y.W.; Investigation, M.E., A.N.V., N.A.V., S.C.P., and S.Y.W.; writing—original draft, S.C.P. and S.Y.W.; writing—review & editing, S.C.P. and S.Y.W.; funding acquisition, S.C.P. and S.Y.W.; resources, M.E.V. and C.K.B.; supervision, A.B., N.L.W., and A.A.D.

# DECLARATION OF INTERESTS

S.Y.W. is an employee and shareholder of COMPANY. M.E.V. is a founder of COMPANY and a member of its scientific advisory board.

# DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES

During the preparation of this work, the author(s) used [NAME OF TOOL OR SERVICE] in order to [REASON]. After using this tool or service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

# SUPPLEMENTAL INFORMATION

A brief list (index) of the [supplemental files](https://www.cell.com/information-for-authors/star-supplemental-information) you are including should appear in the main-text manuscript under a “supplemental information” heading. The files themselves should be uploaded separately, not as a part of this manuscript.

The primary file is typically a PDF, called “Document S1,” and should be listed first. Include a short list of the PDF’s contents, e.g., “Figures S1–S6” (see below), but **do not include their titles or legends here**; for supplemental figures, the titles and any legends should appear only in the supplemental PDF (but for papers publishing in the journal *Cell*, see the **NOTE** below). Additional non-PDF supplemental files (e.g., Excel files, video files, large datasets in ZIP formats) should have their titles and any legends listed here on their own lines.

Example (for journals other than *Cell*):

**Document S1. Figures S1–S6, Tables S1 and S2, and supplemental references**

**Table S3. Traces of Edman sequencing of rhBMPs, related to Figure 2**

**Video S1. Stages of cell mitosis, related to Figure 3**

Mitosis is the process by which a cell divides to make two genetically identical cells.

In the example above, the author has uploaded three supplemental files: the primary supplemental PDF (Document S1), one Excel file, and one video. The PDF (Document S1) contains six supplemental figures; the figures as well as their full titles and legends are in the PDF. Also in this PDF are two supplemental tables, which can appear easily in PDF format, and additional references for works cited within the same PDF. One additional table has been uploaded separately as an Excel file. Finally, the author has uploaded a video file, for which a brief legend is included.

**NOTE:** For the journal *Cell* only, supplemental figures are treated just like main figures, with the image files uploaded separately and individually and the titles and legends appearing in this main text file, after the titles and legends for the main figures (see “figure titles and legends” section below). The supplemental figures will be included as part of the main text. If a *Cell* paper has supplemental figures but no other supplemental items, then there is no “Document S1” PDF, and there is no supplemental information index. Otherwise, the index might look like this example:

**Document S1. Tables S1–S5 and supplemental references**

**Table S6. Traces of Edman sequencing of rhBMPs, related to Figure 2**

In the *Cell*-only example above, the author has uploaded two supplemental files: a primary supplemental PDF (Document S1), which contains five supplemental tables and a list of supplemental references, and one larger table as an Excel file. Because they are publishing in *Cell*, any supplemental figures will have been uploaded separately as individual files, and the titles and legends for those supplemental figures will be included in their main-text manuscript.

# FIGURE TITLES AND LEGENDS

Once your article has been accepted for publication, main-text figures must be uploaded separately as high-resolution image files (for complete information, please see the [Cell Press figure guidelines](https://www.cell.com/information-for-authors/figure-guidelines)). Their titles and legends should be included at the end of the editable manuscript (example below). (Note that at initial submission, it is often more useful to include the figures and their legends in the main text near where they are referenced for the ease of your peer reviewers.)

## Figure 1. Concise title, which might re-use the results section subheadings to make the relationship clear, without panel labels, references, or footnotes

The figure legend can be all one paragraph and describe the images (A), graphs (B), and plots (C), etc., together.

(A) Alternatively, each panel or group of panels can be described separately.

(B and C) If panels are grouped like this, please explicitly describe each panel, e.g., “Images showing SEM (B) and TEM (C).”

(D) Errors and scale bar labels should be defined in the legends. Legends should state the statistical test(s) used, and the value of the p values indicated by asterisk(s) in the figure panels should be defined, e.g.: “\**p* < 0.05, \*\**p* < 0.01 by Student’s t test (A, F, and H) or by two-way ANOVA (B and C).” Legends should state the number of biological and technical replicates for each result, e.g.: “*n* = 3 technical replicates from 5 biological replicates for each strain.”

Legends should refer to relevant items in the supplemental information (e.g., "See also Figure S1.").

All figures/schemes must be cited/mentioned in the main text in numerical order (Figure 1 must be cited before Figure 2, which must be cited before Figure 3, etc.).

**NOTE:** For the journal *Cell* only, supplemental figures are treated just like main figures, with the image files uploaded separately and individually and the titles and legends appearing in this main text file, after the titles and legends for the main figures. For all other journals, supplemental figures (image files) along with their titles and legends should appear in the primary supplemental PDF (see “supplemental information” above).

# TABLES AND TEXT BOXES

Use the Microsoft Word Table tool to create all main-text tables. Do not include main-text tables in Excel or PDF format. Avoid the use tabs or spaces to separate one thing from another within a cell, because the text may be run together during typesetting.

Tables should have discrete data in each cell. “N/A," “N/D,” or an en dash (–) can be used to indicate “no data.”

Tables should be in black and white, with no colored text or shading. Bold or italic font may be used for scientific nomenclature, such as numbered chemical compounds; for any other purpose, please use footnotes. Very small, simple, embedded graphics are OK. If your table includes graphics, make sure they have transparent backgrounds.

Tables should be numbered Table 1, Table 2, Table 3, etc., not Table 1A, 1B, etc. All tables must be cited/mentioned in the main text.

## Table 1. Concise title without reference or footnote citations

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| Header 3 | Header 4 |
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Table titles are required, but legends are optional. Use the legend to define any abbreviations that appear in the table.

aTable footnotes should use superscript lowercase letters, beginning with “a,” not numbers or symbols

bIf your table includes reference citations, please write them in the table cells as “Smith et al.1” (not just “1”), “Lee and colleagues2” (not just “2”), etc.

## Box 1. For text boxes, titles are optional

Text boxes are permitted. These boxes must be numbered (Box 1, Box 2, etc.); titles are optional. Please place text boxes after any figures or tables. You do not need to put your text box content in a box or frame; our typesetters will do that. Very small, simple, embedded graphics are OK. If your table includes graphics, make sure they have transparent backgrounds.

# REFERENCES

NOTE: (Journal article) and similar text is solely to identify the reference type in each example below; this is not a part of the actual reference format.

1. *(Journal article)* Sondheimer, N., and Lindquist, S. (2000). Rnq1: an epigenetic modifier of protein function in yeast. Mol. Cell *5*, 163–172.
2. *(Journal article with 10+ authors)* Vanham, D., Leip, A., Galli, A., Kastner, T., Bruckner, M., Uwizeye, A., van Dijk, K., Ercin, E., Dalin, C., Brandão, M., et al. (2019). Environmental footprint family to address local to planetary sustainability and deliver on the SDGs. Sci. Total Environ. 693, 133642.
3. *(Book chapter)* King, S.M. (2003). Dynein motors: Structure, mechanochemistry and regulation. In Molecular Motors, M. Schliwa, ed. (Wiley-VCH Verlag GmbH), pp. 45–78.
4. *(Govt. report or working paper)* Noleppa, S., and Hahn, T. (2013). The value of Neonicotinoid seed treatment in the European Union: a socio-economic, technological and environmental review. HFFA Working Paper 01/2013, Humboldt Forum for Food and Agriculture. http://www.ask-force.org/web/Bees/Noleppa-Value-Neonicotinoid-Seed-Treatment-2013.pdf.
5. *(News article)* Guilford, G. (2013). Half of the rice in Guangzhou is polluted. The Atlantic, May 21, 2013. https://www.theatlantic.com/china/archive/2013/05/half-of-the-rice-in-guangzhouis-polluted/276098/.
6. *(Website)* New York Declaration on Forests Global Platform. https://nydfglobalplatform.org/.
7. *(Preprint)* Carroll, B.W. (2019). The Delicate Dance of Orbital Rendezvouz. Preprint at arXiv, https://doi.org/10.48550/arXiv.1908.02592.
8. *(Software)* R Development Core Team (2008). R: A language and environment for statistical computing (R Foundation for Statistical Computing).
9. *(Data/code repository)* Gerczuk, M. (2023). HyperPersonalisation. Zenodo. https://doi.org/10.5281/zenodo.8328092.

# STAR★METHODS

# KEY RESOURCES TABLE

The items in the key resources table (KRT) must also be reported alongside the description of their use in the method details section. Literature cited within the KRT must be included in the references list. Please **do not edit the headings or add custom headings or subheadings** to the KRT. We highly recommend using [RRIDs](https://scicrunch.org/resources) as the identifier for antibodies and model organisms in the KRT. To create the KRT, please use the template below or the [KRT webform](https://star-methods.com/). See the more detailed [Word table template](http://www.cell.com/pb-assets/journals/research/cell/methods/table-template1.docx) document for examples of how to list items.

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# EXPERIMENTAL MODEL AND STUDY PARTICIPANT DETAILS

Please list here under separate headings all the experimental models/study participants (animals, human participants, plants, microbe strains, cell lines, primary cell cultures) used in the study. For each model, provide information related to their species/strain, genotype, age/developmental stage, sex (and gender, ancestry, race, and ethnicity if reported for human studies), maintenance, and care, including institutional permission and oversight information for the experimental animal/human participant study. The influence (or association) of sex, gender, or both on the results of the study must be reported. In cases where it cannot, authors should discuss this as a limitation to their research’s generalizability.

# METHOD DETAILS

Please provide precise details of all the procedures in the paper (behavioral task, generation of reagents, biological assays, modeling, etc.) such that it is clear how, when, where, and why procedures were performed. We encourage authors to provide information related to the experimental design as suggested by NIH and ARRIVE guidelines (e.g., information about replicates, randomization, blinding, sample size estimation, and the criteria for inclusion and exclusion of any data or subjects).

# QUANTIFICATION AND STATISTICAL ANALYSIS

Please describe here all statistical analysis and software used. We ask authors to indicate in this section where all of the statistical details of experiments can be found (e.g., in the figure legends, figures, results, etc.), including the statistical tests used, exact value of n, what n represents (e.g., number of animals, number of cells, etc.), definition of center, and dispersion and precision measures (e.g., mean, median, SD, SEM, confidence intervals). Also, please summarize in this section how significance was defined, the statistical methods used to determine strategies for randomization and/or stratification, sample size estimation, and inclusion and exclusion of any data or subjects, as well as any methods used to determine whether the data met assumptions of the statistical approach.

# ADDITIONAL RESOURCES

Please provide links to websites that provide further information relevant to the study (e.g., protocol download, troubleshooting forum, etc.). Clinical trial registry numbers and links should also be placed here. Please briefly describe the resource and its relevance for the paper. Please report this information as: “Description: URL.”