

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

- | | | |
|-------------------------------------|-------------------------------------|--|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | The exact sample size (n) for each experimental group/condition, given as a discrete number and unit of measurement |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | The statistical test(s) used AND whether they are one- or two-sided
<i>Only common tests should be described solely by name; describe more complex techniques in the Methods section.</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | A description of all covariates tested |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 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) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | For null hypothesis testing, the test statistic (e.g. F , t , r) with confidence intervals, effect sizes, degrees of freedom and P value noted
<i>Give P values as exact values whenever suitable.</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 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

Data analysis

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](#)

Human research participants

Policy information about [studies involving human research participants and Sex and Gender in Research](#).

Reporting on sex and gender	<input type="text" value="n/a"/>
Population characteristics	<input type="text" value="n/a"/>
Recruitment	<input type="text" value="n/a"/>
Ethics oversight	<input type="text" value="n/a"/>

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

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](https://www.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	<input type="text" value="The sample size is not statistically predetermined. We used a generally accepted sample size based on our past experience. For experiments, a minimum of 3 samples were chosen based on the standard practice of the field."/>
Data exclusions	<input type="text" value="No data was excluded."/>
Replication	<input type="text" value="All data represents at least three independent experiments."/>
Randomization	<input type="text" value="Samples were randomly allocated to experimental groups."/>
Blinding	<input type="text" value="Experiments were blinded where appropriate."/>

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	Included in the study
<input type="checkbox"/>	<input checked="" type="checkbox"/> Antibodies
<input type="checkbox"/>	<input checked="" type="checkbox"/> Eukaryotic cell lines
<input checked="" type="checkbox"/>	<input type="checkbox"/> Palaeontology and archaeology
<input type="checkbox"/>	<input checked="" type="checkbox"/> Animals and other organisms
<input checked="" type="checkbox"/>	<input type="checkbox"/> Clinical data
<input checked="" type="checkbox"/>	<input type="checkbox"/> Dual use research of concern

Methods

n/a	Included in the study
<input checked="" type="checkbox"/>	<input type="checkbox"/> ChIP-seq
<input checked="" type="checkbox"/>	<input type="checkbox"/> Flow cytometry
<input checked="" type="checkbox"/>	<input type="checkbox"/> MRI-based neuroimaging

Antibodies

Antibodies used	<input type="text" value="Primary antibodies:
Cell Signaling Technology
rabbit anti-phospho-PKA substrate (#9624)
mouse anti-Myc-Tag (#9B11)
rabbit anti-HA-Tag (#C29F4)
rabbit anti-RhoA (#2117)
rabbit anti-β-actin (13E5)(#4970)"/>
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rabbit anti-Myc-tag (71D10) (#2278)

Sigma-Aldrich Corporation
 mouse anti- β -actin (#A2228)
 mouse anti-Flag (M2) (#F3165)
 rabbit anti-ZNF185 (#HPA000400)

Santa Cruz
 mouse anti-GAPDH (#sc-32233)

Abcam
 rabbit anti-RhoGDI (#ab133248)

Assay Biotechnology Company
 rabbit anti-ARHGDI (Phospho-Ser174) (#A1189)

Bio-Rad
 rabbit anti-Plectin (#VPA00847)

Secondary antibodies:
 Promega Corporation
 anti-Rabbit IgG (Fc), AP Conjugate (#S3731)
 anti-Mouse IgG (H+L), AP Conjugate (#S3721)

Sigma-Aldrich Corporation
 goat anti-mouse light-chain antibody (#AP200A)

Validation

Antibodies used were all reported and validated by the manufacturer and in the literature.

rabbit anti-phospho-PKA substrate (#9624; Cell Signaling Technology) <https://www.cellsignal.com/products/primary-antibodies/phospho-pka-substrate-rrxs-t-100g7e-rabbit-mab/9624>
 mouse anti-Myc-Tag (#9B11; Cell Signaling Technology) <https://www.cellsignal.jp/products/primary-antibodies/myc-tag-9b11-mouse-mab/2276>
 rabbit anti-HA-Tag (#C29F4; Cell Signaling Technology) <https://www.cellsignal.jp/products/primary-antibodies/ha-tag-c29f4-rabbit-mab/3724>
 rabbit anti-RhoA (#2117; Cell Signaling Technology) <https://www.cellsignal.com/products/primary-antibodies/rhoa-67b9-rabbit-mab/2117>
 rabbit anti- β -actin (#4970; Cell Signaling Technology) <https://www.cellsignal.jp/products/primary-antibodies/b-actin-13e5-rabbit-mab/4970>
 rabbit anti-Myc-tag (71D10) (#2278; Cell Signaling Technology) https://www.cellsignal.jp/products/primary-antibodies/myc-tag-71d10-rabbit-mab/2278?_=1666777409603&Ntt=71d10&tahead=true
 mouse anti- β -actin (#A2228; Sigma-Aldrich Corporation) <https://www.sigmaaldrich.com/JP/ja/product/sigma/a2228>
 mouse anti-Flag (M2) (#F3165; Sigma-Aldrich Corporation) <https://www.sigmaaldrich.com/JP/ja/product/sigma/f3165>
 rabbit anti-ZNF185 (#HPA000400; Sigma-Aldrich Corporation) <https://www.sigmaaldrich.com/JP/ja/product/sigma/hpa000400>
 mouse anti-GAPDH (#sc-32233; Santa Cruz) <https://www.scbt.com/p/gapdh-antibody-6c5>
 rabbit anti-RhoGDI (#ab133248; Abcam) <https://www.abcam.co.jp/rhogdi-antibody-epr3773-ab133248.html>
 rabbit anti-ARHGDI (Phospho-Ser174) (#A1189; Assay Biotechnology Company) <https://www.assaybiotechnology.com/ARHGDI-Phospho-Ser174-Antibody-A1189-WB-IHC-ELISA>
 rabbit anti-Plectin (#VPA00847; Bio-Rad Laboratories) <https://www.bio-rad-antibodies.com/polyclonal/human-plectin-antibody-vpa00847.html?f=purified>
 Anti-Rabbit IgG (Fc), AP Conjugate (#S3731; Promega Corporation) <https://www.promega.jp/products/protein-detection/primary-and-secondary-antibodies/anti-rabbit-igg-fc-ap-conjugate/?catNum=S3731>
 Anti-Mouse IgG (H+L), AP Conjugate (#S3721; Promega Corporation) <https://www.promega.jp/products/protein-detection/primary-and-secondary-antibodies/anti-mouse-igg-h-and-l-ap-conjugate/?catNum=S3721>
 goat anti-mouse light-chain antibody (#AP200A; Sigma-Aldrich) <https://www.sigmaaldrich.com/JP/ja/product/mm/ap200a>

Eukaryotic cell lines

Policy information about [cell lines and Sex and Gender in Research](#)

Cell line source(s)

Human umbilical vein endothelial cells (HUVECs) were obtained from PromoCell, and Human embryonic kidney 293T (HEK293T) cells were obtained from American Type Culture Collection (ATCC).

Authentication

All cell lines were commonly used cell lines purchased from PromoCell and ATCC.

Mycoplasma contamination

All cell lines were negative for mycoplasma contamination.

Commonly misidentified lines
 (See [ICLAC](#) register)

No commonly misidentified cell lines were used.

Animals and other research organisms

Policy information about [studies involving animals](#); [ARRIVE guidelines](#) recommended for reporting animal research, and [Sex and Gender in Research](#)

Laboratory animals	We used genetically modified mice (<i>mus musculus</i>) for this study. All mouse lines have been backcrossed to C57BL/6 background. Male mice were used for experiments.
Wild animals	n/a
Reporting on sex	n/a
Field-collected samples	n/a
Ethics oversight	All animal studies were performed in accordance with the guidelines for animal research of Tokyo Medical and Dental University. The study protocol was approved by the Animal Care and Use Committee of Tokyo Medical and Dental University (approval number: A2021-120C).

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