

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

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

Mass spectrometry raw data generated in this study have been deposited to the ProteomeXchange via the PRIDE partner repository with the dataset identifier PXD052827. All other relevant data supporting the key findings of this study are available within the article, its Supplementary Information, or from the corresponding authors upon reasonable request. Source data are provided in the Source Data file.

Research involving human participants, their data, or biological material

Policy information about studies with [human participants or human data](#). See also policy information about [sex, gender \(identity/presentation\), and sexual orientation](#) and [race, ethnicity and racism](#).

Reporting on sex and gender	n/a
Reporting on race, ethnicity, or other socially relevant groupings	n/a
Population characteristics	n/a
Recruitment	n/a
Ethics oversight	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

Life sciences study design

All studies must disclose on these points even when the disclosure is negative.

Sample size	No sample size calculation in this study.
Data exclusions	No data exclusion in this study.
Replication	All experiments were repeated at least three times and similar results were observed.
Randomization	Mice were randomly assigned to each experimental group in all experiments.
Blinding	The investigators were blinded to group allocation during data collection and analysis.

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
<input checked="" type="checkbox"/>	<input type="checkbox"/> Plants

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

Antibodies were obtained and used as specified: rabbit anti-ARL13B (17711-1-AP, ProteinTech; WB 1:3000, IP 3 µg), rabbit anti-RAB8A (55296-1-AP, ProteinTech; WB 1:1000, IP 3 µg), rabbit anti-CEP131 (25735-1-AP, ProteinTech; WB 1:1000, IP 3 µg), rabbit anti-KIF3A (13930-1-AP, ProteinTech; WB 1:1000, IP 3 µg), rabbit anti-PCM1 (19856-1-AP, ProteinTech; WB 1:8000, IP 3 µg), rabbit anti-LC3 (14600-1-AP, ProteinTech; WB 1:2000, IF 1:500), rabbit anti-p16 (10883-1-AP, ProteinTech; WB 1:4000), mouse anti-ac-

tubulin (T7451, Sigma-Aldrich; IF 1:1000), rabbit anti-pericentrin (ab220784, Abcam, IF 1:2000), rabbit anti- γ -Tubulin (T3559, Sigma-Aldrich; IF 1:1500), mouse anti-CD31 (ab24590, Abcam; IF 1:1000), rabbit anti-CD31 (MA5-29475, Invitrogen; IF 1:100), mouse anti-VE?-cadherin (14-1449-82, Thermo Fisher; IF 1:100), streptavidin HRP (S911, Thermo Fisher), rabbit anti-SCD1 (28678-1-AP, ProteinTech; WB 1:8000), rabbit anti-CHOP (15204-1-AP, ProteinTech; WB 1:1000), rabbit anti-PERK (20582-1-AP, ProteinTech; WB 1:1000), rabbit anti-phospho-PERK (Thr980) (MA5-15033, Thermo Fisher; WB 1:1000), rabbit anti-GAPDH (AB0036, Abways; IB 1:2000), rabbit anti-IgG H+L (Alexa Fluor 568) (ab175471, Abcam; IF 1:1000), mouse anti-IgG H+L (Alexa Fluor 647) (ab150115, Abcam; IF 1:1000), rabbit anti-IgG H+L (Alexa Fluor 647) (ab150075, Abcam; IF 1:1000), mouse anti-IgG H+L (Alexa Fluor 568) (ab175473, Abcam; IF 1:1000), HRP-conjugated goat anti-rabbit IgG (H+L) (SA00001-2, ProteinTech; WB 1:10000), and HRP-conjugated goat anti-mouse IgG (H+L) (SA00001-1, ProteinTech; WB 1:10000).

Validation

All primary antibodies are commercially available and validation results can be found at manufacturer's websites.

Eukaryotic cell lines

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

Cell line source(s)

HUVECs (CRL-1730) and HAECs (CRL-4052) were obtained from the American Type Culture Collection. MAECs were isolated from the thoracic aortas of male mice.

Authentication

HUVECs and HAECs were authenticated by STR profiling. The MAECs were not authenticated.

Mycoplasma contamination

HUVECs, HAECs, and MAECs were tested and found to be mycoplasma-free.

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

No commonly misidentified lines in this study.

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

Ift88fl/fl, Tek-Cre, and ApoE-KO mice in the C57BL/6 background were used. 4~12 weeks-old male mice were used unless otherwise stated.

Wild animals

No wild animals were used.

Reporting on sex

Only male mice were used in the study.

Field-collected samples

No field-collected samples were used.

Ethics oversight

All relevant ethical regulations for animal testing and research have been complied with. All animal procedures were approved by the Animal Ethics Committee of Shandong Normal University.

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

Plants

Seed stocks

n/a

Novel plant genotypes

n/a

Authentication

n/a