nature portfolio

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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	Mass spectrometry data an all information on data collection and analysis we previously reported in Lu et al. Nature Communications 2023. Biorad Image Lab v. 6.0.1 was used for immunoblot data collection. Flow cytometry data were collected with a BD LSR II SORP apparatus. Confocal images were collected with a confocal fluorescence laser scanning Zeiss LSM900 microscope
Data analysis	Mass spectrometry: String: v9.0; DAVID; ToppCluster; Gene Ontology; Cytoscape: v.3.9.1; Western blot: Image Lab: v.6.0.1 build 34; Confocal images: Fiji imageJ: v.2.1.0/1.53c; Statistics: GraphPad Prism 10: Version 10.1.0 (264); Flow cytoimetry FlowJo: v10.9

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

Data reported in Liu et al. Nature Communications, 2023 Supporting data 1. https://doi.org/10.1038/s41467-023-43946-0

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	EBV transformed LCLs were established from PBMCs purchased from the Blood Bank of Karolinska Hospital. Information on sex and gender is not available and is not relevant to the study
Reporting on race, ethnicity, or other socially relevant groupings	Information on sex, race, and ethnicity is not available for anonimous donor and is not relevant to the study
Population characteristics	*Describe the covariate-relevant population characteristics of the human research participants (e.g. age, genotypic information, past and current diagnosis and treatment categories). If you filled out the behavioural & social sciences study design questions and have nothing to add here, write "See above."*
Recruitment	*Describe how participants were recruited. Outline any potential self-selection bias or other biases that may be present and how these are likely to impact results.*
Ethics oversight	*Identify the organization(s) that approved the study protocol.*

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	Data were obtained from repeated independent experiments. Each experiments was repeated between two to five time in order to assess reproducibility and obtain statistical data. The number of independent experiments for each condition is specified in Material and methods and figure legends. No sample size calculation was performed.
Data exclusions	No data were excluded from the analysis
Replication	Each experiments was repeated between two to five time to assure reproducibility.
Randomization	No randomization method was used. However, proper controls were included in each experiment
Blinding	Fluorescence assays were independently assessed by the main investigator and by a collaborator who was blinded to group allocation

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	Involved in the study
☐	☒ Antibodies
☐	☒ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Antibodies

Antibodies used

Mouse monoclonal Anti-β-actin clone AC-15 1:5000 Sigma-Aldrich Cat# A5441, RRID: AB_476744
Mouse monoclonal Anti-GAPDH 1:10000 Millipore Cat#CB1001
Mouse monoclonal anti-tubulin 1:5000 Millipore Cat#CP06
Mouse monoclonal anti-FLAG 1:10000 Sigma-Aldrich Cat# F3165, RRID: AB_259529)
Rabbit polyclone anti-FLAG 1:5000 Sigma-Aldrich Cat#F7425, RRID: AB_439687
Anti-FLAG M2 affinity gel Sigma-Aldrich Cat#A2220 RRID:AB_10063035
Mouse anti-Myc Tag, clone 4A6, agarose conjugate Millipore Cat# 16-219
Rabbit monoclonal Anti-Myc Tag 1:1000 Cell signaling technology Cat#2278
Mouse monoclonal anti-S Tag, 1:2000 Millipore Cat#71549-3 RRID: AB_11210600
Mouse monoclonal anti-HA Tag 1:2000 Sigma-Aldrich Cat# H9658 RRID:AB_260092
S-Protein Agarose Novagen Cat#69704
GammaBind Plus Sepharose Cytiva Cat#17088601
Rabbit IgG isotype control Abcam Cat# ab172730 RRID:AB_2687931
Goat Anti-Rabbit IgG (H+L) Antibody, Alexa Fluor 647 Conjugated 1:1000 Thermo Fisher Scientific Cat#A21245 RRID: AB_141775
Rabbit polyclonal anti-ZNF598 1:1000 Invitrogen Cat# PA559777 RRID: AB_2650226
Rabbit polyclonal anti-LTN1 1:1000 ProteinTech Cat# 28452-1-AP RRID: AB_2881144
Rabbit polyclonal anti-UFL1 1:5000 Bethyl Laboratories Cat# A303-456A, RRID: AB_10951658
Rabbit polyclonal anti-CDK5RAP3 1:3000 ProteinTech Cat#11007-1-AP RRID: AB_2076869
Rabbit polyclonal anti-DDRGK1 1:3000 Thermo Fisher Scientific Cat# PA5-100467 RRID: AB_2849977
Rabbit monoclonal anti-UFC1 1:5000 Abcam Cat#ab189251
Rabbit Monoclonal anti-UFM1 1:3000 Abcam Cat# ab109305, RRID: AB_10864675
Rabbit polyclonal anti-Histone H3 1:2000 Millipore Cat# 07-690
Rabbit monoclonal anti-UFSP2 1:3000 Abcam Cat# ab185965
Rabbit polyclonal anti-SEC63 1:2000 Bethyl Laboratories Cat# A305-084A, RRID: AB_2631479
Mouse monoclonal anti-RPN1 1:1000 Santa Cruz Biotechnology Cat# sc-48367, RRID: AB_628221
Rabbit polyclonal anti-SRPRB 1:2000 Bethyl Laboratories Cat# A305-440A, RRID: AB_2631831
Rabbit polyclonal anti-SRP68 1:2000 Bethyl Laboratories Cat# A303-955A, RRID: AB_2620304
Rabbit monoclonal anti-RPS10 1:2000 Abcam Cat# ab151550 RRID:AB_2714147
Rabbit monoclonal anti-RPS20 1:2000 Abcam Cat# ab133776 RRID:AB_2714148
Rabbit Polyclonal anti-RPL26 1:2000 Abcam Cat# ab59567, RRID: AB_945306
Rabbit polyclonal anti-SEC61B 1:10000 Thermo Fisher Scientific Cat# PA3-015 RRID: AB_2239072
Mouse monoclonal anti-eIF4G1 (Clone 2A9) 1:1000 Abnova Cat# H00001981-M10, RRID: AB_606171
Rabbit anti-CYB5R3 1:2000 ProteinTech Cat# 10894-1-AP RRID:AB_2292715
Rabbit anti-LC3B 1:1000 Sigma-Aldrich Cat#L7543 RRID:AB_796155
Rabbit Polyclonal anti-SUMO2+3 1:1000 Abcam Cat# ab3742
Mouse monoclonal anti-ubiquitin 1:1000 Santa Cruz Cat#sc8017
Rat monoclonal anti-EBV-BPLF1 1:1000 van Gent, et al. 2014 1

Validation

All antibodies were validated by the manufactures and were previously used in peer reviewed work. Methods of validation are provided in the dedicated website pages. Working conditions for each antibody were assessed in preliminary experiments to confirm detection of the expected size product in western blots and immunofluorescence including appropriated positive and negative controls

Eukaryotic cell lines

Policy information about cell lines and Sex and Gender in Research

Cell line source(s)

A list of the cell lines used with source and references is provided in Supporting information Table 2. Established cell lines were commercially purchased (HeLa, HEK293T, U2OS, HCT116 from ATCC). Stable sublines (HEK293T- ZNF598-KO, HEK293T-UFSP2-KO, U2OS-UFSP2-KO, HCT116-EATR, HEK-EBV BPLF1 wt/mut) were produced in house from early passages. EBV immortalized LCLs (LCLwt/cm Tet-on BZLF1) were produced in house from PBMC of anonimus blood bank donors.

Authentication

No further authentication was performed for commercially purchased cell lines

Mycoplasma contamination

All cell lines are mycoplasma free as assessed by regular PCR testing

Commonly misidentified lines (See ICLAC register)	Early passages of validated commercially available HeLa, HEK293T and HCT116 cell were used

Plants

Seed stocks	N/A
Novel plant genotypes	N/A
Authentication	N/A