

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 (<i>n</i>) 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 <i>Only common tests should be described solely by name; describe more complex techniques in the Methods section.</i>
☐	☒ 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. <i>F</i> , <i>t</i> , <i>r</i>) with confidence intervals, effect sizes, degrees of freedom and <i>P</i> value noted <i>Give <i>P</i> values as exact values whenever suitable.</i>
☒	☐ 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 <i>d</i> , Pearson's <i>r</i>), 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	No specific code or software was used to collect the data.
Data analysis	Statistical analyses were performed using GraphPad Prism, RStudio, SCiLS Lab, and MetaboAnalyst 6.0.

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](#)

Source data are provided with this paper.

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	No human subjects were included in this study.
Reporting on race, ethnicity, or other socially relevant groupings	No human subjects were included in this study.
Population characteristics	No human subjects were included in this study.
Recruitment	No human subjects were included in this study.
Ethics oversight	No human subjects were included in this study.

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	No statistical methods were used to select sample size. Each type of experiment requires different number of samples. The number of animals proposed per group was informed by power analyses performed on previously-collected data to generate group sizes that will ensure minimally sufficient statistical power to detect statistically significant different groups.
Data exclusions	No data were excluded from the analyses.
Replication	All experiments have at least 3 independent repeats with reproducible results.
Randomization	No method of randomization was used to assign experimental groups.
Blinding	Experiments were not blinded. However, samples and data were collected in batches for at least 3 completely independent biological replicates to ensure reproducibility.

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	Primary antibodies included: anti-CerS6 (Cat. No. ab115539, Abcam, Cambridge, UK), anti-p21 (Cat. No. 14-6715-81, Thermo Fisher Scientific, Waltham, MA, USA), anti-p53 (Cat. No. 2524S, Cell Signaling Technology, Danvers, MA, USA), anti-p-p53 (Ser20) (Cat. No.
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PA5-104741, Thermo Fisher Scientific, Waltham, MA, USA), anti-p-p53 (Ser15) (Cat. No. 2524S, Cell Signaling Technology, Danvers, MA, USA), and anti-synaptopodin (SYNPO) (Cat. No. sc-515842, Santa Cruz Biotechnology, Dallas, TX, USA).

Validation

All the antibodies were obtained from commercial sources and the lots were validated on the manufacturer websites. Validated lots and corresponding applications in the published literature can be found on the company websites.

Eukaryotic cell lines

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

Cell line source(s)

Immortalized mouse podocyte cell lines were obtained from the laboratory of Dr. Jochen Reiser. the University of Texas Medical Branch. These cell lines were established from the Immortomouse, which carries a thermosensitive variant of the SV 40 as a transgene. T-antigen expression can be stimulated by mouse gamma-interferon (gamma-IFN).

Authentication

Proliferating cells express WT-1 protein (C19 rabbit polyclonal; Santa Cruz) and differentiate within 14 days when grown under non-permissive conditions. Differentiated cells develop prominent processes and express synaptopodin.

Mycoplasma contamination

Cell lines were tested negative for mycoplasma.

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

No cross-contaminated or misidentified cell lines were identified.

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

All marmosets were either born at the University of Texas Health San Antonio or at the Southwest National Primate Research Center (SNPRC) in San Antonio TX. Podocyte-specific CerS6 knockout mice were generated by crossing CerS6-floxed (a gift from Dr. Jens C. Brüning) mice with podocin-Cre (Nphs2-Cre) transgenic mice (Jackson Lab #008205).

Wild animals

No wild animals were used in this study.

Reporting on sex

For marmosets, both sexes were used in these studies. For mice, only male animals were used. Sex information is provided in figure legends.

Field-collected samples

Field-collected samples were not used in the current study.

Ethics oversight

All procedures were performed in accordance with institutional animal care and use committee (IACUC) guidelines of the University of Texas Health San Antonio which complies with the US Public Health Service's Policy on Humane Care and Use of Laboratory Animals and the Guide for the Care and Use of Laboratory Animals and adheres to the American Society of Primatologists principles for the ethical treatment of non-human primates.

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